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General Meeting Information

Registration Badges
Most attendees who register by the advance cut-off date, September 7, will receive their badges and tickets by mail. International attendees will not receive their badges/tickets by mail.

Anyone who registers after September 7 (including international attendees who register anytime) will pick up their badges onsite at the Advance Registration Desk at the Ernest N. Morial Convention and Exhibition Center. Registration hours are: Friday, October 19 through Monday, October 22, 6:30 am-6:00 pm.

Exhibit Hall
Open Saturday through Monday, the Technical Exhibit is a vital educational extension of the conference. Please visit the company’s representatives, including those who have so generously supported our conference!

Exhibit Hall hours:
Saturday • 12:15 pm – 4:00 pm
Ribon Cutting Ceremony: 12:15 pm

Sunday • 10:00 am – 4:00 pm
5:30 pm – 7:00 pm Extended Hours During the President’s Reception

Monday • 10:00 am – 2:00 pm

AAP Section on Urology Business Meeting
The AAP business meeting (members only) will be held on 11:30 am on Sunday. Please attend!
Special Events

Thursday, October 18
The Pediatric Urology Nurse Specialists Welcome Reception will be held on Thursday, October 18, from 6:00 – 9:00 pm in River Room at the Hilton Riverside Hotel. Pediatric Urology Nurses and those interested in joining the Section are invited to attend. The event is supported by Hollister and UROMED.

Saturday, October 20
4:00 – 5:30 pm
Joint Surgery Conference – Anesthesia Neurotoxicity: Are We Poisoning Children’s Brains?
Grand Ballroom A&B (Hilton)

This session will feature international experts discussing the recent studies in infant rodent and nonhuman primates that have found evidence of neurotoxicity after exposure to anesthetic and sedative agents as well as the recent birth cohort studies that have shown a possible association with learning disabilities in children. The session will conclude with an extensive discussion of the implications of these studies on the current practice of anesthesia, procedural sedation, and surgery.

5:30 to 6:30 pm
Pediatric Surgical Specialists Networking Forum
Grand Salons A&B (Hilton),
A reception will be held on Saturday, Oct. 20, across the hall from the Urology Scientific Meeting. Join your fellow surgical specialists for networking and light appetizers and drink immediately following Saturday’s education programming. Table top exhibits will be provided to mingle with our corporate donors. No charge to attendees.

7:00 – 10:30 pm
Section on Urology banquet - National World War II Museum
945 Magazine Street (Entrance on Andrew Higgins Drive)

The Louisiana Memorial Pavilion in the National World War II Museum offers the unique opportunity to dine and mingle surrounded by the workhorses of the World War II era — a restored C-47, Sherman tanks, historic Higgins Boats and more. Banquet guests can stroll through the museum exhibits that tell the story of the war that changed the world — why it was fought, how it was won, and what it means today. All while being serenaded by a 1940s-style musical group that will take you on a
nostalgic musical journey of WWII-era classics. And what is a trip to New Orleans without great food! Catering is provided by James Beard award-winning chef John Besh. This native son grew up in southern Louisiana and celebrates the bounty and traditions of the region. Guest will enjoy tempting food stations and open bar. So take advantage of this unique opportunity to join your friends and colleagues at the Section on Urology banquet, Saturday, October 20, 7:00 – 10:30 pm. Tickets are $100 and can be purchased at the Registration Desk (pending the event has not sold out).

The National World War II Museum is located in the historic Warehouse District, within walking distance of the French Quarter and Convention Center. No buses will be provided.

Enjoy this opportunity to visit the exhibits…and visit with colleagues! Exhibits, dinner, and open bar are included with the $100 admission price. The event is walking/taxi distance from the French Quarter; no buses are provided.

**Supported by Salix Pharmaceuticals**

**Sunday, October 21**

11:25 am  
**Urology Medal Presentation**  
Grand Ballroom A&B (Hilton)

Please join us as we celebrate the career of Edmond Gonzales, MD, FAAP.

11:30 am  
**Section on Urology Business Meeting**  
Grand Ballroom A&B (Hilton)
2012 Program Committee

2012 Program Chairperson:
Patrick H. McKenna, MD, FAAP

2012 Local Arrangements Chairperson
Joseph Ortenberg, MD, FAAP

Basic Science Committee:
Fernando A. Ferrer, MD, FACS, FAAP
Thomas F. Kolon, MD, FAAP
Paul F. Austin, MD, FAAP
Hiep Nguyen, MD, FAAP
Antoine E. Khoury, MD, FAAP
Linda A. Baker, MD, FAAP

Clinical Research Committee:
Douglas A. Canning, MD, FAAP
C. D. Anthony Herndon, MD, FAAP
Patrick C. Cartwright, MD, FAAP
John C. Pope IV, MD, FAAP
Paul A. Merguerian, MD, FAAP
Joao Luiz Pippi-Salle, MD, FAAP

OFFICERS

AAP Section on Urology Executive Committee
Craig A. Peters, MD, FAAP, Chair
William Hulbert, MD, FAAP, Chair-Elect
Saul P. Greenfield, MD, FAAP, Secretary-Treasurer
Douglas A. Canning, MD, FAAP
Gregory E. Dean, MD, FAAP
Israel Franco, MD, FAAP
Patrick H. McKenna, MD, FAAP
Eugene A. Minevich, MD, FAAP
John C. Pope IV, MD, FAAP
Anthony Casale, MD, FAAP Ex Officio Chair

Pediatric Urology Nurses Executive Committee
Cynthia Camille, RN, MSN, CPNP, Chair
Angelique Champeau, RN, PNP, Chair-elect
Christine Danielson, ARNP
Anne Boisclair-Fahey, RN, CPNP
Joanna Maynard, RN, MSN, CPNP
Natalie Plachter, RN, MSN, CPNP
Dalia Spisak, RN, MSN, CNP, CNS
Shelly King, RN, MSN, CPNP, Education Liaison
Valre Welch, MSN, CPNP, Education Liaison
Carla Garwood, RN, Ex Officio Chairperson
AAP Section Representatives
American Board of Urology Representative: Michael Ritchey, MD
American College of Surgeons Regents: Howard Snyder, MD
American College of Surgeons Board of Governors:
   Anthony Atala, MD
Journal of Urology: Michael Ritchey, MD
Program Directors: Lane Palmer, MD
Urology Fellow Representatives: and Abhishek Seth (Sr. representative) and Emilie Johnson (Jr. representative)
Pediatric Urology Advisory Committee to the Board on Urology: Tony Caldamone, MD

AAP Section Committee Members and Chairpersons
Education Chairman: Earl Cheng, MD
Membership Chairman: Mark Adams, MD
2012 Nominating Committee: Steven Skoog, Craig Peters, Martin Kaefer
2012 Medal Committee: Steven Skoog, Craig Peters, C.D. Anthony Herndon
2013 Nominating Committee: Anthony Casale, William Hulbert, Douglas Canning
2013 Medal Committee: Anthony Casale, William Hulbert, open

AAP Action Committee Chairpersons
Credentialing Task Force: Saul Greenfield, MD
International Committee: Ken Glassberg, MD
Oncology Committee: Jonathan Ross, MD
PISCE and PSCE Exams: Douglas Husmann, MD
Research Council: Barry Kogan, MD
Research Funding: Saul Greenfield, MD
Socioeconomic committee: Howard Snyder, MD
Unified Coding Committee: David Ewalt, MD, and Howard Snyder, MD
Website Editor: David Joseph, MD
International Pediatric Endosurgery Group (IPEG): Martin Koyle, MD
AAP Past Officers
Chairpersons, Committee on Urology
John K. Lattimer .....................................................1960-69
Lowell R. King .....................................................1969-72

Chairpersons, AAP Section on Urology
Alan D. Perlmutter ................................................1972-76
Panayotis P. Kelalis ...............................................1976-78
John W. Duckett, Jr. ............................................1979-81
Robert D. Jeffs ...................................................1981-82
R. Dixon Walker ..................................................1982-83
Alan B. Retik .......................................................1983-84
Terry D. Allen .....................................................1984-85
George W. Kaplan .............................................1985-86
Frank Hinman, Jr. ................................................1986-87
John R. Woodard ................................................1987-88
A. Barry Belman ..................................................1988-89
David T. Mininberg .............................................1989-90
Edward S. Tank, Jr. .............................................1990-91
Casimir F. Filit ...................................................1992-93
Richard M. Ehrlich .............................................1993-94
Stuart B. Bauer ...................................................1994-95
Robert Kay ..........................................................1995-96
Kenneth Glassberg .............................................1996-97
Evans Kass .........................................................1997-98
Ronald Rabinowitz ............................................1999-00
H. Gil Rushton ....................................................2000-01
David Bloom ......................................................2001-02
Michael Mitchell ................................................2002-03
Richard Rink .......................................................2003-04
Barry Kogan .......................................................2004-05
Brent Snow ........................................................2005-06
Michael Ritchey ..................................................2006-07
Linda Shortliffe ..................................................2007-08
Mark Zaontz .......................................................2008-09
Steven Skoog ......................................................2009-10
Anthony Casale ..................................................2010-11
Craig Peters .......................................................2011-12

Secretaries, AAP Section on Urology
Lowell R. King ....................................................1972-75
John W. Duckett, Jr. ............................................1976-79
R. Dixon Walker ..................................................1979-81
George W. Kaplan .............................................1982-84
A. Barry Belman ..................................................1984-87
Edmond T. Gonzales, Jr. ......................................1987-90
Stuart B. Bauer ...................................................1990-93
Evan J. Kass .........................................................1993-96
H. Gil Rushton ....................................................1996-99
Richard Rink .......................................................1999-02
Michael Ritchey ..................................................2002-05
Steven Skoog .......................................................2005-08
William Hulbert ................................................2008-11
Saul Greenfield ...................................................2011-14
Presidents, AAP Section on Urology
John P. Smith ........................................................... 1972
Willard Goodwin .................................................... 1973
John K. Lattimer ........................................................ 1974
Foster Fuqua ........................................................... 1975
Thomas H. Guthrie ..................................................... 1976
Keith Waterhouse ..................................................... 1977
Alan D. Perlmutter ...................................................... 1978
Panayotis P. Kelalis (Office Discontinued) .................. 1979

Pediatric Urology Medal Recipients
Harry M. Spence ...................................................... 1984
Sir David I. Williams ................................................ 1985
F. Douglas Stephens .................................................. 1986
John K. Lattimer ........................................................ 1987
J. Herbert Johnston .................................................... 1988
Jack Lapides ............................................................ 1989
Frank Hinman, Jr. ....................................................... 1990
Lowell R. King .......................................................... 1992
W. Hardy Hendren, III ............................................... 1993
Alan B. Retik ............................................................ 1994
Victor A. Politano ...................................................... 1995
Panayotis Kelalis ........................................................ 1996
Alan D. Perlmutter ...................................................... 1997
John W. Duckett, Jr. .................................................... 1998
Robert Jeffs ............................................................... 1999
John Woodard .......................................................... 2000
Philip G. Ransley ........................................................ 2001
Terry D. Allen ............................................................. 2002
Barry O’Donnell .......................................................... 2003
Rudolf Hohenfellner .................................................... 2004
Dixon Walker .............................................................. 2005
A. Barry Belman ........................................................ 2006
George W. Kaplan ...................................................... 2007
Michael E. Mitchell ..................................................... 2008
Bernard M. Churchill ................................................ 2009
Stephen A. Koff .......................................................... 2010
Stuart B. Bauer ........................................................... 2012
Edmond T. Gonzales ................................................... 2013
2012 UROLOGY MEDALIST

Edmond T. Gonzales, MD, FAAP

Please join us in celebrating the career of Dr Edmond Gonzales, when he receives the Urology Medal at 11:25 am on Sunday, October 21, 2012. The Urology Medal is given to an individual who has made outstanding contributions to the field of Pediatric Urology.

Dr. Gonzales received his medical degree from Tulane, completed Urology residency at Duke, and pursued additional training in Pediatric Urology at the Children’s Hospital of Michigan. In 1974, he joined the faculty at Baylor and Texas Children’s Hospital in Houston as Chief of the Urology Service. For many years he served as Head, Department of Surgery and, in 2008, became the first Surgeon-in-Chief at TCH.

He has served as secretary and chairman of the Urology Section, AAP and was the inaugural chair of the Surgical Action Committee of the Council of Sections. He has also served as president of the Society of Pediatric Urology.

Dr. Gonzales was committed early in his career to work toward establishing formal, structured training programs in Pediatric Urology. He was involved in the earliest discussions toward that end and served for 20 years as chair of the Pediatric Urology Fellowship Committee.
2013 Distinguished Guest Lecturers

**American Urological Association Guest Lecture**

*Karen Moore, APR, CPRC*
Choosing the Best Digital Media Strategies for your Practice
Saturday, October 20, 10:45 AM

**AAP Lattimer Lecture**

*Ralph V. Clayman, MD*
Innovations in Medical Education: The Changing Tide of Resident (Surgical) Training
Saturday, October 20, 2:25 pm

**AAP Guest Lecture**

*Tim Moran, CEO, Pediaworks*
Innovative Products for Pediatric Surgery
Sunday, October 21, 10:25 am
AAP BASIC SCIENCE PRIZE FINALISTS

Research presented on Saturday, October 20, in Session 3 and Session 4. Prizes are sponsored by the American Association of Pediatric Urology (AAPU), and will be awarded at 4:40 pm on Sunday, October 21.

BASIC SCIENCE FINALISTS (SESSION 3)

5) 9:45 AM
The Bladder Has Got Rhythm: Involvement of Bladder Circadian Clock and Connexin43 in the Coordination of Diurnal Micturition Rhythm
Hiromitsu Negoro1, Akihiro Kanematsu2, Masao Doi3, Sylvia O. Suadicani4, Takeshi Okinami1, Nobuyuki Nishikawa1, Hitoshi Okamura3, Yasuhiko Tabata5 and Osamu Ogawa1, (1)Department of Urology, Graduate School of Medicine, Kyoto University, Kyoto, Japan, (2)Department of Urology, Hyogo College of Medicine, Nishinomiya, Japan, (3)Department of Systems Biology, Graduate School of Pharmaceutical Sciences, Kyoto University, (4)Department of Urology, Albert Einstein College of Medicine, (5)Department of Biomaterials, Institute for Frontier Medical Sciences, Kyoto University

6) 9:51 AM
Development of Liposomal and Polymer-Based Nanoparticles for the Intravesical Delivery of Oxybutynin
Brian M. Rosman, MD1, Mayura Wagle2, Gerard D’Souza, PhD2 and Hiep T. Nguyen, MD, FAAP3, (1)Department of Urology, Children’s Hospital Boston, Boston, MA, (2) Massachusetts College Of Pharmacy and Health Sciences, Boston, MA

7) 9:57 AM
Inflammatory Response to Escherichia Coli Urinary Tract Infection in the Neurogenic Bladder of the Spinal Cord-Injured Host
Rajeev Chaudhry1, Zarine Balsara1, Yuping Tang1, Unwana Nseyo1, John S. Wiener1, Sherry S. Ross1 and Patrick Seed3, (1)Division of Urology, Duke University Medical Center, Durham, NC, (2)Department of Pediatrics, Duke University Medical Center, (3)Department of Pediatrics, Duke University Medical Center, Durham, NC

8) 10:03 AM
Social Stress in Mice Induces Overactive Bladder with Upregulation of Nerve Growth Factor
Gerald Mingin Jr., MD, Surgery/Urology, Vermont Children’s Hospital, Burlington, VT
9) 10:09 AM
Chronic Cyclic Bladder Over-Distension Upregulates Hypoxia-Dependent Pathways
Heidi A. Penn, MD¹, Stacy T. Tanaka, MD¹, Mariana M. Cajaiba, MD², John C. Thomas, MD¹, John C. Pope IV, MD¹, Mark C. Adams, MD¹, John W. Brock III, MD¹ and Douglass B. Clayton, MD¹, (1) Division of Pediatric Urology, Monroe Carell Jr. Children’s Hospital at Vanderbilt, Nashville, TN, (2) Department of Pathology, Vanderbilt University, Nashville, TN

10) 10:15 AM
Physiologic Relevance of LL-37 Induced Bladder Inflammation and Mast Cells
Siam Oottamasathien, MD¹, Wanjian Jia, MD, PhD¹, Lindsi McCoard, BS¹, Jianxing Zhang, PhD², Li Wang, MS¹, Xiangyang Ye, MS³, A. Cameron Hill², Justin Savage, PhD², Wong Yong Lee, DVM, PhD², AnnMarie Hannon, MSN¹, Sylvia Milner, BSN¹ and Glenn D. Prestwich, PhD², (1) Urology, University of Utah, Salt Lake City, UT, (2) Medicinal Chemistry, University of Utah, Salt Lake City, UT, (3) Pharmacology, University of Utah, Salt Lake City, UT

11) 10:21 AM
Epigenetic Mechanisms Direct Estrogen-Induced Downregulation of Gene Expression and Cell Biological Processes Critical for Genital Tubercle Formation
Karen J. Aitken, BSc, PhD¹, Jiaxin Jiang¹, Matthew Bechbache, BSc, (pending)¹, Tyler Kirwan¹, Sevan Hopyan, MD, PhD, FRCPSC² and Darius Bagli³, (1) Developmental and Stem Cell Biology, Urology, Hospital for Sick Children, Toronto, ON, Canada, (2) Developmental and Stem Cell Biology, Research Institute; Orthopaedic Surgery, Department of Surgery, Hospital for Sick Children, Toronto, ON, Canada, (3) Division of Urology, Surgery; Developmental and Stem Cell Biology, Research Institute, Hospital for Sick Children, Toronto, ON, Canada
12) 11:15 AM

Genito-Urinary Second Malignant Neoplasms In Survivors of Childhood Cancer: A Report from the Childhood Cancer Survivor Study
Margaret Shnorrhavorian, MD, MPH, Wendy Leisenring, ScD, Pamela Goodman, MS, Debra L. Friedman, MD, MS, Marilyn Stovall, MD, Lillian Meacham, MD, Eric Chow, MD, Charles Sklar, MD, Lisa Diller, MD, Fernando A. Ferrer Jr, MD, FAAP, Greg Armstrong, MD, Joseph Neglia, MD, MPH and Leslie Robison, PhD

13) 11:21 AM

Nebulization of Bupivicaine Intra-Abdominally Reduces Post-Operative Shoulder Pain and Opioid Use In Children Undergoing Robotic-Assisted Urologic Surgery

14) 11:27 AM

Kinetic and Kinematic Evaluation of Walking Joints in Bladder Exstrophy Patients with and without Osteotomy
Antonio Zaccara, Armando Marciano, Maurizio Petrarca, Giovanni Mosiello, Maria Luisa Capitanucci, Mario DE Gennaro, Paolo Caione, Sacha Carniel, Gessica Della Bella, Ivan Aloi and Enrico Castelli
15) 11:33 AM

**Histology of Testicular Biopsy Specimens Obtained for Cryopreservation and Future Re-Implantation as a Fertility-Preserving Technique**

Eugene J. Pietzak III, MD¹, Gregory E. Tasian, MD, MSc², Sarah K. Tasian, MD³, Ralph L. Brinster, VMD, PhD⁴, Claire Carlson, RN, BSN⁵, Jill P. Ginsberg, MD⁴ and Thomas F. Kolon, MD, FAAP⁶

(1) Urology, Hospital of the University of Pennsylvania, Philadelphia, PA, (2) John W. Duckett Center for Pediatric Urology, Children’s Hospital of Philadelphia, Philadelphia, PA, (3) Oncology, Children’s Hospital of Philadelphia, Philadelphia, PA, (4) University of Pennsylvania School of Veterinary Medicine, Philadelphia, PA, (5) Cancer Survivorship Program, Children’s Hospital of Philadelphia, Philadelphia, PA

16) 11:39 AM

**Utility of Initial Renal Ultrasound in Finding Vesicoureteral Reflux in Children Who Present with Febrile Urinary Tract Infection: Single Institutional Experience**

Eric Z. Massanyi, MD¹, Janae Preece, MD², Susan M. Lin³, Angela Gupta, MD¹ and Ming-Hsien Wang, MD¹

(1) Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2) Division of Urology, University of Maryland Medical Center, Baltimore, MD, (3) Johns Hopkins School of Medicine, Baltimore, MD

17) 11:45 AM

**Urethral Strictures Following Urethral Plate and Proximal Urethral Elevation during Proximal TIP Hypospadias Repair**

Warren T. Snodgrass, MD, Candace F. Granberg, MD and Nicol Corbin Bush, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX

18) 11:51 AM

**Management of the Retroperitoneum in Children and Adolescents with Malignant Germ Cell Tumors of the Testis**

Jonathan H. Ross, MD, FAAP¹, Deborah Billmire, MD, FAAP², Frederick J. Rescorla, MD, FAAP³, Thomas A. Olson, MD³, Marc G. Schlatter, MD, FACS⁴, A. Lindsay Frazier, MD, ScM⁵

(1) Pediatric Urology, University Hospitals Rainbow Babies and Children’s Hospital, Cleveland, OH, (2) Pediatric Surgery, JW Riley Hospital for Children, Indianapolis, IN, (3) Pediatric Hematology/Oncology, Emory University School of Medicine, Atlanta, GA, (4) Pediatric Surgery, Helen DeVos Children’s Hospital, Grand Rapids, MI, (5) Pediatric Hematology/Oncology, Dana-Farber Cancer Institute, Boston, MA
THURSDAY, OCTOBER 18, 2012
Pediatric Urology Nurse Specialists (PUNS) Reception
Hilton Riverside New Orleans Hotel, River Room

6:00 – 9:00 PM  
PUNS Welcome Reception and Program  
Supported by Hollister and UroMed  
Reception for Pediatric Urology Nurses and nurses interested in joining the Section

FRIDAY, OCTOBER 19, 2012
Pediatric Urology Nurse Specialists (PUNS) Educational Program
Session # H0005  
Ernest Morial Convention Center, Room 208-209

7:50 AM  
Welcome Introduction: Cindy Camille, MSN, FNP, CPNP, Chair

8:00 AM  
Evaluation and Management of Urinary Tract Infections and Vescicoureteral Reflux in Children: Guidelines and More:  
Ranjiv Mathews, MD, FAAP

9:00 AM  
Management of the Pediatric Neurogenic Bowel and Bladder:  
Jean Brown, MS, APRN

10:00 AM  
Break

Abstract Presentations

10:15 AM  
Cecostomy Button with Concomittant Lower Urinary Tract Reconstruction for Continent Enema  
Cheryl G. Baxter, RN, CNP, Section of Pediatric Urology, Nationwide Children’s Hospital, Columbus, OH

10:22 AM  
To Study the Factors That Are Associated with SB Patients On CIC Developing UTI  
Cheryl G. Baxter, RN, CNP and Kristina Booth, Section of Pediatric Urology, Nationwide Children’s Hospital, Columbus, OH
10:29 AM  **Urine Cultures Obtained At the Time of Urodynamic Studies: Clinically Useful?**
Theresa Meyer, BSN, MS, CPN and Melanie Mitchell, BSN, RNFA, Urology, Children's Memorial Hospital, Chicago, IL

10:36 AM  **Single Centre Experience with Transdermal Oxybutynin Patch for Overactive Bladder In Children**
Catherine Daniels, RN(EC), MS, NP-Paediatrics, Abby Varghese, RN, (EC), NP-PHC, Katharine Williams, RN(EC), MN, NP-Paediatrics, Darius J. Bagli, MD, Walid A. Farhat, MD, Martin A. Koyle, MD, Joao L. Pippi Salle, MD and Armando J. Lorenzo, MD, Hospital for Sick Children, Department of Urology, Toronto, ON, Canada

10:43 AM  **Sensory Processing Differences and Urinary Incontinence In School Aged Children**
Emily T. Cupelli, DNP, RN1, Lori Escallier, RN, PhD1, Nora Galambos, PhD1, Shaolan Xiang, BA1 and Israel Franco, FACS, FAAP2, (1)Pediatric Urology, Stony Brook University & Maimonides Medical Center, Brooklyn, NY, (2)Pediatric Urology, New York Medical College, Valhalla, NY

10:50 AM  **Pediatric Urology Perioperative Improvement (PUPPI) Project**
Sue M. Hadden, BSN, RN1, Kate H. Kraft, MD2, David A. Bloom, MD2, Carla K. Garwood, RN1, Vesna Ivancic2, Sandy Ratliff-Ahmed, RN, BSN1, Julian Wan, MD2 and John M. Park, MD2, (1) Pediatric Urology, University of Michigan Health System, CS Mott Children’s Hospital, Ann Arbor, MI, (2)Urology, University of Michigan, Ann Arbor, MI

10:57 AM  **Discussion**

11:15 AM  **Current Trends**
- **Update on Activities in PUNS Special Interest Groups**
  - Urodynamics (AnnMarie Hannon, MSN, CPNP)
  - Biofeedback (Marlo Eldridge, MSN, CPNP)
  - Educating the School Health Educators (AnnMarie Berger Finley, MSN, FNP)
• Establishing Group Visits in Pediatric Urology: 
  Christine Danielson, ARNP
• The Impact of Adaptive Sports on People with Disabilities: 
  Ashley Thomas

12:15 PM  Lunch – at Mulate’s Party Hall (743 Convention Center Blvd) 
  Supported by Salix Pharmaceuticals

1:30 PM  Pediatric Uroradiology: How, What, Why, When?  
  John Wiener, MD, FAAP and Ana Gaca, MD

2:30 PM  Urology Nursing Practice (breakout sessions to run concurrently) 
  • Bowel- Bladder Dysfunction: 
    Anne Arnhym, CPNP
  • Research and Evidence Based Practice: Finding the On-Ramp: 
    Amanda Berry, NP

3:30 PM  Break

3:45 PM  Obstructive Uropathy: 
  Karla Giramonti, MS, FNP

4:45 PM  Meeting Wrap-up/Adjourn

SATURDAY, OCTOBER 20, 2012
Urology Scientific Meeting and Abstract Presentations
Session # H1016
Grand Ballroom A&B, Hilton Riverside
New Orleans Hotel

7:30 AM  Welcome and Introduction

7:35 AM  Live Robotic Surgery – Ureteral Reimplantation 
  Distant Moderator: Mohan S. Gundeti, MD, MB, MCh, FEBU, FRCS, FEAPU 
  Local Moderator: Christina Kim, MD, FAAP 
  Supported by Intuitive Surgical

9:15 AM  SESSION 1: NOCTURNAL ENURESIS 
  Moderators: Pamela I. Ellsworth, MD, FAAP, Eugene A. Minevich, MD, FAAP
1) 9:15 AM  
**Lower Health-Related Quality of Life and Psychosocial Difficulties In Children with Nocturnal Enuresis: Is Snoring a Marker of Severity?**  
Cortney Wolfe-Christensen, PhD, Larisa Kovacevic, MD, FAAP, Jelena D. Mirkovic, MD and Yegappan Lakshmanan, MD, FAAP, Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI

2) 9:21 AM  
**Management of Monosymptomatic Nocturnal Enuresis: American versus European Prospectives**  
Larisa Kovacevic, MD, FAAP, Cortney Wolfe-Christensen, PhD, Fe Consolacion and Yegappan Lakshmanan, MD, FAAP, Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI

9:27 AM  
**SESSION 2: TRAUMA**  
Moderators: Douglas A. Husmann, MD, FAAP, Martin A. Koyle, MD, FAAP

3) 9:27 AM  
**Pediatric Genital Injury: An Analysis of the National Electronic Injury Surveillance System**  
Jessica T. Casey, MS, MD1, Marc A. Bjurlin, DO2 and Earl Y. Cheng, MD, FAAP1, (1)Division of Urology, Children’s Memorial Hospital, Chicago, IL, (2)Division of Urology, Department of Surgery, Cook County Hospital, Cook County Health and Hospitals System, Chicago, IL

4) 9:33 AM  
**The Utility of Initial and Follow-up Ultrasound Reevaluation for Blunt Renal Trauma in Children and Adolescents**  
Stephen J. Canon, MD1, John Recicar2, Christopher J. Sweaingten, PhD3, Robert T. Maxson2, Leann E. Linam, MD4, (1) Urology, University of Arkansas for Medical Sciences, Little Rock, AR, (2) Surgery, Arkansas Children’s Hospital, Little Rock, AR, (3) Pediatrics--Biostatistics, University of Arkansas for Medical Sciences. Arkansas Children’s Hospital, Little Rock, AR, MD, and (4) Radiology, University of Arkansas for Medical Sciences, Little Rock, AR

9:39 AM  
**DISCUSSION**
SESSION 3: BASIC SCIENCE FINALISTS
Moderators: Darius J. Bagli, MD, FAAP, Linda A. Baker, MD, FAAP

5) 9:45 AM
The Bladder Has Got Rhythm: Involvement of Bladder Circadian Clock and Connexin43 in the Coordination of Diurnal Micturition Rhythm
Hiromitsu Negoro1, Akihiro Kanematsu2, Masao Doi3, Sylvia O. Suadicani4, Masaaki Imamura1, Takeshi Okinami1, Nobuyuki Nishikawa1, Hitoshi Okamura3, Yasuhiko Tabata2 and Osamu Ogawa1, (1)Department of Urology, Graduate School of Medicine, Kyoto University, Kyoto, Japan, (2)Department of Urology, Hyogo College of Medicine, Nishinomiya, Japan, (3)Department of Systems Biology, Graduate School of Pharmaceutical Sciences, Kyoto University, (4)Department of Urology, Albert Einstein College of Medicine, (5)Department of Biomaterials, Institute for Frontier Medical Sciences, Kyoto University

6) 9:51 AM
Development of Liposomal and Polymer-Based Nanoparticles for the Intravesical Delivery of Oxybutynin
Brian M. Rosman, MD1, Mayura Wagle2, Gerard D’Souza, PhD2 and Hiep T. Nguyen, MD, FAAP3, (1)Department of Urology, Children's Hospital Boston, Boston, MA, (2)Massachusetts College Of Pharmacy and Health Sciences, Boston, MA

7) 9:57 AM
Inflammatory Response to Escherichia Coli Urinary Tract Infection in the Neurogenic Bladder of the Spinal Cord-Injured Host
Rajeev Chaudhry1, Zarine Balsara1, Yuping Tang2, Unwana Nseyo1, John S. Wiener1, Sherry S. Ross1 and Patrick See2, (1)Division of Urology, (2)Department of Pediatrics, Duke University Medical Center, Durham, NC

8) 10:03 AM
Social Stress in Mice Induces Overactive Bladder with Upregulation of Nerve Growth Factor
Gerald Mingin Jr., MD, Surgery/Urology, Vermont Children's Hospital, Burlington, VT
9) 10:09 AM  Chronic Cyclic Bladder Over-Distension Upregulates Hypoxia-Dependent Pathways  Heidi A. Penn, MD, Stacy T. Tanaka, MD, Mariana M. Cajaiba, MD, John C. Thomas, MD, John C. Pope IV, MD, Mark C. Adams, MD, John W. Brock III, MD and Douglass B. Clayton, MD, (1) Division of Pediatric Urology, Monroe Carell Jr. Children’s Hospital at Vanderbilt, Nashville, TN, (2) Department of Pathology, Vanderbilt University, Nashville, TN

10) 10:15 AM  Physiologic Relevance of LL-37 Induced Bladder Inflammation and Mast Cells  Siam Oottamasathien, MD, Wanjian Jia, MD, PhD, Lindsi McCoard, BS, Jianxing Zhang, PhD, Li Wang, MS, Xiangyang Ye, MS, A. Cameron Hill, Justin Savage, PhD, Wong Yong Lee, DVM, PhD, AnnMarie Hannon, MSN, Sylvia Milner, BSN and Glenn D. Prestwich, PhD, (1) Urology, University of Utah, (2) Medicinal Chemistry, University of Utah, (3) Pharmacology, University of Utah, Salt Lake City, UT

11) 10:21 AM  Epigenetic Mechanisms Direct Estrogen-Induced Downregulation of Gene Expression and Cell Biological Processes Critical for Genital Tubercle Formation  Karen J. Aitken, BSc, PhD, Jiaxin Jiang, Matthew Bechbache, BSc, (pending), Tyler Kirwan, Sevan Hopyan, MD, PhD, FRCS and Darius Baghi, (1) Developmental and Stem Cell Biology, Urology, Hospital for Sick Children, (2) Developmental and Stem Cell Biology, Research Institute; Orthopaedic Surgery, Department of Surgery, Hospital for Sick Children, (3) Division of Urology, Surgery; Developmental and Stem Cell Biology, Research Institute, Hospital for Sick Children, Toronto, ON, Canada

10:27 AM DIscussion

10:37 AM BREAK/POSTER VIEWING
10:45 AM  
**AUA Guest Lecture -- Karen Moore, APR, CPRC**  
Choosing the Best Digital Media Strategies for your Practice  

**Supported by the American Urological Association**

11:15 AM  
**SESSION 4: CLINICAL PRIZE FINALISTS**  
Moderators: Anthony A. Caldamone, MD, FAAP, Douglas A. Canning, MD, FAAP

12) 11:15 AM  
**Genito-Urinary Second Malignant Neoplasms In Survivors of Childhood Cancer: A Report from the Childhood Cancer Survivor Study**  
Margarett Shnorhavorian, MD, MPH1, Wendy Leisenring, ScD2, Pamela Goodman, MS3, Debra L. Friedman, MD, MS3, Marilyn Stovall, MD4, Lillian Meacham, MD5, Eric Chow, MD6, Charles Sklar, MD7, Lisa Diller, MD8, Fernando A. Ferrer Jr., MD, FAAP9, Greg Armstrong, MD10, Joseph Neglia, MD, MPH11 and Leslie Robison, PhD10, (1)Urology, Seattle Children Hospital, Seattle, WA, (2)Clinical Statistics and Cancer Prevention Programs, Fred Hutchinson Cancer Research Center, Seattle, WA, (3)Pediatric Oncology, Vanderbilt Ingram Cancer Center, Nashville, TN, (4)Department of Radiation Physics, The University of Texas MD Anderson Cancer Center, Houston, TX, (5)Department of Pediatrics, Emory University School of Medicine, Atlanta, GA, (6)Department of Pediatrics, University of Washington, Seattle, WA, (7)Department of Pediatrics, Memorial Sloan-Kettering Cancer Center, New York, NY, (8)Department of Pediatric Oncology, Dana Farber Cancer Institute, Boston, MA, (9)Division of Urology, Connecticut Children’s Medical Center, Hartford, CT, (10)Department of Epidemiology and Cancer Control, St. Jude Children’s Research Hospital, Memphis, TN, (11) Department of Pediatrics, University of Minnesota
13) 11:21 AM  Nebulization of Bupivicaine Intra-Abdominally Reduces Post-Operative Shoulder Pain and Opioid Use In Children Undergoing Robotic-Assisted Urologic Surgery
Lorenzo F. M. Trevisani¹, Constance S. Houck², Gustavo N.C. Inoue³, Brian M. Rosman³, Petra M. Meier², Carlos Munoz-San Julian⁴, Courtney K. Rowe³, Vitor C. Zanetta¹, Hiep T. Nguyen¹ and Carlo C. Passerotti³, (1)Urology, Children’s Hospital Boston, Boston, MA, (2)Anesthesiology, Children’s Hospital Boston, Boston, MA, (3)Urology, UNINOVE, São Paulo, Brazil

14) 11:27 AM  Kinetic and Kinematic Evaluation of Walking Joints in Bladder Exstrophy Patients with and without Osteotomy
Antonio Zaccara¹, Armando Marciano¹, Maurizio Petraca², Giovanni Mosiello¹, Maria Luisa Capitanucci¹, Mario DE Gennaro¹, Paolo Caione¹, Sacha Carniel², Gessica Della Bella², Ivan Aloi¹ and Enrico Castelli³, (1)Urology, Bambino Gesu’ Children’s Hospital, Rome, Italy, (2)Movement Analysis and Robotic Laboratory, Pediatric Neurorehabilitation Division, Bambino Gesu’ Children’s Hospital, Rome, Italy, (3)Pediatric Neurorehabilitation Division, Bambino Gesu’ Children’s Hospital, Rome, Italy

15) 11:33 AM  Histology of Testicular Biopsy Specimens Obtained for Cryopreservation and Future Re-Implantation as a Fertility-Preserving Technique
Eugene J. Pietzak III, MD¹, Gregory E. Tasian, MD, MSc², Sarah K. Tasian, MD³, Ralph L. Brinster, VMD, PhD⁴, Claire Carlson, RN, BSN⁵, Jill P. Ginsberg, MD⁶ and Thomas F. Kolon, MD, FAAP⁷, (1) Urology, Hospital of the University of Pennsylvania, Philadelphia, PA, (2)John W. Duckett Center for Pediatric Urology, Children’s Hospital of Philadelphia, Philadelphia, PA, (3)Oncology, Children’s Hospital of Philadelphia, Philadelphia, PA, (4)University of Pennsylvania School of Veterinary Medicine, Philadelphia, PA, (5) Cancer Survivorship Program, Children’s Hospital of Philadelphia, Philadelphia, PA
Eric Z. Massanyi, MD, Janae Preece, MD, Susan M. Lin, Angela Gupta, MD and Ming-Hsien Wang, MD, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)Division of Urology, University of Maryland Medical Center, Baltimore, MD, (3)Johns Hopkins School of Medicine, Baltimore, MD

Urethral Strictures Following Urethral Plate and Proximal Urethral Elevation during Proximal TIP Hypospadias Repair
Warren T. Snodgrass, MD, Candace F. Granberg, MD and Nicol Corbin Bush, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX

Management of the Retroperitoneum in Children and Adolescents with Malignant Germ Cell Tumors of the Testis
Jonathan H. Ross, MD, FAAP, Deborah Billmire, MD, FAAP, Frederick J. Rescorla, MD, FAAP, Thomas A. Olson, MD, Marc G. Schlatter, MD, FACS, A. Lindsay Frazier, MD, ScM, (1) Pediatric Urology, University Hospitals Rainbow Babies and Children’s Hospital, Cleveland, OH, (2)Pediatric Surgery, JW Riley Hospital for Children, Indianapolis, IN, (3) Pediatric Hematology/Oncology, Emory University School of Medicine, Atlanta, GA, (4)Pediatric Surgery, Helen DeVos Children’s Hospital, Grand Rapids, MI, (5) Pediatric Hematology/Oncology, Dana-Farber Cancer Institute, Boston, MA

DISCUSSION

SESSION 5: EDUCATION
Moderators: Barry A. Kogan, MD, FAAP, Rama Jayanthi, MD, FAAP
19) 12:10 PM  
Training for Prenatal Consultation for “Pyelectasis” – E-Learning Improves Concordance In Clinical Practices  
Max Maizels, MD1, LaTasha Nelson, MD2, C.D.A. Herndon, MD3, Erin Rowell, MD4, (1)Urology, Children’s Memorial Hospital, Chicago, IL, (2) Maternal Fetal Medicine, Northwestern Memorial Hospital / Prentice Women’s Hospital, Chicago, IL, (3) Surgery/Section of Pediatric Urology, University of Alabama at Birmingham, Birmingham, AL, (4) Pediatric Surgery, Children’s Memorial Hospital, Northwestern University, Chicago, IL

20) 12:16 PM  
Perceptions of Competence in Pediatric Urology after Residency Training  
Michaella M. Prasad, MD1, Jessica T. Casey, MS, MD1, Jennie Mickelson, MD, FRCSC2 and Elizabeth B. Yerkes, MD, FAAP1, (1) Division of Urology, Children’s Memorial Hospital, Chicago, IL, (2) Department of Urologic Sciences, University of British Columbia, Vancouver, BC, Canada

21) 12:22 PM  
Computer Enhanced Visual Learning Module Significantly Improves Resident Training In a Basic Pediatric Urology Procedure: Sleeve Circumcision  
Blake W. Palmer, MD1, Bradley Kropp, MD1 and Max Maizels, MD2, (1) Pediatric Urology, University of Oklahoma, Oklahoma City, OK, (2) Urology, Children’s Memorial Hospital, Chicago, IL

22) 12:28 PM  
Pediatric Robotic Urology Training: When Does the Going Get Good?  
Gregory E. Tasian, MD, MSc, and Pasquale Casale, MD, Urology, The Children’s Hospital of Philadelphia, Philadelphia, PA

12:34 PM  
DISCUSSION

12:40 PM  
LUNCH BREAK

1:45 PM  
SESSION 6: MISCELLANEOUS I  
Moderators: Ross M. Decter, MD, FAAP, Andrew J. Kirsch, MD, FAAP
23) 1:45 PM Reduction in Patient Radiation Exposure during Ureteroscopy Through the Use of a Pre-Fluoroscopy Checklist
Paul J. Kokorowski, MD, MPH1, Jeanne Chow2, Keith Strauss, MSc3, Melanie C. Pennison, MPH1, Bartley Cilento, MD4 and Caleb P. Nelson, MD, MPH1, (1) Department of Urology, (2) Department of Radiology, Children’s Hospital Boston, Boston, MA

24) 1:51 PM High Incidence of Urologic Manifestations in Duchenne Muscular Dystrophy
Eric J. Askeland, MD1, Angela M. Arlen, MD1, Katherine D. Mathews, MD, FAAP2 and Christopher S. Cooper, MD, FAAP, FACS3, (1) Department of Urology, (2) Departments of Neurology and Pediatrics, University of Iowa, Iowa City, IA

25) 1:57 PM Barriers and Facilitators Encountered During Transition of Care for Adult Patients with Congenital Chronic Genitourinary Conditions
Pramod Reddy, MD1, James Donovan, MD2, Ayman Mahdy, MD2 and Eugene Minevich, MD1, (1) Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, (2) Division of Urology, University of Cincinnati, Cincinnati, OH

26) 2:03 PM Innovative Use of an Amnioport to Maintain Amniotic Fluid Volume in Fetuses with Lower Urinary Tract Obstruction
William Polzin, MD1, Pramod Reddy, MD2, Timothy Crombleholme, MD3, Mounira Habli, MD4 and Foong-Yen Lim, MD4, (1) Division of Fetal Surgery, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, (2) Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, (3) Department of Pediatric Surgery, Children’s Hospital Colorado, Aurora, CO, (4) Division of Pediatric Surgery and Fetal Surgery, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH
27) 2:09 PM  In-Home Robots Can Effectively Engage Children and Their Parents in Post-Operative Care, and Allow for Cost-Efficient Remote Physician Monitoring  
Brian M. Rosman, MD, Alan B. Retik, MD, Bartley Cilento, MD and Hiep T. Nguyen, MD, FAAP, Department of Urology, Children’s Hospital Boston, Boston, MA

2:15 PM  DISCUSSION

2:25 PM  Lattimer Lecture -- Innovations in Medical Education: The Changing Tide of Resident (Surgical) Training  
Ralph V. Clayman, MD

2:55 PM  Panel: Update on Educational Innovation in Pediatric Urology  
Moderator: Craig Andrew Peters, MD, FAAP  
Panelists: Thomas Sean Lendvay, MD, Ralph V. Clayman MD, Jeff Berkley, PhD

3:50 PM  BREAK/POSTER VIEWING

4:00 PM  Joint Surgery Conference—Anesthesia Neurotoxicity: Are We Poisoning Children’s Brains?  
Moderator: Constance S. Houck, MD, FAAP  
Experimental Evidence for Neurotoxic Effects of Anesthetics and Sedative Agents in Young Animals  
Sulpicio Soriano, MD, FAAP

4:30 PM  Do Anesthetics and Sedative Agents Cause Neurotoxicity in Humans?  
Randall Flick, MD, FAAP

5:00 PM  Summary & Panel Discussion  
Anesthesiology: Constance S. Houck, MD, FAAP; Sulpicio Soriano, MD, FAAP; and Randall Flick, MD, FAAP  
Otolaryngology & Head and Neck Surgery: Diego Preciado, MD, PhD, FAAP  
Orthopaedics: Brian Shaw, MD, FAAP  
Urology: Carlos Estrada, MD, FAAP  
Surgery: Shawn St Peter, MD, FAAP
5:30 PM — Joint Surgical Specialists Reception
(Immediately following the Joint Surgery Conference, located in Grand Salons A & B across the hall)

Join your fellow surgical specialists for networking and complimentary food and drink following Saturday’s educational program. Table top exhibits are anticipated. Come discuss the latest surgical practices and advancements.

Supported by Sidra Medical & Research Center

6:30 PM

7:00 PM — Section on Urology Reception

WWII Museum
945 Magazine Street (Entrance on Andrew Higgins Drive)

The Section on Urology is proud to host this year’s Annual Banquet at the National World War II Museum. Dine and mingle surrounded by the workhorses of the World War II era — a restored C-47, Sherman tanks, historic Higgins Boats and more. Banquet guests can stroll through the museum exhibits that tell the story of the war that changed the world — why it was fought, how it was won, and what it means today. All while being serenaded by a 1940s-style musical group that will take you on a nostalgic musical journey of WWII-era classics. And what is a trip to New Orleans without great food! Catering is provided by James Beard award-winning chef John Besh.

Exhibits, dinner, and open bar are included with the $100 admission price. Tickets can be purchased at the onsite registration desk at the Convention Center. The event is walking/taxi distance from the French Quarter; no buses are provided.

Supported by Salix Pharmaceuticals
Master Class: How to move from Novice Robotic Surgeon to Expert
Moderator: Aseem Shukla, MD, FAAP
Past Present and Future of Robotic Simulation -- Jeff Berkley, PhD
So You Want to Be a Robotic Surgeon? How to Progress in Case Complexity with Time and Experience – Craig Peters, MD, FAAP
Expectation vs. Reality: The Bumps on the Road – Pasquale Casale, MD, FAAP

SESSION 7: ONCOLOGY
Moderators: Walid A. Farhat, MD, FAAP; Lisa Cartwright, MD, FAAP

Feasibility and Potential Impact of Using CT Volume As a Predictor of Specimen Weight in a Subgroup of Patients with Low Risk Wilms Tumors Registered On COG Study ARENO3B2
Fernando A. Ferrer Jr., MD, FAAP1, Katherine W. Herbst, MSc1, Conrad Fernandez, MD2, Geetika Khanna, MD3, Elizabeth Mullen, MD4, Jeffrey S. Dome, MD, PhD5, Robert C. Shamberger, MD6, Michael L. Ritchey, MD7 and Peter F. Ehrlich, MD, FACS8, (1)Division of Urology, Connecticut Children’s Medical Center, Hartford, CT, (2)Department of Pediatrics, IWK Health Center, Halifax, NS, Canada, (3)Mallinckrodt Institute of Radiology, Washington University School of Medicine, (4)Dana-Farber/Children’s Hospital Cancer Care, Boston, MA, (5)Center for Cancer and Blood Disorders, Children’s National Medical Center, Washington, DC, (6)Department of Surgery, Children’s Hospital Boston, Harvard Medical School, Boston, MA, (7)Department of Urology, Phoenix Children’s Hospital, Phoenix, AZ, (8)Division of Pediatric Surgery, University of Michigan, Ann Arbor, MI
Urologic Co-Morbidities Associated with Sacrococcygeal Teratoma and a Rational Plan for Urologic Surveillance
Nicholas G. Cost, MD1, Louis D. Le, MD2, Timothy M. Crombleholme, MD, FACS, FAAP3, James I. Geller, MD4, Sundeep G. Keswani, MD5, Foong-Yen Lim, MD2 and Shumyle Alam, MD5,
(1)Division of Urology, Cincinnati Children’s Hospital Medical Center (2)Department of Pediatric General & Thoracic Surgery, Cincinnati Children’s Hospital Medical Center, (3)Department of Pediatric General & Thoracic Surgery, Children’s Hospital Colorado, Aurora, CO, (4)Division of Pediatric Oncology, Cincinnati Children’s Hospital Medical Center (5)Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH

DISCUSSION

Panel: Management of Pediatric and Adolescent Testis Tumors in 2012
Moderator: Margarett Shnorhavorian, MD, FAAP
Pediatric germ cell tumors – Treatment strategy and management of the retroperitoneum – Jonathan H. Ross, MD, FAAP
Adolescent and young adult testis tumors – Jose A. Karam, MD
International Ovarian and Testicular Stromal Tumor Registry - Kris Ann Schultz, MD
Survivorship – Daniel M. Green, MD, FAAP

SESSION 8: VESICOURETERAL REFLEX I
Moderators: Patrick C. Cartwright, MD, FAAP, Marc Cendron, MD, FAAP

Impact of the AAP Guidelines for the Management of Urinary Tract Infections in Children on the Diagnosis of VUR: Evaluation Using a Historical Series
Kristina D. Suson1 Ranjiv Mathews, MD2, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)Brady Urological Institute, Johns Hopkins University School of Medicine, Baltimore, MD
31) 9:06 AM Vesicoureteral Reflux in Siblings: A Longterm Prospective Study
Manuela Hunziker and Prem Puri, Our Lady's Children's Hospital, National Children's Research Centre, Dublin, Ireland

32) 9:12 AM Assessment of Post-Operative Pain and Discomfort in Children Undergoing Open Ureteral Reimplantation Surgery
Guilherme A. Rossini¹, Lorenzo F. M. Trevisani¹, Brian M. Rosman¹, Vitor C. Zanetta¹, Sabrina T. Reis¹, Gustavo N. C. Inoue¹, Carlos A. O. Buchalla¹, Daniela C. J. Sanchez¹, Constance S. Houck², Petra M. Meier², Carlos Munoz-San Julian, MD³, Carlo C. Passerotti³ and Hiep T. Nguyen¹, (1)Urology, Children's Hospital Boston, Boston, MA, (2)Anesthesiology, Perioperative and Pain Medicine, Children's Hospital Boston, Boston, MA, (3)Anesthesiology, Perioperative and Pain Medicine, Children's Hospital Boston, (4) Urology, University Nove de Julho, São Paulo, Brazil

33) 9:18 AM Prevalence and Predictors of Renal Functional Abnormalities in High Grade Vesicoureteral Reflux
Manuela Hunziker and Prem Puri, Our Lady's Children’s Hospital, National Children's Research Centre, Dublin, Ireland

34) 9:24 AM Endoscopic Correction of VUR Utilizing Vantris as a New Non-Biodegradable Tissue Augmenting Substance: Three Years of Prospective Followup
Boris Chertin, MD, Wael Abu Arafah and Stanislav Kocherov, Pediatric Urology, Shaare Zedek Medical Center, Jerusalem, Israel

9:30 AM DISCUSSION

9:37 AM SESSION 9: VESICOURETERAL REFLUX II
Moderators: Stuart B. Bauer, MD, FAAP, Saul P. Greenfield, MD, FAAP
35) 9:37 AM Trends in Use of Antibiotic Prophylaxis in Children with Vesicoureteral Reflux
Vijaya M. Vemulakonda, MD, JD1, Duncan T. Wilcox, MD1, Anne M. Libby, PhD2, (1)Department of Pediatric Urology, Children's Hospital Colorado, Aurora, CO, Pediatric Urology, Children's Hospital Colorado, Aurora, CO (2) Pharmaceutical Outcomes Research, Department of Clinical Pharmacy, University of Colorado School of Pharmacy, Aurora, CO

36) 9:43 AM Prevalence of Urinary Tract Infections and Vesicoureteral Reflux amongst Children Diagnosed with Lower Urinary Tract Dysfunction
Jason P. Van Batavia, MD, Angela M. Fast, BS, Andrew J. Combs, RPA-C and Kenneth I. Glassberg, MD, FAAP, Division of Pediatric Urology, Department of Urology, Columbia University College of Physicians and Surgeons, Morgan Stanley Children's Hospital of New York - Presbyterian, New York, NY

37) 9:49 AM New Contralateral Vesicoureteral Reflux after Unilateral Reimplantation: Predictive Factors and Clinical Outcomes
Katherine C. Hubert, MD, MPH1, Paul J. Kokorowski, MD, MPH1, Lin Huang, PhD2, Michaela M. Prasad, MD1, Ilina Rosoklija, MPH1, Alan B. Retik, MD1 and Caleb P. Nelson, MD, MPH1, (1) Department of Urology, Children's Hospital Boston, Boston, MA, (2) Clinical Research Program, Children's Hospital Boston, Boston, MA

38) 9:55 AM (ALSO poster # 16) Sensitivity of Renal Ultrasound for the Detection of Grade 5 Vesicoureteral Reflux
Robert C. Orth, MD, PhD3, A. Chantal Caviness, MD, PhD2, Alan Schlesinger, MD, FAAP1 and James Crowe, MD3, (1) Edward B. Singleton Department of Pediatric Radiology, Texas Children's Hospital, Houston, TX, (2) Section of Emergency Medicine, Department of Pediatrics, Baylor College of Medicine, Houston, TX
Is Renal Ultrasound Enough? Risk for Abnormal DMSA Despite Normal Renal Ultrasonography after One Febrile UTI

Nicol Corbin Bush, MD¹, William A. Smith¹, Janelle Traylor², Karen Pritzker², Anjana Shah², Carlos A. Villanueva, MD¹ and Warren T. Snodgrass, MD¹, (¹)Pediatric Urology, Children’s Medical Center, Dallas, TX, (²)Pediatric Urology, Children’s Medical Center Dallas, Dallas, TX

DISCUSSION

BREAK/POSTER VIEWING

Guest Lecturer: Innovative Products for Pediatric Surgery

Tim Moran, CEO, Pediaworks

SESSION 10: BLADDER

Moderators: Linda Dairiki Shortliffe, MD, FAAP, Steven J. Skoog, MD, FAAP

Changes in Urinary Substance P Level Is Correlated with Post-Operative Bladder Spasms Following Bladder Surgery

Guilherme A. Rossini¹, Brian M. Rosman¹, Caio M. Oliveira¹, Constance S. Houck², Petra M. Meier², Carlos Munoz-San Julian², Sabrina T. Reis¹, Carlo C. Passerotti³ and Hiep T. Nguyen¹, (¹)Urology, Children’s Hospital Boston, Boston, MA, (²)Anesthesiology, Perioperative and Pain Medicine, Children’s Hospital Boston, Boston, MA, (³)Urology, University Nove de Julho, São Paulo, Brazil
Single Center Experience with Onabotulinumtoxina Endoscopic Detrusor Injection for the Treatment of Neurogenic Bladder in Children: Effect of Dose Adjustment, Multiple Injections and Avoidance of Reconstructive Procedures

Victor H. Figueroa1, Rodrigo LP Romão, Clinical, Fellow2, Joao L. Pippi Salle1, Luis H. Braga, MD, PhD3, Martin A. Koyle4, Darius J. Bagli2 and Armando J. Lorenzo1, (1)Division of Urology, The Hospital for Sick Children, Toronto, ON, Canada, (2)Division of Urology, Department of Surgery, The Hospital for Sick Children, Toronto, ON, Canada, (3)Department of Surgery/Urology, McMaster University, Hamilton, ON, Canada, (4)Urology, The Hospital for Sick Children, Toronto, ON, Canada

Intravesical Botulinum Toxin Injection in Children with Neurogenic Bladder

Abhishek Seth, MD1, Duong D. Tu, MD1, Carlos A. O. Buchalla2, Stuart B. Bauer, MD2 and Carlos R. Estrada, MD3, (1)Department of Urology, Children’s Hospital Boston, Harvard Medical School, Boston, MA, (2)Department of Urology, Children’s Hospital Boston, Boston, MA, (3)Urology, Children’s Hospital Boston, Boston, MA

Cost Savings from Not Catheterizing Newborns with Spina Bifida

Candace F. Granberg, MD, Warren T. Snodgrass, MD, Micah A. Jacobs, MD and Patricio C. Gargollo, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX

11:19 AM DISCUSSION

11:25 AM Pediatric Urology Medal

Medalist: Edmond T. Gonzales, Jr., MD, FAAP

Tribute Presented by: David R. Roth, MD, FAAP

11:30 AM BUSINESS MEETING

11:45 AM LUNCH BREAK
12:45 PM  
SESSION 11: KIDNEY/ HYDRONEPHROSIS I
Moderators: Brent W. Snow, MD, FAAP, H. Gil Rushton, MD, FAAP

44) 12:45 PM  
Prediction of Clinical Outcomes in Infants with Unilateral and Bilateral Isolated Hydronephrosis Diagnosed Antenatally
Gustavo N. C. Inoue1, Carlos A. O. Buchalla1, Vitor C. Zanetta1, Brian M. Rosman, MD1, Guilherme A. Rossini1, Lorenzo F. M. Trevisani1, Daniela C. J. Sanchez1 and Hiep T. Nguyen, MD, FAAP1, (1)Department of Urology, Children’s Hospital Boston, Boston, MA, (2)Urology, Children’s Hospital Boston, Boston, MA

45) 12:51 PM  
Society of Fetal Urology (SFU) Recommendations for Postnatal Evaluation of Antenatal Hydronephrosis: Will Fewer Voiding Cystourethrogram’s Lead to More Urinary Tract Infections?
Melissa A. St.Aubin, Medical, Student1, Katie H. Willihnganz-Lawson, M1, Briony K. Varda, M1, Matthew Fine, MD2, Jane M. Lewis, MD3, Tracy Prosen, M3 and Aseem Shukla, MD1, (1)Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN, (2)Department of Urologic Surgery, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN, (3)Maternal Fetal Medicine, University of Minnesota Amplatz Children’s Hospital

46) 12:57 PM  
Should Prenatal Hydronephrosis That Resolves Before Birth Be Followed Postnatally? An Analysis and Comparison to Persistent Prenatal Hydronephrosis
Patrick Scarborough, MD1, Elizabeth Ferrara, MD2, Douglas W. Storm, MD3, (1)Urology, Naval Medical Center San Diego, (2)Pediatric Nephrology, Naval Medical Center San Diego, (3)Pediatric Urology, Naval Medical Center, San Diego, CA
1:03 PM  
**Approach to the Failed Pyeloplasty in Children: Revisiting the Unknown**  
Rodrigo LP Romao, Martin Koyle, Joao L Pippi Salle, Abdulhakim Alotay, Victor Figueroa, Armando J Lorenzo, Darius Bagli and Walid Farhat, Division of Urology, The Hospital for Sick Children, Toronto, ON, Canada

1:09 PM  
**Variability in Initial Urologic Evaluation of Infants with Congenital Hydronephrosis: A Multi-Center EPIC Database Study**  
Vijaya M. Vemulakonda, MD, JD¹, George Chiang, MD², Sean T. Corbett, MD³, (1)Department of Pediatric Urology, Children’s Hospital Colorado, Aurora, CO, (2)Urology, Rady Children’s Hospital, University of California, San Diego, San Diego, CA (3)Urology, University of Virginia Medical Center, Charlottesville, VA

1:15 PM  
**DISCUSSION**

1:22 PM  
**SESSION 12: KIDNEY/HYDRONEPHROSIS II**  
Moderators: Julian H. Wan, MD, FAAP, Jeff Campbell, MD, FRCSC, FACS, FAAP

1:22 PM  
**Robotic-Assisted Laparoscopic Dismembered Pyeloplasty and Vascular Hitch Technique in Children: Comparison of Outcomes**  
Candace F. Granberg, MD¹, Daniel Dajusta, MD¹, Linda A. Baker, MD, FAAP² and Patricio C. Gargollo, MD³, (1)Pediatric Urology, Children’s Medical Center, Dallas, TX, (2)Ambulatory Care Pavilion, Children’s Medical Center, Dallas, TX

1:28 PM  
**Inter-Rater Reliability of Ultrasound Interpretation in Infants with Congenital Hydronephrosis**  
Vijaya M. Vemulakonda, MD, JD¹, Susan J. Staulcup, MPH², Michelle R. Torok, PhD³, Amy H. Hou, MD¹, Jeffrey B. Campbell, MD¹ and Duncan T. Wilcox, MD¹, (1)Department of Pediatric Urology, Children’s Hospital Colorado, Aurora, CO, (2)University of Colorado Denver, Aurora, CO
51) 1:34 PM  Urinary NGAL Levels Correlate with Differential Renal Function in Patients with Ureteropelvic Junction Obstruction Undergoing Pyeloplasty
Nicholas G. Cost, MD1, Paul H. Noh, MD2, Prasad Devarajan, MD2, Vesna Ivancic, MD2, Pramod Reddy, MD1, Eugene Minevich, MD1, Michael Bennett2 and W. Robert DeFoor Jr., MD, MPH, FAAP1, (1)Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, (2) Pediatric Nephrology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH

52) 1:40 PM  Comparison between Ultrasound and Dimercaptosuccinic Acid Scintigraphy in the Evaluation of Renal Scars
Maryse Marceau-Grimard1, Christian Côté2, Stéphane Bolduc1, Marcel Dumont2 and Katherine Moore1, (1) Urology, CHUL-CHUQ, Université Laval, Quebec City, QC, Canada, (2) Nuclear medicine, CHUQ, Université Laval, Québec, QC, Canada

53) 1:46 PM  (ALSO poster # 22) Hydronephrosis In Patients with Spina Bifida – Can It Predict Vesicoureteral Reflux?
Woojin Kim, Hiroko Suzuki, Yoshiyuki Shiroyanagi and Yuichiro Yamazaki, Urology, Kanagawa Children’s Medical Center, Yokohama, Japan

1:50 PM  DISCUSSION

2:00 PM  History of the AAP Section on Urology
David A. Bloom, MD, FAAP

2:30 PM  SESSION 13: MISCELLANEOUS II
Moderators: Patrick C. Cartwright, MD, FAAP, Marc Cendron, MD, FAAP
54) 2:30 PM  Radiation Exposure to Children During Videourodynamics: How Low Can We Go?  
Andrew J. Combs, RPA-C, Jason P. Van Batavia, MD and Kenneth I. Glassberg, MD, Division of Pediatric Urology, Department of Urology, Columbia University College of Physicians and Surgeons, Morgan Stanley Children’s Hospital of New York - Presbyterian, New York, NY

55) 2:36 PM  Feasibility of Integrating Research Data Collection into Routine Clinical Practice Using the Epic Electronic Medical Record  
Vijaya M. Vemulakonda, MD, JD, Department of Pediatric Urology, Children’s Hospital Colorado, Aurora, CO, Duncan T. Wilcox, MD, Pediatric Urology, Children’s Hospital Colorado, Aurora, CO and Michael G. Kahn, Clinical Informatics, Children’s Hospital Colorado, Aurora, CO

56) 2:42 PM  Antegrade Continence Enema: Which Bowel Segment Is Better?  
Jonathan S. Ellison, MD, A. Neil Haraway and John M. Park, Urology, University of Michigan, Ann Arbor, MI

57) 2:48 PM  Characteristics of Unscheduled Pediatric Urology Consultations: Effects of Day, Month and Diagnosis  
Julian Wan, MD, Chang He, Heather Crossley, Vesna Ivancic, John M. Park, Kate H. Kraft and David A. Bloom, Urology, University of Michigan, Ann Arbor, MI

58) 2:54 PM  Contemporary Epidemiology of Complex Genitourinary Defects  
Jonathan C. Routh, MD, MPH, Brant A. Inman, MD, Patricio C. Gargollo, MD, Jessica C. Lloyd, MD, Sherry S. Ross, MD and John S. Wiener, MD, (1)Division of Urology, Duke University Medical Center, Durham, NC, (2) Urology, Children’s Medical Center and University of Texas Southwestern, Dallas, TX
3:00 PM

External Sphincterotomy to Improve Bladder Emptying In Prune Belly Syndrome
Douglas E. Coplen, MD, FAAP, Pediatric Urology, Washington University School of Medicine, Saint Louis, MO

3:06 PM

(ALSO poster # 5)
Utilizing a Serosal-Trough for Fashioning a Continent Catheterizable Stoma: Technique and Outcomes
Nima Baradaran, MD1, Andrew A. Stec, MD2, Angela Gupta, MD3, Michael A. Keating, MD, FAAP4 and John P. Gearhart, MD, FAAP4, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)Urology, Medical University of South Carolina, Charleston, SC, (3)Division of Pediatric Urology, Walt Disney Pavilion at Florida Hospital for Children, Orlando, FL

3:10 PM

DISCUSSION

3:20 PM

BREAK/POSTER VIEWING

3:35 PM

Panel: Innovative approaches and treatments for LUT dysfunction in children
Moderator: Paul F. Austin, MD, FAAP
Pelvic floor rehabilitation -- Ubirajara Barroso Jr., MD
Pharmacotherapy -- Paul F. Austin, MD, FAAP
Neuromodulation -- Mario De Gennaro, MD

4:40 PM

Presentation of Prizes
Prizes sponsored by the American Association of Pediatric Urology

4:50 PM

SESSION 14: POSTERIOR URETHRAL VALVES
Moderators: David A. Diamond, MD, FAAP, Douglas E. Coplen, MD, FAAP

6:00 PM

N-of-1 Studies to Optimize the Clinical Outcomes of Individual Patients with Posterior Urethral Valves
Pramod Reddy, MD, W. Robert DeFoor, MD and Curtis Sheldon, MD, Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH
**Using Improvement Science to Optimize Documentation of Outcomes in the Management of Patients with Posterior Urethral Valves**

Pramod Reddy, MD, Shumyle Alam, MD, Deborah Reeves, Katherine Pandolfo and Curtis Sheldon, MD, Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH

**DISCUSSION**

**ADJOURN**

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**MONDAY, OCTOBER 22, 2012**

**Urology Scientific Meeting and Abstract Presentations**

Session # H3017

Grand Ballroom A&B, Hilton Riverside New Orleans Hotel

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**7:00 AM**

**Master Class: A Practical Update of the COG Protocols and Current Management of Pediatric Genitourinary Tumors**

Moderator: Michael L. Ritchey, MD, FAAP

Testis-tumor up-date – Nicholas G. Cost, MD

Renal tumor up-date – Armando J. Lorenzo, MD, MSc, FRCSC, FACS, FAAP

Rhabdomyosarcoma up-date – Fernando A. Ferrer, MD, FACS, FAAP

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**8:00 AM**

**Long Term Management of Disorders of Sexual Differentiation Impact on Fertility, Cancer Risk, Psychosexual Development**

Moderators: Thomas Francis Kolon, MD, FAAP

Panelists: John M. Hutson, MD, DSc, FAAP

Pramod P. Reddy, MD

David A. Diamond, MD, FAAP

Brad P. Kropp, MD, FACS, FAAP

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**8:45 AM**

**SESSION 15: DISORDERS OF SEX DEVELOPMENT**

Moderators: Joseph G. Borer, MD, FAAP, Bradley P. Kropp, MD, FACS, FAAP
DNA Copy Number Variations in 46, XY Disorders of Sexual Development
Steven M. Harrison, and Linda A. Baker, MD, Urology, University of Texas Southwestern Medical Center, Dallas, TX

Stress Is Differentially Associated with Parenting Style and Mental Health of Caregivers of Children with a Disorder of Sex Development
Courtney Wolfe-Christensen, PhD1, David A. Fedele, MS2, Katherine Kirk, RN3, Larry L. Mullins, PhD4, Yegappan Lakshmanan, MD, FAAP5 and Amy B. Wisniewski, PhD6, (1)Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI, (2)Psychology, Bradley/Hasbro Children’s Research Center, J, (3)Nursing, University of Oklahoma College of Nursing, Oklahoma City, OK, (4)Psychology, Oklahoma State University, Stillwater, OK, (5)Pediatric Urology, University of Oklahoma Health Sciences Center, Oklahoma City, OK

Complexities of Müllerian Anatomy in 46XX Cloacal Exstrophy Patients
Kristina D. Suson1, Janae Preece, MD2, Heather N. DiCarlo, MD3, Nima Baradaran4 and John P. Gearhart4, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)Division of Urology, University of Maryland Medical Center, Baltimore, MD, (3)Urology, Stony Brook University Medical Center, Stony Brook, NY, (4) Division of Pediatric Urology, The Johns Hopkins Hospital, Baltimore, MD

Using a National Pediatric Hospital Database to Assess the Practice Pattern of Clitoroplasty From 1992-2011 in the United States
Blake W. Palmer, MD1, Amy B. Wisniewski, PhD1, Kevin Kierl1, Dominic Frimberger, MD1, Bradley P. Kropp, MD1 and Christopher C. Roth, MD2, (1)Pediatric Urology, University of Oklahoma Health Sciences Center, Oklahoma City, OK, (2)Urology, Louisiana State University Health Sciences Center, New Orleans, LA
67) 9:07 AM  (ALSO poster #29)
Psychosocial Adjustment of Children with DSD
Amy Wisniewski1, Stephanie Hullmann, MS2 and Larry L. Mullins, PhD1, (1) Pediatric Urology/Child and Adolescent Psychiatry, University of Oklahoma Health Sciences Center, Oklahoma, OK, (2) Psychology, Oklahoma State University, Stillwater, OK

68) 9:11 AM  (ALSO poster #56)
Transcriptome Analysis of the Fetal Gubernaculum Following DHT Exposure Identifies Common Androgen and Insulin-Like 3 Targets
Julia Spencer Barthold, Alan Robbins, Yanping Wang, Jack Pike, Erin McDowell, Kamin Johnson and Suzanne M. McCahan, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE

9:15 AM  DISCUSSION

9:30 AM  SESSION 16: VOIDING DYSFUNCTION
Moderators: Yves Homsy, MD, FAAP, Barry P. Duel, MD, FAAP

69) 9:30 AM  Incidence of Anatomic Abnormalities in Boys with Overactive Bladder Symptoms
Joel F. Koenig, MD1, Joe Miller, MD2, John Hulsen III, MD3, Patrick H. McKenna, MD, FAAP, FACS4, (1) Surgery, Division of Urology, Southern Illinois University SOM, Springfield, IL, (2) Urology, University of California, San Francisco, San Francisco, CA, (3) Plastic Surgery, The Ohio State University SOM, Columbus, OH, (4) Division of Urology, Southern Illinois University SOM, Springfield, IL

70) 9:36 AM  Visual Analog Scale: A Suitable Method for Assessing Voiding Dysfunction?
Ruiyang Jiang, Karen Pritzker, Anjana Shah, Janelle Taylor and Nicol Bush, Pediatric Urology, Children’s Medical Center Dallas, Dallas, TX
Incidence of Abnormal Imaging and Urologic Intervention after First Febrile Urinary Tract Infection in Children 2-24 Months
Trisha M. Juliano, MD, Heidi A. Penn, MD, Douglass B. Clayton, MD, John C. Thomas, MD, John C. Pope IV, MD, Mark C. Adams, MD, John W. Brock III, MD and Stacy T. Tanaka, MD, Division of Pediatric Urology, Monroe Carell Jr. Children’s Hospital at Vanderbilt, Nashville, TN

History of Recurrent Urinary Tract Infection Not Predictive of Abnormality on Voiding Cystourethrogram or Dimercaptosuccinic Acid Renal Scan
Ariella A. Friedman, MD, Cortney Wolfe-Christensen, PhD, Amanda Toffoli, Jack S. Elder, MD, FAAP and Yegappan Lakshmanan, MD, FAAP, Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI

High Sodium Diet and Hypercalciuria in Children with Dysuria and/or Hematuria
Ruiyang Jiang¹, Elizabeth Brown², Karen Pritzker¹, Anjana Shah¹, Janelle Traylor¹, Katherine Twombly² and Nicol Corbin Bush, M¹, (1)Pediatric Urology, Children’s Medical Center Dallas, Dallas, TX, (2)Pediatric Nephrology, Children’s Medical Center Dallas, Dallas, TX

Prospective Evaluation of Sacral Nerve Modulation In Children with Validated Questionnaires
Heidi A. Penn, MD, Stacy T. Tanaka, MD, Douglass B. Clayton, MD, John C. Thomas, MD, Mark C. Adams, MD, John W. Brock III, MD and John C. Pope IV, MD, Division of Pediatric Urology, Monroe Carell Jr. Children’s Hospital at Vanderbilt, Nashville, TN
Factor Analysis of the Pediatric Symptom Checklist In a Population of Children with Voiding Dysfunction/Enuresis

Cortney Wolfe-Christensen, PhD1, David A. Fedele, MS2, DeMond Grant, PhD3, Amy L. Veenstra, MA4, Larisa Kovacevic, MD, FAAP5, Jack S. Elder, MD, FAAP5, and Yegappan Lakshmanan, MD, FAAP5, (1)Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI, (2)Psychology, Bradley/Hasbro Children’s Research Center, (3)Oklahoma State University, (4)Pediatrics, Children’s Hospital of Michigan, Detroit, MI

DISCUSSION

BREAK/POSTER VIEWING

SESSION 17: HYPOSPADIAS/PENIS I
Moderators: William C. Hulbert, MD, FAAP, Earl Y. Cheng, MD, FAAP

Is There A Role for Prophylactic Antibiotics After Stented Hypospadias Repair?
Niki Kanaroglou, MD, FRCSC, Elias J. Wehbi, MD, FRCSC, Abdulhakim Alotay, Rodrigo Romao, Martin A. Koyle, MD, Armando Lorenzo, Darius Bagli and Walid Farhat, Division of Urology, The Hospital for Sick Children, Toronto, ON, Canada

Resulting Trends of Non-Coverage of Elective Circumcision by Louisiana Medicaid in Boys Aged 0-5
Joseph Ortenberg, MD, FAAP, and Christopher C. Roth, MD, Department of Urology, Louisiana State University Health Sciences Center, New Orleans, LA

Urethral Mobilization for Distal and Midshaft Hypospadias with Chordee
Joel F. Koenig, MD1, Avi Weiss, MD2, Michael Kottwitz3 and Patrick H. McKenna, MD, FAAP, FACS1, (1) Division of Urology, Southern Illinois University SOM, Springfield, IL, (2) Urology, Urology Specialists of Nevada, Las Vegas, NV, (3)Southern Illinois University SOM, Springfield, IL
Duration of Follow-up to Identify Urethral Complications after TIP Hypospadias Repair
Carlos A. Villanueva, MD, Nicol Corbin Bush, MD and Warren T. Snodgrass, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX

The Need for Additional Procedures in Patients Undergoing Proximal Hypospadias Repairs As Reported In the Pediatric Health Information System Database
Katherine W. Herbst, MSc, Fernando A. Ferrer Jr., MD, FAAP and John H. Makari, MD, FAAP, Division of Urology, Connecticut Children’s Medical Center, Hartford, CT

DISCUSSION

SESSION 18: HYPOSPADIAS/PENIS II
Moderators: Warren T. Snodgrass, MD, FAAP, Mark R. Zaontz, MD, FAAP

Objective and Subjective Sexual Outcomes of Adult Patients Following Hypospadias Repair Performed In Childhood
Boris Chertin, MD¹, Aladin Natsheh¹, Dan Prat¹, Itzhak Ben-zion² and Ofer Z. Shenfeld², (1)Pediatric Urology, Shaare Zedek Medical Center, Jerusalem, Israel, (2)Urology, Shaare Zedek Medical Center, Jerusalem, Israel

Masculine Function of Hypospadias Patients in Adulthood
Yoshihide Higuchi, MD, Akihiro Kanematsu, MD, Michio Nojima, MD, Hiroki Shima, MD, Fumihiko Ikoma, MD and Shingo Yamamoto, MD, Urology, Hyogo College of Medicine, Nishinomiya, Japan
Hypospadias and Anorectal Malformation: A Unique Problem
Shumyle Alam, MD1, Nicholas G. Cost, MD2, Marc Levitt, MD3, Eugene Minevich, MD1 and Alberto Peña, M1, (1)Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, (2)Division of Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH, (3)Colorectal Center for Children, Cincinnati Children’s Hospital, Cincinnati, OH

Patient Reported Long-Term Lower Urinary Tract Symptom after Two Stage Hypospadias Repair
Akihiro Kanematsu1, Yoshihide Higuchi1, Koji Yoshimura, MD2, Fumihiko Ikoma1 and Shingo Yamamoto1, (1)Urology, Hyogo College of Medicine, Nishinomiya, Japan, (2)Urology, Kyoto University, Kyoto, Japan

Validation of the G.M.S. Hypospadias Score: Correlation with Post-Operative Complications
Laura S. Merriman, Edwin A. Smith, Hal C. Scherz, Andrew J. Kirsch and James Elmore, Pediatric Urology, Emory University School of Medicine, Atlanta, GA

Objective Criteria for Preoperative Testosterone Use before Proximal Hypospadias Repair: Evidence for Androgen Resistance
Candace F. Granberg, MD, Nicol Corbin Bush, MD, and Warren T. Snodgrass, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX

DISCUSSION

LUNCH BREAK

SESSION 19: EXTROPHY
Moderators: John W. Brock III, MD, FAAP, William G. Reiner, MD
A Survey to Assess Self-Image in Individuals with Bladder Exstrophy: A Call for Psychosocial Support
Melanie C. Pennison, MPH, Lauren Mednick, PhD, Rosemary H. Grant, RN, Diane Price, MSW, Ilina K. Rosoklija, MPH, Lin Huang, PhD, Sonja Ziniel, PhD and Joseph G. Borer, MD
(1)Department of Urology, Children’s Hospital Boston, Boston, MA, (2)Department of Psychiatry, Children’s Hospital Boston, Boston, MA, (3) Department of Social Work, Children’s Hospital Boston, Boston, MA, (4)Clinical Research Program, Children’s Hospital Boston, Boston, MA

Radical Forearm Free Flap Phalloplasty Following Repair of Bladder Exstrophy
Eric Z. Massanyi, MD, Angela Gupta, MD, Sameer Goel, Student, John P. Gearhart and Richard J. Redett, MD
(1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)School of Medicine, Johns Hopkins Hospital, Baltimore, MD, (3) Plastic and Reconstructive Surgery, Johns Hopkins University School of Medicine, Baltimore, MD

Examining Long Term Patient Reported Outcomes of Bladder Exstrophy: A 20 Year Follow up
Angela D. Gupta, MD, Sameer Goel, Student, Christopher Woodhouse and Daniel Wood, PhD, FRCS(Urol)
(1) Urology, Johns Hopkins Medical Institutions, Baltimore, MD, (2)School of Medicine, Johns Hopkins Hospital, Baltimore, MD, (3)Paediatrics and Adolescent Urology, University College London Hospitals, London, United Kingdom

The Fate of the Complete Female Epispadias and Female Exstrophy Bladder: Is There A Difference?
Kristina D. Suson, Janae Preece, MD, Nima Baradaran, Heather N. DiCarlo, MD and John P. Gearhart
(1) Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2) Division of Urology, University of Maryland Medical Center, Baltimore, MD, (3) Urology, Stony Brook University Medical Center, Stony Brook, NY
91) 1:24 PM  **Is Complete Primary Repair of Bladder Exstrophy (CPRE) Associated with a Flaccid Neurogenic Bladder?**
*Hrair-George O. Mesrobian, MD, MSc, Urology, Medical College and Children’s Hospital of Wisconsin, Milwaukee, WI*

92) 1:30 PM  **Protocol of Delayed Bladder Exstrophy Management: The Bengali Scenario**
*Claudia Gatti, MD¹, Carmine Del Rossi¹, Alberto Attilio Scarpa¹, Francesca Caravaggi, MD¹, Giovanni Casadio¹, Giovanni Mosiello², Akanksha Mehta, MD³ and Anthony A. Caldamone, MD³, (1)Paediatric Surgery, Maggiore Hospital, Parma, Italy, (2)Urology, Bambino Gesù Children’s Hospital, Rome, Italy, (3)Pediatric Urology, Alpert Medical School of Brown University and Hasbro Children’s Hospital, Providence, RI*

93) 1:36 PM  **(ALSO poster # 42) Number of Bladder Exstrophy Closures Is Stable with No Evidence of Regionalization of Care: A HCUP/KID Database Analysis**
*Adejoro Oluwakayode¹, Melissa A. St.Aubin, Medical, Student², Katie H. Willihnganz-Lawson, MD³, Jane M. Lewis, MD¹ and Aseem Shukla, MD³, (1)Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN, (2)Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, St. Paul, MN, (3)Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN*

1:40 PM  **DISCUSSION**
1:50 PM VIDEO FORM
Moderator: Paul Arthur Merguerian, MD, FAAP
Ilioinguinal nerve to dorsal penile nerve neuroneurorrhaphy: Bridging penile skin sensation in Spina bifida -- Tom Lendvay, MD
Glansplasty and Redo Glansplasty in hypospadias surgery -- Nicol Corbin Bush, MD, FAAP
ASTRA Procedure -- Joao L. Pippi Salle, MD, FAAP
Vaginoplasty using Buccal Mucosa -- Linda Baker, MD, FAAP

2:35 PM SESSION 20: MISCELLANEOUS III
Moderators: John C. Pope IV, MD, FAAP, Lane S. Palmer, MD, FACS, FAAP

94) 2:35 PM Identifying Urologic Injuries in Children: Is There a Correlation between Presence of Hematuria and Presence and Severity of Urologic Injury in Pediatric Trauma Patients?
Bayo D. Tojuola, MD, Xiao Gu, MD, Nathan R. Littlejohn, Jim Wan, PhD, Mark A. Williams, MD and Dana W. Giel, MD, Division of Pediatric Urology, University of Tennessee Health Science Center, Le Bonheur Children’s Hospital, Memphis, TN

95) 2:41 PM Incidental Open Inguinal Rings During Laparoscopic Varicocelectomy: How Common Are They and What Should Be Done When Found?
Jason P. Van Batavia, MD, Angela M. Fast, BS and Kenneth I. Glassberg, MD, FAAP, Division of Pediatric Urology, Department of Urology, Columbia University College of Physicians and Surgeons, Morgan Stanley Children’s Hospital of New York - Presbyterian, New York, NY

96) 2:47 PM Bowel Continence in Spina Bifida
Courtney L. Shepard, MD1, David B. Joseph, MD2, (1)Division of Urology, University of Alabama-Birmingham (2) Surgery/Section of Pediatric Urology, University of Alabama at Birmingham, Birmingham, AL
(ALSO poster #6) Experience with the Invance AMS Sling for the Treatment of Incontinence in Boys
Gregory Dean, MD, FAAP, Mark R. Zaontz, MD, FAAP, Antonio Chaviano, Jack Elder, MD, Israel Franco, FACS, FAAP, Andrew Kirsch, Yegappan Lakshmanan, MD, FAAP, (1)Urology, Temple University, Voorhees, NJ, (2) Urology, Children’s Memorial Hospital, Chicago, IL, (3) Urology, Henry Ford Health System, Detroit, MI, (4)Pediatric Urology, New York Medical College, Valhalla, NY, (5)Pediatric Urology, Childrens Hospital of Atlanta, Emory University Medical Center, Atlanta, GA, (6) Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI

(ALSO poster #54) 'Wrap' Plication of a Megaureter around the Normal-Sized Ureter in the Management of Complete Duplex System Reimplantation
M.M.C. van den Heijkant, MD, P. Dik, A.J. Klijn, R. Chrzan, C.F. Kuijper and T.P.V.M. de Jong, Pediatric Urology, Pediatric Renal Center, University Children’s Hospitals UMC Utrecht and AMC, Utrecht, Netherlands

DISCUSSION

SESSION 21: TESTES
Moderators: Israel Franco, MD, FAAP; Martin A. Koyle, MD, FAAP

Comparison of Semen Analyses amongst Youths with a History of Cryptorchidism or Varicocele

Elevation of Scrotal Deep Body Temperature Predicts the Testicular Catch-up Growth after Varicocelectomy in Adolescent Varicocele
Koji Shiraishi, MD, PhD and Hideyasu Matsuyama, Urology, Yamaguchi University, Ube, Japan
Ultrasound Testicular Volumes Do Not Differentiate Fertility Risk in Adolescents with a Varicocele  

The Relation between Adult-Dark Spermatogonia and Other Parameters of Fertility Potential In Cryptorchid Testes  
Dina Cortes1, Bodil Laub Petersen2, Kolja Kvist1, Erik Clasen-Linde2, Jorgen Thorup3 (1)Pediatric Department, Hvidovre Hospital, University of Copenhagen, Copenhagen, Denmark, (2) Department of Pathology, Rigshospitalet, University of Copenhagen (3)Pediatric Surgery, Rigshospitalet, University of Copenhagen

Inpatient and Outpatient Patterns of Care in the Management of Testicular Torsion: Influence of Hospital Transfer on Testicular Outcomes  
Jenny H. Yiee, MD1, Lynne Chang, AB1, Alan Kaplan, MD1, Paul J. Chung, MD, MS2, Lorna Kwan, MPH1 and Mark S. Litwin, MD, MPH1, (1)Urology, UCLA, Los Angeles, CA, (2)Pediatrics and Health Services, UCLA, Los Angeles, CA

The Natural History of Adolescent Varicoceles  
Aaron Krill, MD1, Nikhil Waingankar, MD1, Suzanne Sunday, PhD1, Jordan Gitlin, MD1, Steven Friedman, MD2, Lori Dyer, MD3, Paul Zelkovic, MD3, Israel Franco, FACS, FAAFP3, Edward F. Reda, MD, FAAFP3 and Lane S. Palmer, MD, FAAFP1, (1)Pediatric Urology, Cohen Children’s Medical Center of NY, New Hyde Park, NY, (2)Urology, Maimonides Medical Center, Brooklyn, NY, (3)Pediatric Urology, Maria Fareri Children’s Hospital, Valhalla, NY

DISCUSSION

SESSION 22: CALCULI

Moderators: David B. Joseph, MD, FAAP; Steven J. Skoog, MD, FAAP
105) 3:56 PM Predictors of Urolithiasis in Gastrostomy Tube Fed Children: A Case-Control Study
Emilie K. Johnson, MD1, Jenifer R. Lightdale, MD, MPH2 and Caleb P. Nelson, MD, MPH1, (1)Urology, Children’s Hospital Boston, Boston, MA, (2)Gastroenterology/Nutrition, Children’s Hospital Boston, Boston, MA

106) 4:02 PM The Development of Upper Urinary Tract Stones In Patients with Neural Tube Defects: Impact of Bladder Augmentation
Heidi A. Penn, MD, Douglass B. Clayton, MD, Stacy T. Tanaka, MD, John C. Thomas, MD, John C. Pope IV, MD, John W. Brock III, MD and Mark C. Adams, MD, Division of Pediatric Urology, Monroe Carell Jr. Children’s Hospital at Vanderbilt, Nashville, TN

107) 4:08 PM Morbidity and Efficacy of Ureteroscopy in Patients with Neurogenic Bladder
Matthew Christman, Angela Kalmus and Pasquale Casale, The Children’s Hospital of Philadelphia, Philadelphia, PA

108) 4:14 PM (ALSO poster # 55) The Effect of Dietary Sodium and Fructose Intake on Urine and Serum Parameters of Stone Formation in a Pediatric Mouse Model
Elizabeth M. Masko1, Michael E. Lipkin, MD2, Michael R. Abern1, Emma H. Allott1, Alexis R. Gaines1, Jonathan C. Routh, MD, MPHP, John Wiener, MD3, Glenn M. Preminger2 and Sherry S. Ross2, (1) Division of Urology, Department of Surgery, Duke University, Durham, NC, (2) Division of Urology, Duke University Medical Center, Durham, NC, (3) Division of Urologic Surgery, Duke University Medical Center, Durham, NC

4:17 PM DISCUSSION

4:25 PM ADJOURN
Lower Health-Related Quality of Life and Psychosocial Difficulties In Children with Nocturnal Enuresis: Is Snoring a Marker of Severity?

Cortney Wolfe-Christensen, PhD, Larisa Kovacevic, MD, FAAP, Jelena D. Mirkovic, MD and Yegappan Lakshmanan, MD, FAAP, Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI

Purpose: Sleep Disordered Breathing (SDB) in children has been linked to numerous negative psychosocial consequences, including lower health-related quality of life (HRQL), an increase in behavioral problems, and impairments in neuropsychological functioning. The prevalence rate of SDB in children with enuresis is 54%, compared to only 3% in the population. We previously reported that children with monosymptomatic nocturnal enuresis (MNE) were 2.47 times more likely to exhibit psychosocial difficulties than children seen in primary care settings, and they also had significantly higher rates of externalizing behaviors (e.g., fights with other children, refuses to share). However, the explanation for these finding was unclear. The aim of the current project was to examine whether snoring, the least severe form of SDB, or HRQL could account for the increased rates of psychosocial difficulties in children with MNE.

Methods: A retrospective chart review was conducted on all patients between the ages of 5 and 16 who were seen in a pediatric urology clinic for nocturnal enuresis between January 2011 and February 2012. Patients with diagnoses of MNE and completed measures of HRQL (OSA-18), sleep disordered breathing (Pediatric Sleep Questionnaire; PSQ), and psychosocial difficulties (Pediatric Symptom Checklist; PSC) were retained for the current study. Patients were categorized into 2 groups (snoring vs. no snoring) based on their score on the snoring subscale of the PSQ, and two multivariate analyses of covariance (MANCOVA), controlling for BMI, were conducted to determine whether the groups differed on any of the PSC or OSAS-18 scales.

Results: One hundred and seven patients (62M, 45F) were included in the study. Mean age of participants was 9.09±2.58 years, and their BMIs ranged from 13 to 49 (M=21.00±6.93). The sample was evenly split between snorers (N=56; 52.3%) and non-snorers (N=51; 47.7%). The overall models for both MANCOVAs were significant [PSC:F(4,97)=2.63, p=.039; OSAS-18: F(6,84)=7.18, p<.001]. Post-hoc comparisons revealed that compared to children with MNE who do not snore, patients with MNE who do snore had significantly more externalizing problems and total psychosocial problems in addition to significantly more impairment in all areas of HRQL (Table 1).
Conclusion: The presence of snoring in children with MNE puts them at increased risk for behavioral and psychosocial problems in addition to impairments in aspects of HRQL. These findings support recommendations for treating SDB in addition to MNE in children.

**Table 1.** Differences between the groups on PSC and OSAS-18 scales

<table>
<thead>
<tr>
<th>Subscale</th>
<th>No Snoring (N=56)</th>
<th>Snoring (N=51)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PSC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Externalizing Problems</td>
<td>2.26±2.73</td>
<td>3.72±2.97</td>
<td>0.014</td>
</tr>
<tr>
<td>Internalizing Problems</td>
<td>1.58±1.52</td>
<td>2.26±3.36</td>
<td>0.470</td>
</tr>
<tr>
<td>Attention Problems</td>
<td>2.89±2.58</td>
<td>3.74±2.37</td>
<td>0.070</td>
</tr>
<tr>
<td>Total Problems</td>
<td>12.51±9.64</td>
<td>19.04±11.03</td>
<td>0.004</td>
</tr>
<tr>
<td><strong>OSAS-18</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep Disturbance</td>
<td>5.45±3.53</td>
<td>11.42±6.27</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Physical Symptoms</td>
<td>5.57±2.78</td>
<td>9.22±5.95</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Emotional Symptoms</td>
<td>6.26±3.88</td>
<td>9.44±5.12</td>
<td>0.002</td>
</tr>
<tr>
<td>Daytime Functioning</td>
<td>6.21±2.80</td>
<td>9.53±4.39</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Caregiver Concerns</td>
<td>7.21±4.74</td>
<td>10.91±6.32</td>
<td>0.003</td>
</tr>
<tr>
<td>Overall HRQL</td>
<td>29.51±12.37</td>
<td>48.22±19.49</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

2) 9:21 AM

Management of Monosymptomatic Nocturnal Enuresis (MNE): American versus European Prospectives

Larisa Kovacevic, MD, FAAP, Cortney Wolfe-Christensen, PhD, Fe Consolacion and Yogappan Lakshmanan, MD, FAAP, Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI

**Purpose:** AAP recommends urinalysis as the only investigation in children with MNE. However, there are no widely accepted guidelines regarding the management of MNE. This study looked at the current worldwide prevalent management of MNE.

**Methods:** We surveyed health professionals in USA and Europe regarding their approach to children with MNE. We collected data on age of intervention, need for initial work-up (urinalysis and renal bladder ultrasound, RBUS) and use of bedwetting alarm as initial treatment in children with MNE. Significant differences between groups were determined using the chi-square test.

**Results:** Surveys were completed by 148 health professionals (137 physicians). Significant differences between American and European physicians, as well as between American and European pediatricians were seen in the recommended age of work-up and the need for RBUS (Table). Significantly more European specialists (Urologists and Nephrologists) ordered RBUS compared to European pediatricians (61.5% vs. 34.8%, p<0.001).
About half of American pediatricians recommended a bedwetting alarm compared to less than one third of European pediatricians. The most common reason for not ordering the alarm was sound sleeping (16/44, 36.3%) and cost (12/44, 27.3%) in the USA, and parental refusal (11/51, 21.5%) and cost (11/51, 21.5%) in Europe. Overall, about half performed urinalysis and about one-third ordered RBUS and recommended a bedwetting alarm as initial intervention. Physicians who saw more than 20 children/month with MNE showed a trend towards using their own experience to make treatment decisions, rather than relying solely on published recommendations (p=0.064).

Table: Survey differences between American and European practice

<table>
<thead>
<tr>
<th>Age of Intervention</th>
<th>&lt;5 years</th>
<th>5-7 years</th>
<th>&gt;7 years</th>
<th>P</th>
<th>RBUS</th>
<th>P</th>
<th>BW alarm</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA HP* (N=79)</td>
<td>14 (18.6%)</td>
<td>30 (40%)</td>
<td>30 (40.5%)</td>
<td>0.001</td>
<td>7 (9.1%)</td>
<td>0.001</td>
<td>36 (51.4%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Europe HP** (N=69)</td>
<td>3 (4.5%)</td>
<td>60 (90.9%)</td>
<td>2 (3%)</td>
<td>0.023</td>
<td>7 (9.5%)</td>
<td>0.004</td>
<td>17 (25%)</td>
<td>0.229</td>
</tr>
<tr>
<td>USA Peds (N=75)</td>
<td>14 (20%)</td>
<td>28 (37.3%)</td>
<td>28 (40%)</td>
<td>0.047</td>
<td>8 (11%)</td>
<td>0.001</td>
<td>36 (51.4%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Europe Peds (N=23)</td>
<td>0</td>
<td>21 (91.3%)</td>
<td>0</td>
<td>0.023</td>
<td>8 (34.7%)</td>
<td>8 (34.7%)</td>
<td>0.023</td>
<td></td>
</tr>
</tbody>
</table>

HP-Health professionals; *75 pediatricians, 4 others; **23 pediatricians, 19 nephrologists, 20 urologists, 7 others

Conclusion: There is a significant difference amongst American pediatricians regarding the age of intervention in MNE. In general, specialists and physicians seeing more enuretic patients are more likely to order RBUS, based on their own experience. For various reasons, bedwetting alarm is not used as commonly as expected. Large prospective studies are needed to clarify the best approach for managing these children.

SESSION 2: TRAUMA

3) 9:27 AM

Pediatric Genital Injury: An Analysis of the National Electronic Injury Surveillance System

Jessica T. Casey, MS, MD1, Marc A. Bjurlin, DO2 and Earl Y. Cheng, MD, FAAP1, (1)Division of Urology, Children’s Memorial Hospital, Chicago, IL, (2)Division of Urology, Department of Surgery, Cook County Hospital, Cook County Health and Hospitals System, Chicago, IL

Purpose: The epidemiology of pediatric genital injuries is not well known. This study sought to describe the characteristics of genital injuries in pediatric patients (≤18 years old) presenting to United States (US) emergency departments (ED).

Methods: A retrospective cohort study utilizing the
US Consumer Product Safety Commission National Electronic Injury Surveillance System (NEISS) from 1991 to 2010 to evaluate pediatric genital injuries was performed. Incidence, descriptive analysis of injury type, location of injury, causes, demographic variables, and hospital disposition were evaluated.

**Results:** From 1991 to 2010, NEISS recorded 19,885 ED visits for genital injury (defined in NEISS as "pubic region" including vagina, penis, scrotum, perineum, but not groin) related to a consumer product or sports activity in patients ≤18 years old, representing an estimate of 521,893 nationwide visits (95% confidence interval (CI): 450,226-669,739). Using US Census data, this represents 0.35 injuries/1,000 children/year. Pediatric genital injuries represented 0.6% of all pediatric injuries. The number of pediatric genital injuries has risen between 1991 and 2010 (see Figure 1). Gender distribution was 56.6% female (CI: 55.9-56.2%) and 43.4% male (CI: 42.7-44.1%). The majority of pediatric genital injuries occurred in those ≤8 years old (0-4 years old: 31.9%, CI: 31.2-32.5%; 5-8 years old: 37.1%, CI: 36.5-37.8%; 9-12 years old: 17.6%, CI: 17.1-18.1%; 13-18 years old: 13.4%, CI: 13.0-13.9%). The overall mean age at pediatric genital injury was 7.1 years old (CI: 7.03-7.16). The most common described diagnosis was laceration (43.3%, CI: 42.6-44.0%), followed by contusion/abrasion (42.2%, CI: 41.5-42.9%). Other diagnoses were rare: foreign body (2.9%, CI: 2.7-3.1%), hematoma (2.8%, CI: 2.6-3.1%), dermatitis (2.5%, CI: 2.2-2.7%), and strain/sprain (2.1%, CI: 1.9-2.3%). The most common consumer products associated with pediatric genital trauma were: bicycles (14.7%, CI: 14.2-15.3%), bath tubs (5.8%, CI: 5.4-6.2%), daywear (5.6%, CI: 5.2-5.9%), monkey bars (5.4%, CI: 5.0-5.7%), and toilets (4.0%, CI: 3.7-4.3%). Of those with a known location of injury, the majority occurred at home (65.9%, CI: 65.3-66.6%), at a sports or recreation place (13.8%, CI: 13.3-14.3%), at school (11.6%, CI: 11.1-12.0%), or on a street or highway (4.8%, CI: 4.5-5.1%). The majority (94.7%, CI: 94.4-95.0%) were treated and released from the ED without admission. There were no recorded fatalities.

**Conclusion:** Pediatric genital injuries related to a consumer product or sports activity represent a small proportion of overall injuries presenting to the ED. They are more common in female patients and those 5-8 years old. The majority were lacerations and contusions or abrasions. Most injuries occurred at home and did not require hospital admission. Further research is needed to determine risk and protective factors associated with injuries in this age group and location to design appropriate prevention strategies.
The Utility of Initial and Follow-up Ultrasound Reevaluation for Blunt Renal Trauma In Children and Adolescents

Stephen J. Canon, MD¹, John Recicar², Christopher J. Swearingen, PhD³, Robert T. Maxson², Leann E. Linam, MD⁴, (1) Urology, University of Arkansas for Medical Sciences, Little Rock, AR, (2) Surgery, Arkansas Children’s Hospital, Little Rock, AR, (3) Pediatrics–Biostatistics, University of Arkansas for Medical Sciences. Arkansas Children’s Hospital, Little Rock, AR, (4) Radiology, University of Arkansas for Medical Sciences, Little Rock, AR

Purpose: With the advent of the “As Low as Reasonably Achievable” concept, ultrasound has been proposed to be an alternative to computed tomography (CT) for the conservative management of children and adolescents with blunt renal injuries. Initial ultrasound reevaluation in this setting has been previously studied, but its utility has been questioned. Standard outpatient follow-up includes CT or magnetic resonance (MR) imaging with no prior reports of ultrasound for follow-up reevaluation. Our hypothesis is that ultrasound can be utilized both for initial and follow-up outpatient reevaluation.

Methods: We initiated a protocol in 2009 utilizing initial and follow-up outpatient renal ultrasound (RUS) reevaluations for children and adolescents treated for blunt renal injuries at our institution. All patients in the protocol (Post) had an initial CT with standard conservative management for stable patients with an initial RUS at day 2 and a repeat RUS with their 2 week post-discharge visit. We retrospectively compared this group to a 2 year cohort with blunt renal trauma treated between 2007-2009 (Pre). Variables compared include age, renal injury severity (American Association for the Surgery of Trauma grading system), length of stay (LOS), imaging reevaluation, surgical intervention, presence of hypertension, and length of follow-up (follow-up visit and/or phone interview). Differences between protocols were estimated using Mann-Whitney-Wilcoxon test for continuous variables and two-group test of equal proportions for binary variables.
Results: 29 patients were treated with the Post protocol, and 22 patients were treated in the Pre cohort. The average age and LOS were Pre 11.1 years and 6 days versus Post 10.8 years and 5.6 days. The average renal injury grades were 2.4 for both groups with average length of follow-up of Pre 40.5 months and Post 14.2 months. Initial reevaluation RUS and outpatient follow-up RUS studies were obtained in 0 and 13 (59.1%) Pre patients versus 21 (72.4%) and 21 (72.4%) Post patients (p <0.001, p =0.318). Repeat CT during admission and with follow-up were obtained in 3 (13.6%) and 1 (4.5%) Pre patients compared to 1 (3.4%) and 1 (3.4%) Post patients (p=0.180, p=0.842). One Pre and 2 Post patients underwent nephrectomy following the initial injury. While no patients in the Pre group required urinary drainage procedures, 2 patients in the Post cohort required intervention (1 ureteral stent and 1 percutaneous drain). Both patients in the Post group who required urinary drainage procedures underwent initial reevaluation with ultrasound followed by a repeat CT in order to formulate a plan of care. No patients developed hypertension with follow-up. 

Conclusion: Initial and follow-up ultrasound outpatient reevaluations can be safely utilized for the conservative management of blunt renal injuries in children and adolescents. The initial ultrasound reevaluation in this setting may be unnecessary since the findings were inconclusive without a repeat CT.

SESSION 3: BASIC SCIENCE FINALISTS

5) 9:45 AM

The Bladder Has Got Rhythm: Involvement of Bladder Circadian Clock and Connexin43 in the Coordination of Diurnal Micturition Rhythm

Hiromitsu Negoro¹, Akiiro Kanematsu¹, Masao Doi¹, Sylvia O. Suadicani², Masaaki Imamura¹, Takeshi Okinami¹, Nobuuki Nishikawa¹, Hitoshi Okamura³, Yasushiko Tabata² and Osamu Ogawa¹, (1)Department of Urology, Graduate School of Medicine, Kyoto University, Kyoto, Japan, (2)Department of Urology, Hyogo College of Medicine, Nishinomiya, Japan, (3)Department of Systems Biology, Graduate School of Pharmaceutical Sciences, Kyoto University, (4)Department of Urology, Albert Einstein College of Medicine, (5)Department of Biomaterials, Institute for Frontier Medical Sciences, Kyoto University

Purpose: The circadian clock is a molecular oscillator system consisting of a group of genes formulating transcription-translation feedback loops, and exists in most body cells and organs. Involvement of the circadian clock is reported in the normal and pathological physiology of various organs, including brain, heart, liver, adrenal grand, and others. However, it is poorly investigated in the urinary bladder. We aimed to investigate the presence of functional circadian clock in the bladder, and to demonstrate its contribution to the
diurnal control of micturition rhythm, associated with genetic oscillation of Connexin43 (Cx43), a gap junction protein in the bladder.

**Methods:** 1. Using a novel method for automatic recording of mouse micturition named automated Voided Stain On Paper (aVSOP) method, micturition of Cx43 heterozygote knock-out mice was compared with that of littermates. 2. Diurnal micturition rhythm in wild-type mice and Cry-null mice, having a dysfunctional biological clock, was measured in 12-hour light/dark and constant dark conditions by aVSOP method, and circadian expressions of Cx43 and clock genes in the bladder were assessed in mRNA and protein levels. 3. Using ex-vivo bladder slice culture of Per2-luciferase knock-in mice, an internal oscillation of the expression of Per2, a clock gene, was recorded. An internal oscillation of Cx43 expression and gap junction function were assessed in cultured rat bladder smooth muscle cells (BSMC), whose circadian clock was synchronized by serum-shock, a method for evaluating clock gene oscillations in-vitro. 5. A transcriptional regulatory link between the circadian clock and Cx43 was investigated by promoter-reporter assay and chromatin-immunoprecipitation assay.

**Results:** Urine volume voided per micturition in heterozygote Cx43 mice was significantly larger than that in littermates (p<0.05 by two-way ANOVA), indicating that Cx43 is a negative regulator of functional bladder capacity. Bladder Cx43 levels and functional bladder capacity showed circadian oscillations in wild-type mice, but such rhythms were completely lost in Cry-null mice. Both bladder smooth muscle ex-vivo and BSMC in-vitro had internal genetic oscillation rhythm, associated with oscillations of Cx43 and gap junction function represented by dye-transfer experiments. A clock regulator, Rev-erba, upregulated Cx43 transcription as a co-factor of a transcription factor Sp1, using Sp1 cis-elements of the promoter.

**Conclusion:** Circadian genetic oscillation of Cx43 is associated with the biological clock and generates circadian rhythm of gap junction function. This may contribute to diurnal changes in functional bladder capacity peaking at resting phase, i.e. light phase for rodents, avoiding disturbance of sleep by micturition. These findings highlight a new insight into pathophysiology of nocturnal enuresis and nocturia, characterized by impairment of the diurnal micturition rhythm.
Development of Liposomal and Polymer-Based Nanoparticles for the Intravesical Delivery of Oxybutynin

Brian M. Rosman, MD1, Mayura Wagle2, Gerard D’Souza, PhD2 and Hiep T. Nguyen, MD, FAAP1, (1)Department of Urology, Children’s Hospital Boston, Boston, MA, (2) Massachusetts College Of Pharmacy and Health Sciences, Boston, MA

Purpose: Oxybutynin is a commonly used drug that acts to relax the urinary system by interrupting the parasympathetic nervous input to the bladder, ureter, and urinary sphincters. Because it is given orally, it frequently has systemic side effects, such as dry eyes, intestinal effects, and arrhythmias. In addition, long-term oral use may impair memory and cognitive development. Our objective was to create stable nanoparticles that can contain and predictably release the water-soluble compound oxybutynin directly to the bladder muscle without causing systemic distribution.

Methods: Liposomes were formed around oxybutynin from phosphatidylcholine and cholesterol (PC-CHOL). Alternative formulations were created, including a polymeric form of sodium alginate and Eudragit RLPO polymer. Each was tested for maximum capture of oxybutynin. All oxybutynin levels were determined using HPLC (free, loaded on nanoparticles, and in tissue). Drug movement through tissue was determined using a Franz diffusion cell, containing a donor and receiver compartment separated by pig bladder tissue. The cell was tested for leaks using methylene blue in the donor compartment. Free oxybutynin was first tested in the
donor compartment to determine pharmacodynamics of its movement through the bladder tissue. Following this, various nanoparticles were tested in the donor compartment, and their pharmacodynamics determined. Fluorescent microscopy was used to visualize tagged nanoparticle penetration into the bladder tissue.

**Results:** PC-CHOL was found to have an oxybutynin capture efficiency of 5-7%. Sodium alginate, after optimization, was found to have a capture efficiency of 87-95%. Eudragit RPLO polymer particles had a capture efficiency of 97%. When comparing free oxybutynin to the liposomal formulation, the liposomal oxybutynin stayed in the tissue for a longer period of time and at higher concentrations than the free oxybutynin. Liposomal particles were seen within the tissue layers of the pig bladder segment.

**Conclusion:** Oxybutynin can be loaded into liposomes with therapeutic doses. Alternative formulations of nanoparticles are extremely efficient at loading oxybutynin. Nanoparticles can penetrate bladder mucosa, remain in the muscle and deliver oxybutynin to its target avoiding system exposure. This novel method of intravesical drug delivery provides high drug dose to the target tissue without systemic exposure, avoiding significant toxicity and side effects.

**Figure 1:** Concentration vs time

![Concentration vs time graph](image)

**Table 1:** Concentration in each compartment

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Total amount administered (ug)</th>
<th>Amount in donor (ug)</th>
<th>Amount in tissue (ug)</th>
<th>Amount in receiver (ug)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxybutynin solution</td>
<td>3000</td>
<td>2928.11</td>
<td>14.08</td>
<td>54.98</td>
</tr>
<tr>
<td>Oxybutynin in PC:Chol liposomes</td>
<td>3000</td>
<td>2912.736</td>
<td>30.74</td>
<td>54.35</td>
</tr>
</tbody>
</table>
Figure 2: Untreated bladder vs Pig Bladder treated with Rhodamine labeled PC: CHOL liposomes

7) 9:57 AM

Inflammatory Response to Escherichia Coli Urinary Tract Infection in the Neurogenic Bladder of the Spinal Cord-Injured (SCI) Host

Rajeev Chaudhry1, Zarine Balsara1, Yuping Tang2, Unwana Nseyo1, John S. Wiener1, Sherry S. Ross1 and Patrick See2,
(1)Division of Urology, (2)Department of Pediatrics, Duke University Medical Center, Durham, NC

Purpose: Urinary tract infections (UTI) cause significant morbidity in patients with neurogenic bladder (NB). Our lab has established an in-vivo model of experimental Escherichia coli UTI in SCI rat. Using this model, we studied the course of acute UTI in NB and found enhanced susceptibility to UTI in SCI rats. The aims of our study are: 1) to determine if spinal cord injury in the absence of infection upregulates gene expression of bladder inflammatory pathways, 2) to compare transcript levels involved in the innate immune response after acute infection between SCI and control rat bladders, and 3) to assess presence of inflammation after early antibiotic therapy after infection in SCI rats as compared to controls.

Methods: Rats underwent T10 spinal cord transection or sham surgery (spinal cord-intact) and were inoculated transurethrally with human cystitis strain E. coli UTI89 at 2 wks post-surgery. Inflammatory pathway transcript levels were measured in bladder tissue from SCI and control animals prior to infection, at 24 hours postinfection (hpi) and after 5 days of treatment with the antibiotic enrofloxacin (7 days post infection total). Urine and tissue bacterial counts were measured in the postinfection animals.

Results: Preinfection arm: Compared to sham, SCI bladders in absence of infection demonstrated greater than 2-fold upregulation in 38% of the 84 innate immune response genes measured. Representative pro-inflammatory chemo/cytokines Cxcl3, IL-6, and 11.1b showed 5.3-fold, 2.3-fold, 3.6-fold upregulation, respectively. Acute infection arm: At 24 hpi, SCI and sham rats exhibited the same CFU counts in urine and bladder tissue (p=0.2 and p=0.4, respectively), despite SCI rats being infected with lower inoculum. Sixty-seven percent
of the measured inflammatory gene transcript levels in the SCI bladders were reduced relative to that of shams in response to infection. Cxcl3, IL-6, and IL-1b transcript levels in sham and SCI bladders increased 6848.3-fold vs. 210.9-fold, 188.5-fold vs. 3.3-fold, and 1539.5-fold vs. 20.9-fold, respectively. Antibiotic treatment arm: Bacteriuria was cleared from all animals by 48 hr of antibiotic treatment. Persistent intracellular bacteria remained in the SCI and sham bladder tissue despite 5 days of therapy Mean IL-6 levels in organ homogenates from SCI and sham rats after 5 days of antibiotics were 7.6± 1.7 vs. 4.2 ± 3.5 pg/mg of bladder tissue, respectively (p=0.4), and 55.3 ± 10.5 vs. 14.6 ± 3.7 pg/mg of kidney tissue (p=0.04).

Conclusion: Spinal cord injury produces increased inflammatory pathway activation at baseline, suggesting that disruption of neural network to bladder may alter the host inflammatory profile. SCI bladders exhibit a dysregulated inflammatory response to E. coli infection as compared to sham bladders. This may lead to increased susceptibility to UTI. Despite clearance of bacteriuria with early antibiotic, SCI animals have persistent inflammation in the urinary tract.

8) 10:03 AM
Social Stress in Mice Induces Overactive Bladder with Upregulation of Nerve Growth Factor
Gerald Mingin Jr., MD, Surgery/Urology, Vermont Children’s Hospital, Burlington, VT
Purpose: To explore the role of social stress in bladder dysfunction. Specifically, how stress alters bladder dynamics and mediates bladder wall remodeling.
Methods: Six week old FVB mice were exposed directly and via barrier cage to C57 retired breeder aggressor mice for periods of 2 to 4 weeks. The FVB mice underwent surgical tube implantation followed by conscious cystometry. Mice were euthanized; the bladders were removed for analysis and immunohistochemistry staining for nerve growth factor (NGF) and histamine. Stressed mice were compared to age matched controls.
Results: Stressed mice exhibited increased micturition intervals and decreased bladder capacity in comparison to controls. The first group (group A, n=3 mice) was exposed to the stress paradigm for a total of two weeks. The second group (group B, n=6 mice) was exposed for 4 weeks. These mice were compared to age matched FVB control mice (n=4 for group A, n=6 for group B). In group A there was a significant difference in the average intermicturition interval (199 ± 9.8 s vs. 321± 56 s; p≤ 0.05) as well as the bladder capacity (83 ± 4.1µl vs. 133 ± 23.5µl; p≤ 0.05) between the stressed mice and the control animals. Nonvoiding contractions (NVCs) were also observed in the stress group at a frequency of 6.1 NVCs/100 seconds compared to control mice that exhibited only two NVCs. There were no significant changes in bladder pressure (filling, threshold or peak)
between the two groups. In the group B stressed animals similar differences in intermicturition interval (218 ± 16.4 d vs. 339 ± 40 s; p ≤ 0.01) and bladder capacity (91 ± 6.8 µl vs. 141 ± 16.7 µl; p ≤ 0.01) were observed between the stressed and control groups of mice. NVCs were seen in the stressed mice at a rate of 5.8/100s, whereas NVCs in the control group were rare. There were no changes in bladder pressure between the stressed and control mice. Cystometry revealed no differences between groups A and B. The bladders of the stressed mice on average weighed more than the control bladders. Immunohistochemistry followed by quantitative Metamorph examination of the bladders from stressed and control mice revealed that NGF expression is increased in all layers of the urothelium and detrusor of the stressed mice, similar results were seen in the analysis of histamine.

**Conclusion:** Social stress leads to overactive bladder in mice. The changes observed in bladder function combined with increased urothelial neuronal proliferation and inflammation underscore the importance of this model as a tool for further exploring the role of stress in bladder dysfunction.

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9) 10:09 AM

**Chronic Cyclic Bladder Over-Distension Upregulates Hypoxia-Dependent Pathways**

Heidi A. Penn, MD1, Stacy T. Tanaka, MD1, Mariana M. Cajaiba, MD2, John C. Thomas, MD1, John C. Pope IV, MD1, Mark C. Adams, MD1, John W. Brock III, MD1 and Douglass B. Clayton, MD1, (1)Division of Pediatric Urology, Monroe Carell Jr. Children’s Hospital at Vanderbilt, Nashville, TN, (2) Department of Pathology, Vanderbilt University, Nashville, TN

**Purpose:** Bladder over-distension secondary to anatomic or functional obstruction can eventually lead to pathologic changes, including decreased elasticity and contractile dysfunction. There has been increasing evidence that ischemia followed by reperfusion and subsequent formation of reactive oxygen species (ROS) may be responsible for the ensuing inflammation and eventual cell death seen from over-distension. We hypothesize that chronic cyclic over-distension in a murine model will activate hypoxia-dependent signaling pathways despite intermittent relief of the distention.

**Methods:** Female C57/Bl6 mice were ovariectomized at 5-6 weeks and subjected to urethral catheterization and infusion of warmed 0.9% saline at 60cmH2O for two hours while under general anesthesia with isoflurane. At the end of the two hours, the bladders were drained and the mice were allowed to recover. This process was repeated for a total of 3 consecutive days. Age-matched ovariectomized mice were subjected to 2 hours of general anesthesia each day without bladder distension and acted as controls. Bladder tissue was harvested and used for H&E staining. Immunohistochemical (IHC) staining for hypoxia markers including glucose transporter-1 and the commercially available antibody, Hypoxyprobe™-1...
was performed. A single pathologist reviewed all slides. Bladder tissue was snap frozen in liquid nitrogen and used for RNA extraction. Hypoxia PCR Array was performed and statistical significance was calculated based on a Student’s t-test of the replicate 2^(- ΔCt) values for each gene in the control treatment groups, and p values less than 0.05 were considered significant.

Results: After 3 consecutive over-distensions, bladders exhibited minimal inflammatory changes on H&E staining. IHC was positive for Hypoxyprobe™-1 and glutamine-1. RT-PCR demonstrated up-regulation of hypoxic genes and their fold changes included: connective tissue growth factor ( +2.97, p = 0.003), transforming growth factor ( +6.14, p = 0.008), hypoxia inducible factor 1 ( +4.57, p = 0.097), vascular endothelial growth factor ( +8.3, p = 0.006), and BCL2-associated x protein (BAX) ( +2.4, p = 0.02).

Conclusion: Intermittent periods of cyclic over-distension create a hypoxic environment and over time may result in abnormal bladder function. This bladder injury model might more closely replicate bladder dysfunction in patients with poor bladder emptying due to neurologic disease and particularly in patients who are not compliant with intermittent catheterization.

10) 10:15 AM

Physiologic Relevance of LL-37 Induced Bladder Inflammation and Mast Cells

Siam Oottamasathien, MD1, Wanjian Jia, MD, PhD1, Lindsi McCoard, BS1, Jianxing Zhang, PhD1, Li Wang, MS1, Xiayang Ye, MS1, A. Cameron Hill1, Justin Savage, PhD1, Wong Yong Lee, DVM, PhD1, AnnMarie Hannon, MSN1, Sylvia Milner, BSN1 and Glenn D. Prestwich, PhD1, (1)Urology, University of Utah, (2)Medicinal Chemistry, University of Utah, (3)Pharmacology, University of Utah, Salt Lake City, UT

Purpose: Inflammatory conditions that afflict the urinary bladder are of significant urologic health concern. Novel inflammatory models to further interrogate mechanisms are needed. We’ve previously shown the naturally occurring urinary anti-microbial peptide LL-37 can induce profound inflammation in a mouse model. Our specific aim was to further establish the physiologic relevance of LL-37 induced bladder inflammation. We first hypothesized human urinary LL-37 levels are elevated in pediatric spina bifida (SB) patients. We further hypothesized within our mouse model that LL-37 induced inflammation occurs via urothelial binding and is dose dependent. Finally, it was hypothesized LL-37 induced inflammation mechanistically involves mast cells.

Methods: To test our first hypothesis, urine samples were obtained from pediatric (<18 y/o) SB (n=56) and normal (n=24) patients. Urinary dipstick ruled out acute infection. Urinary LL-37 levels were measured by ELISA (Hycult Biotech). Our second hypothesis was tested with adult female C57Bl/6 mice placed under
anesthesia, catheterized, then challenged with LL-37 for 1 hr. Six concentrations of LL-37 were tested (10, 20, 40, 80, 160, 320 µM; n=4 for each [ ]). Controls consisted of sterile saline. Animals were sacrificed after 24 hours, examined with gross and H&E histology, and tissue myeloperoxidase (MPO) assay to quantitate inflammation. Fluorescently labeled LL-37 was instilled for 1 hour in separate experiments and tissues obtained either immediately after (t=0) or 24 hours (t=24) to further assess LL-37 activity. To test our final hypothesis, tissues were subjected to immunohistochemistry (IHC) for mast cell tryptase. Mast cell positivity was determined by examining 5 hpf’s for each bladder to yield a mean number of mast cells/mm². Statistical methods for the respective experiments included: Wilcoxon signed-rank, one-way ANOVA, Bonferroni adjustment (p<0.05 significance level, SAS v9.2 software).

**Results:** Urinary LL-37 levels were 89-fold higher in SB patients versus normals (20.43 ng/ml vs. 0.23 ng/ml, p<0.001). In our mouse LL-37 dose escalation experiments, levels of inflammation rose both histologically and with MPO activity, with each successive increase in LL-37 concentration. Fluorescently labeled LL-37 yielded global urothelial binding at t=0, but quickly vanished at t=24. IHC for mast cell tryptase revealed significant infiltration of mast cells in both the urothelial/submucosa and detrusor layers. Higher concentrations of LL-37 challenge led to significantly higher levels of mast cell infiltration (26-fold increase between 320 µM vs. 0 µM, p = 0.0158).

**Conclusion:** Urinary LL-37 levels were significantly elevated in pediatric spina bifida patients. We innovatively demonstrated within our mouse model that a naturally based biologic compound could elicit profound dose dependent bladder inflammation. In addition, LL-37 appears to elicit inflammation through a urothelial mechanism. Finally, the propagation of inflammation appears to intimately involve mast cells. These findings represent the first biologic, non-infectious, non-chemically induced bladder inflammation model that is physiologically relevant.

**11) 10:21 AM**

*Epigenetic Mechanisms Direct Estrogen-Induced Downregulation of Gene Expression and Cell Biological Processes Critical for Genital Tubercle Formation*

Karen J. Aitken, BSc, PhD¹, Jiaxin Jiang¹, Matthew Bechbache, BSc, (pending)¹, Tyler Kirwan¹, Sevan Hopyan, MD, PhD, FRCSC² and Darius Bagli³, (¹)Developmental and Stem Cell Biology, Urology, Hospital for Sick Children, (²)Developmental and Stem Cell Biology, Research Institute; Orthopaedic Surgery, Department of Surgery, Hospital for Sick Children, (³)Division of Urology, Surgery, Developmental and Stem Cell Biology, Research Institute, Hospital for Sick Children, Toronto, ON, Canada
**Purpose:** Hypospadias is associated with in utero Xenoestrogen (XE) exposure (via diethylstilbesterol, vinclozidin, genistein and others), both clinically and experimentally. Conversely, many genes (SHH, WNT5A, β-catenin, HOXA13) are critical for genital tubercle (GT) and urethral development in mouse genetic models. The role of such genes in the response to XE exposure in GTs has been less studied, although XE exert known epigenetic effects. We hypothesized that estrogen exposure might result in altered expression of the aforementioned genes/pathways due to epigenetic regulation resulting in deficits in GT cell biology.

**Methods:** Pregnant Sprague-Dawley rats were given corn oil or corn oil plus 17α-ethinyl-estrogen at embryonic days (ED) 12-17. At ED 18, embryos from treated or untreated dams were examined for lack of sulcus closure in the genital tubercle and cultured in DMEM, 3 days. Human foreskin fibroblasts (BJ cells) were treated every 24 hours with 100 nM of Diethylstibestrol (DES) for 6, 48 and 120 hours +/- 2-deoxy-5-azacytidine (aza) or shRNA against DNMTs, to inhibit DNA methylation. RNA was extracted from cells and tissues for real-time PCR to query expression of candidate genes (WNT5A, HoxA13, DNA methyltransferases (DNMT-1, -3A and -3B, and others) vs housekeeping genes (rpl19, gapdh) using the deltadeltac (t) method. Protein was examined by western blotting. Live cell microscopy of development of the GT with and without estrogen exposure was also performed in myristolyated Venus CD-1 embryos.

**Results:** In foreskin fibroblasts, expression of Wnt5A at 48 hours, and HoxA13 at 120 hours, in cells was downregulated by DES and recovered by azacytidine treatment, p<0.05. Wnt5A expression showed a trend in downregulation in cultured GTs from dams treated with estrogen, p=0.2. β-catenin pathway genes were also downregulated by estrogen treatment, including FN1 p<0.02. Intercalation and migration of cells in subepithelial layers of developing GTs were visualized in embryos at E12.5 to E17.5. Furthermore, in utero estrogen treatment appeared to inhibit migration patterns of cells in estrogen-treated embryos.

**Conclusion:** Estrogen may regulate methylation-dependent candidate gene expression and crucial cell biological traits in the developing genital tubercle.

**SESSION 4: CLINICAL PRIZE FINALISTS**

12) 11:15 AM

**Genito-Urinary (GU) Second Malignant Neoplasms (SMN) In Survivors of Childhood Cancer: A Report from the Childhood Cancer Survivor Study (CCSS)**

Margarett Shnorhavorian, MD, MPH1, Wendy Leisenring, ScD2, Pamela Goodman, MS2, Debra L. Friedman, MD, MS3, Marilyn Stovall, MD4, Lillian Meacham, MD5, Eric Chow, MD6, Charles Sklar, MD7, Lisa Diller, MD8, Fernando A. Ferrer Jr., MD, FAAP9, Greg Armstrong, MD10,
Joseph Neglia, MD, MPH11 and Leslie Robison, PhD10, (1) Urology, Seattle Children Hospital, Seattle, WA, (2) Clinical Statistics and Cancer Prevention Programs, Fred Hutchinson Cancer Research Center, Seattle, WA, (3) Pediatric Oncology, Vanderbilt Ingram Cancer Center, Nashville, TN, (4) Department of Radiation Physics, The University of Texas M.D. Anderson Cancer Center, Houston, TX, (5) Department of Pediatrics, Emory University School of Medicine, Atlanta, GA, (6) Department of Pediatrics, University of Washington, Seattle, WA, (7) Department of Pediatrics, Memorial Sloan-Kettering Cancer Center, New York, NY, (8) Department of Pediatric Oncology, Dana Farber Cancer Institute, Boston, MA, (9) Division of Urology, Connecticut Children’s Medical Center, Hartford, CT, (10) Department of Epidemiology and Cancer Control, St. Jude Children’s Research Hospital, Memphis, TN, (11) Department of Pediatrics, University of Minnesota

**Purpose:** To describe the occurrence of GU SMNs among five year survivors in the CCSS cohort.

**Methods:** Among 14,358 five-year survivors, cumulative incidence of first GU SMN was calculated using death as a competing risk. Standardized Incidence Ratios (SIRs) were calculated using age- sex- year- specific rates from the SEER program.

**Results:** A total of 72 GU SMNs were identified among 68 subjects. Median age at diagnosis of first GU SMN was 31.0 years (range 9.0-51.0), occurring a median of 21.9 years (range 6.3-35.7) after primary cancer. Among GU SMN cases, 68.4% had received radiation therapy (RT) involving the GU system. Sites of first GU SMN included: 27 female reproductive (13.2% ovary, 11.8% endometrium, 7.4% cervix, 2.9% uterus, 2.9% vulva), 24 kidney (35.3%), 10 bladder (14.7%) and 7 male reproductive (5.9% testes, 4.4% prostate). Most common histologies included: 24 renal cell carcinoma (24.3%), 7 adenocarcinoma (9.7%), 5 transitional cell carcinoma (6.9%), and 5 endometrioid carcinoma (6.9%). The overall cumulative incidence at 30 years post diagnosis was 0.6% (95% CI: 0.4-0.8%) and SIR was 11.6 (95% CI: 9.1-14.7). Cumulative incidence was significantly higher for females (0.7%; 95% CI: 0.5-1.0%) as compared to males (0.5%; 95% CI 0.2%-0.7%) (p=0.01) as were SIRs (females: 20.9; 95%CI 15.4-28.4; males: 6.5; 95% CI: 4.3-9.6; p<0.001). Cumulative incidence did not significantly differ between exposure levels of GU RT and risk was elevated in comparison to the general population among those with no GU RT (SIR 12.1; 95% CI: 7.5-19.6), <2000 cGy (SIR 8.4; 95% CI: 5.6-12.7), and RT ≥2000 (SIR 20.6; 95%CI 11.7-36.2).

**Conclusion:** Although the absolute cumulative incidence is low, survivors of childhood cancer are at significantly increased risk for a GU SMN. In particular, female survivors and survivors with GU RT ≥ 2000 cGy have highest elevated risk for a GU SMN.
Nebulization of Bupivacaine Intra-Abdominally Reduces Post-Operative Shoulder Pain and Opioid Use In Children Undergoing Robotic-Assisted Urologic Surgery

Lorenzo F. M. Trevisani¹, Constance S. Houck², Gustavo N.C. Inoue¹, Brian M. Rosman¹, Petra M. Meier², Carlos Munoz-San Julian¹, Courtney K. Rowe¹, Vitor C. Zanetta¹, Hiep T. Nguyen¹ and Carlo C. Passerotti³, (¹)Urology, Children’s Hospital Boston, Boston, MA, (²)Anesthesiology, Children’s Hospital Boston, Boston, MA, (³)Urology, UNINOVE, São Paulo, Brazil

Purpose: Laparoscopic surgery has been shown to decrease the severity of postoperative pain in children compared to open surgery. However, patients still complain about diffuse abdominal and shoulder pain. Our objective was to assess the effectiveness of the administration of intraperitoneal bupivacaine in reducing post-operative pain and opioid use.

Methods: This is a prospective, randomized, controlled, double-blinded clinical trial. To date, 75 patients between 5 and 18 years of age that had robot-assisted laparoscopic surgery have been enrolled. Patients were randomized to receive either intraperitoneal bupivacaine (1.25 mg/kg) or an equivalent volume of saline after establishment of the pneumoperitoneum utilizing either a micro-pump nebulizer or an aerosolizer. Patients in the nebulizer group received undiluted 0.5% bupivacaine while patients in the aerosolizer group received the same dose of bupivacaine but diluted so that all patients received a total volume of 30 mL. Postoperative pain scores were recorded at defined time points, along with pain characteristics and cumulative opioid dose for 24 hours postoperatively.

Results: 39 patients received bupivacaine (26 aerosolized, 13 nebulized) and 36 received saline (25 aerosolized, 11 nebulized). There were no differences in demographic characteristics or length of surgery between the treatment and control groups. Pain scores were not different at any time point but patients in the saline group reported significantly more shoulder pain postoperatively. (Table 1). Patients in the nebulizer group (both saline and bupivacaine) demonstrated a decreasing trend in the use of opioids as compared to the aerosolization group. More importantly, the nebulized bupivacaine group required significantly less opioid when compared to the saline group. (Figure 1). There were no adverse effects from bupivacaine reported, and the systemic absorption as measured in the peripheral blood was minimal.

Conclusion: Nebulized bupivacaine given at the beginning of the procedure can reduce shoulder pain and opioid requirements postoperatively. This study is ongoing but these preliminary results suggest that it may be an effective and safe addition to the anesthetic protocol to reduce the diffuse abdominal and shoulder pain after laparoscopic surgery.
**Table 1**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Bupivacaine (n=39)</th>
<th>Saline (n=36)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal diffuse/ non specified</td>
<td>6 (42.8%)</td>
<td>8 (57.7%)</td>
<td>0.322</td>
</tr>
<tr>
<td>Shoulder</td>
<td>2 (16.7%)</td>
<td>10 (83.3%)</td>
<td>0.008</td>
</tr>
<tr>
<td>Bladder</td>
<td>6 (60%)</td>
<td>4 (40%)</td>
<td>0.421</td>
</tr>
<tr>
<td>Incisional</td>
<td>5 (55.5%)</td>
<td>4 (44.5%)</td>
<td>0.552</td>
</tr>
<tr>
<td>Stomach</td>
<td>1 (50%)</td>
<td>1 (50%)</td>
<td>0.733</td>
</tr>
<tr>
<td>Catheter</td>
<td>3 (75%)</td>
<td>1 (25%)</td>
<td>0.338</td>
</tr>
<tr>
<td>Other</td>
<td>1 (50%)</td>
<td>1 (50%)</td>
<td>0.733</td>
</tr>
</tbody>
</table>

*Chi-square

14) 11:27 AM

**Kinetic and Kinematic Evaluation of Walking Joints in Bladder Exstrophy Patients with and without Osteotomy**

Antonio Zaccara¹, Armando Marciano¹, Maurizio Petrarcha², Giovanni Mosiello¹, Maria Luisa Capitanucci¹, Mario DE Gennaro¹, Paolo Caione¹, Sacha Carnie², Gessica Della Bella², Ivan Aloit and Enrico Castelli³, (1)Urology, Bambino Gesu’ Children’s Hospital, Rome, Italy, (2)Movement Analysis and Robotic Laboratory, Pediatric Neurorehabilitation Division, Bambino Gesu’ Children’s Hospital, Rome, Italy, (3)Pediatric Neurorehabilitation Division, Bambino Gesu’ Children’s Hospital, Rome, Italy

**Purpose:** Bony pelvis anomalies in bladder exstrophy have prompted a great deal of papers addressing biomechanical analysis and kinematic of walking joints. However, a direct evaluation of forces applied to each joint (moments and powers) has never been performed nor has it been correlated to osteotomy

**Methods:** Exstrophy patients in a collaborative age were asked to participate in gait studies using a Vicon MX, a 3-dimensional motion analysis system with 8 cameras – kinematics - and two force plates (AMTI, USA) - kinetics. Kinematics analysis included pelvic tilt and hip, knee and ankle flexion-extension angles. Kinetics analysis consisted in the evaluation of hip, knee and ankle moments
and powers. Normal healthy peers acted as controls. Correlations were sought between extrophy patients and controls and between patients non osteotomized (Group 1) and those with osteotomy (Group 2). In particular, were analyzed: (i) knee angle at contact with floor, during load response, in late stance and during swing; (ii) pelvic tilt angle at contact with floor and the absolute maximum of posterior tilt; (iii) maximum knee flexor moment during early stance (K-fm); (iv) maximum knee extensor moment during late stance (K-em); (v) maximum knee power generation during late stance (k-p). Anova statistical test and Bonferroni post-hoc test was performed with Spss software (p<0.05).

**Results:** Nineteen patients were recruited, ranging in age from 5 to 22 years. Two patients underwent complete primary repair and 17 staged repair. Group 1 consisted of 13 extrophy patients without osteotomy and Group 2 consisted of 6 osteotomized patients, 4 anteriorly and 2 posteriorly. Mean value of the kinematic and kinetic indexes analyzed showed statistically significant differences for all values, between patients and controls, with the only exception for the ankle plantar flexion.

Maximum flexor moment values of the knee increased in patients respect to control group (K-fm 0.41±0.17 Nmkg / 0.25±0.19 Nmkg for patients and controls respectively), while decreased both the maximum extensor moment (K-em -0.20±0.35 Nmkg / -0.43±0.20 Nmkg for patients and controls respectively) and maximum power generation (K-p 0.15±0.19 W/kg / 0.85±0.50 W/kg for patients and controls respectively). The comparison between Group1, Group2 and controls revealed that patient that received osteotomy (Group2) showed the greatest differences with controls.

**Conclusions:** Normal walking in extrophy patients can be achieved at the prize of retroversion of the whole body center of mass which puts knee joint in a state of permanent flexion. This, in turn, leads to increased flexor moment and to decreased extensor moment and power generation at the knee joint. Such modifications are more evident in patients receiving osteotomy. Impaired kinetics at the knee joint should be disclosed early thereby prompting rehabilitative treatment with the aim to prevent joint and tendon diseases.

15) 11:33 AM
**Histology of Testicular Biopsy Specimens Obtained for Cryopreservation and Future Re-Implantation as a Fertility-Preserving Technique**

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Purpose: Therapeutic advances resulting in increased cure rates of childhood cancers have allowed greater focus upon survivorship issues, such as fertility preservation. For adolescents and young men, sperm banking is a viable option and clinically available at most cancer centers. However, successful collection of a sperm specimen is generally not possible for pre- or peri-pubertal boys. We are currently examining the feasibility of cryopreservation of testicular biopsy with subsequent assisted reproduction/re-implantation of germ cells after completion of anti-cancer treatment. We hypothesize that the testis histology in these oncology patients will be normal for age and present the preliminary histologic findings of these specimens.

Methods: Young males unable to sperm bank, most of whom were pre-pubertal, at significant risk of therapy-associated gonadotoxicity were eligible for this study. Open testicular biopsy was performed while patients were under anesthesia for another treatment-related operation, such as central catheter placement. Half of each specimen was cryopreserved for future clinical use, while the other half was divided for histopathologic analysis and murine xenograft studies.

Results: Thirty-four patients (ages 4 months – 17.5 years) underwent open testicular biopsy. In 7, insufficient tissue was obtained for full histologic analysis, although adequate tissue was obtained for cryopreservation. Most children had solid tumors (N = 22). Five children in this study had non-malignant diseases requiring cytotoxic conditioning for bone marrow transplantation. Twenty-two testis specimens (81.5%) had normal number of total germ cells per tubule for their age, while the remaining 5 specimens (18.5%) showed increased germ cells. When adjusted for their age, 11 children (40.7%) had neither adult dark spermatogonia nor primary spermatocytes, suggestive of possible abnormal maturation of germ cells. However, fetal gonocytes, another indicator of abnormal maturation if present after 6 months of age, were not present in any specimen. Only one child had an absence of Leydig cells, this was also the only child with evidence of testicular fibrosis and atrophy. One child also had microlithiasis. No specimens had evidence of either carcinoma in-situ or metastatic cancer.

Conclusion: Cryopreservation of testicular tissue with subsequent surgical re-implantation is a novel experimental approach that may allow future fertility for children following anti-cancer treatment. Murine xenograft studies with implanted testicular tissue are ongoing to evaluate the feasibility of the ART/re-implantation process and the viability of the tissue. Although the human germ cell re-implantation component has not yet been evaluated clinically, our testicular histologic analyses demonstrate age-adjusted...
delayed maturation of spermatogenesis in many of these biopsy specimens. Further investigation on the impact of these preliminary histologic findings is warranted with the goal of improving future fertility for children treated with gonadotoxic therapies.

16) 11:39 AM


Eric Z. Massanyi, MD1, Janae Preece, MD2, Susan M. Lin3, Angela Gupta, MD3 and Ming-Hsien Wang, MD1, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)Division of Urology, University of Maryland Medical Center, Baltimore, MD, (3)Johns Hopkins School of Medicine, Baltimore, MD

Purpose: Classically, children with febrile urinary tract infection (UTI) were screened for vesicoureteral reflux (VUR) by voiding cystourethrogram (VCUG). Changes to the AAP’s guideline regarding the management of children less than 2 years of age who present with initial febrile UTI suggest that a normal screening renal ultrasound (RUS) precludes the need for VCUG. While this practice reduces the need for invasive, radiation-based VCUG, it remains unclear how often patients with clinically significant VUR may be initially overlooked due to normal RUS. The authors conducted a single institutional study of young children presenting for evaluation of febrile UTI and the utility of initial US for the diagnosis of VUR.

Methods: An IRB-approved retrospective review was performed of all children ages zero through two years who were evaluated at our clinic for febrile UTI between 2004 and 2011. Initial RUS results were examined among those patients who were discovered to have renal scarring or required anti-reflux surgery. Additionally, all children who underwent both RUS and VCUG were identified to evaluate the negative predictive value (NPV) and sensitivity of RUS for VUR.

Results: Between 2004 and 2011, 144 patients with no other known urologic disease were evaluated at our institution for febrile UTI that occurred less than 2 years of age. Initial RUS was normal in 12/19 (63%) patients who ultimately underwent anti-reflux procedures. Eighteen patients were found to have renal scarring on DMSA scan and initial RUS was normal in 11 (61%). Among patients in whom both initial RUS and VCUG data were available, 217 kidneys in 90 patients were evaluated. Of the 181 kidneys found to be normal on initial RUS, 136 had evidence of VUR, 31 of which were grades IV - V, yielding negative predictive values (NPV) of 25% (all grades) and 83% (grades IV - V). Of the 36 kidneys with hydronephrosis, 22 were found to have VUR, and 14 were grades IV - V. Among the 6 kidneys with grade 3 or 4 hydronephrosis, 3 (50%) were found to
have grade V VUR. Overall sensitivity of RUS for VUR was 14% (all grades) and 31% (grades IV - V).

**Conclusion:** For children between 0 and 2 years of age who presented with febrile UTI at this institution, RUS had poor sensitivity and NPV for VUR. Furthermore, in a subset of patients who eventually required anti-reflux procedures or developed renal scarring, the majority had a normal initial RUS. These findings suggest that RUS alone may leave many children with potentially clinically significant VUR undiagnosed after initial evaluation. Further studies will be needed to understand long-term clinical outcomes in light of the new AAP guideline.

17) 11:45 AM

**Urethral Strictures Following Urethral Plate and Proximal Urethral Elevation during Proximal TIP**

**Hypospadias Repair**

Warren T. Snodgrass, MD, Candace F. Granberg, MD, and Nicol Corbin Bush, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX

**Purpose:** Dissection of the urethral plate ± the normal proximal urethra off the corpora cavernosa has been performed in order to reduce ventral curvature while maintaining the urethral plate (UP) for urethroplasty by a variety of techniques. We previously reported no difference in outcomes for proximal TIP with versus without UP + normal proximal urethral elevation. Despite similar overall complication rates, neourethral strictures have been noted after UP + proximal urethral elevation, which we now report.

**Methods:** Consecutive patients undergoing proximal TIP repair were recorded in a prospectively maintained database, reviewed for this analysis. Beginning in 2006, UP + proximal urethral elevation was performed for persistent ventral curvature >30° despite degloving and ventral dartos dissection. Patients with <30° curvature underwent single dorsal plication and did not have UP + proximal urethral elevation. Both groups underwent TIP by WS using identical sutures and suturing methods. Strictures were suspected by symptoms of stranguria or urinary infection, and confirmed by cystoscopy.

**Results:** There were 79 consecutive proximal TIP patients, with median follow up 13 months (6w-82m) in 74, including 45 without and 29 with UP + proximal urethral elevation. No strictures occurred in the 45 without proximal urethral elevation, versus 5/29 (17%) in those with UP + proximal urethral elevation (p=0.01). Stricture diagnosis was made at a median of 2 months post-operatively (range 6 weeks – 14 months) for febrile UTI (n=2), urinary retention (n=1), and both (n=2). Strictures were located in the mid-distal shaft and ranged from 0.1-1.5cm. Three were corrected using 1-stage dorsal inlay grafts, while 2 required 2-stage grafting, creating a neo-urethral plate for later tubularization.

**Conclusion:** Although UP + proximal urethral elevation can achieve straightening with preservation of the UP,
TIP repair with this maneuver has an increased risk for stricture versus proximal TIP without it. Patients with persistent ventral curvature >30° after degloving and ventral dartos dissection requiring UP + proximal urethral mobilization may be better suited for inlay grafting of the TIP incision, or an alternative urethroplasty technique.

18) 11:51 AM
Management of the Retroperitoneum in Children and Adolescents with Malignant Germ Cell Tumors of the Testis

Jonathan H. Ross, MD, FAAP1, Deborah Billmire, MD, FAAP2, Frederick J. Rescorla, MD, FAAP2, Thomas A. Olson, MD3, Marc G. Schlatter, MD, FACS4, A. Lindsay Frazier, MD, ScM5 (1)Pediatric Urology, University Hospitals Rainbow Babies and Children’s Hospital, Cleveland, OH, (2)Pediatric Surgery, JW Riley Hospital for Children, Indianapolis, IN, (3) Pediatric Hematology/Oncology, Emory University School of Medicine, Atlanta, GA, (4)Pediatric Surgery, Helen DeVos Children’s Hospital, Grand Rapids, MI, (5) Pediatric Hematology/Oncology, Dana-Farber Cancer Institute, Boston, MA

Purpose: To assess the current management of the retroperitoneum (RP) in children and adolescents with malignant testicular germ cell tumors (GCT).

Methods: We reviewed the records of 98 boys with testicular GCT enrolled in the intergroup POG/CCSG protocols from 1990-1996 regarding management of the RP, histologic findings, and outcome.

Results: The age distribution for the patients was bimodal with all pure yolk sac tumors (YST) (n=57) occurring in boys under 10 years of age and all embryonal, seminoma, and mixed germ cell tumors (ESMGCT) (n=36) occurring in boys over 10 years old. 14 RP operations were performed in patients with YST before chemotherapy. Available pathology revealed metastatic YST in 10 patients (lymph node sizes ranging from 1.8 – 6.2cm) and benign lymph nodes in 3 patients (all <=2.3cm). In 3 RP operations performed in patients with YST following chemotherapy, 2 excised residual masses revealed necrosis and 1 lymph node sampling in a patient with a CR revealed benign lymph nodes. AFP was available for 2 of these patients and was normal. No patient with YST died. 1 RP operations were performed in patients with ESMGCT before chemotherapy all of which were positive for malignant GCT. Lymph nodes measured 0.8 – 14cm in size. 14 ESMGCT patients had RP surgery following chemotherapy for a residual mass revealing 2 GCT, 5 teratomas, 6 necrosis, and 1 neurofibrosarcoma. 4 patients in the study died. 1 patient with neurofibromatosis developed a RP neurofibrosarcoma. The other 3 had stage 4 ESMGCT. 1 of these patients received chemotherapy followed by biopsy of residual liver and RP masses. Pathology revealed teratoma and 1 year later he had a total RPLND for a growing mass which revealed teratoma with
undifferentiated blastic and sarcomatous elements.

**Conclusion:** For prepubertal patients with YST, pre-chemotherapy RP surgery may be unnecessary as large nodes (> 2.3 cm in this study) can be assumed to be positive and small nodes presumed negative that progress can be salvaged with chemotherapy. For adolescents with malignant GCT this limited data suggests that neither pre-chemotherapy biopsy of large nodes nor staging RPLND for clinical stage 1 disease are crucial for survival. Surgical resection or biopsy of a post-chemotherapy RP mass is appropriate in adolescent patients because of the possibility of finding malignant GCT or teratoma. One of the patient deaths suggests that a full RPLND may be appropriate for patient with RP teratoma. Whether biopsy or observation is best for post-chemotherapy masses in YST patients is unknown – both patients in this study had necrotic tumor. Consistent surgical approaches based on clearer guidelines in future protocols will allow better evaluation of how surgical management impacts outcomes and the role of tumor markers and lymph node size in stratifying RP management.

**SESSION 5: EDUCATION**

19) 12:10 PM

Training for Prenatal Consultation for “Pyelectasis” – E-Learning Improves Concordance in Clinical Practices

Max Maizels, MD¹, LaTasha Nelson, MD², C.D.A. Herndon, MD³, Erin Rowell, MD⁴, (1)Urology, Children’s Memorial Hospital, Chicago, IL, (2) Maternal Fetal Medicine, Northwestern Memorial Hospital / Prentice Women’s Hospital, Chicago, IL, (3)Surgery/Section of Pediatric Urology, University of Alabama at Birmingham, Birmingham, AL, (4) Pediatric Surgery, Children’s Memorial Hospital, Northwestern University, Chicago, IL

**Purpose:** For over three decades Pediatric Urologists and Maternal Fetal Medicine (MFM) physicians have been performing prenatal consultations for pediatric urological findings on fetal ultrasonography, most frequently “pyelectasis”. Despite this vast clinical experience, we are unaware of any line of research on this activity. Therefore, the authors collaborated to survey members of Society for Fetal Urology and MFM physicians on their views of needs in this consultation process and to create a structure to satisfy the needs.

**Methods:** The study design is pre- / post-survey testing along with educational intervention. Enrollment of study subjects was by email invitation to registered members of Society for Fetal Urology (270) and local MFM physicians (10). Study subjects enrolled completed a brief intake survey and then could elect to access an e-learning module, which included a post-survey. Statistical significance of categorical data was by Chi square (p<.05).
Results: There were 40 subjects who enrolled in the research including attending physicians (37) (92%) at 34 residency training programs. Intake Survey. The salient survey results are as follows. The most common training method in residency was clinical immersion (70%). While the majority of subjects (93%) now perform such consultations, only 50% of them were comfortable doing so. Furthermore, only 50% report that they personally review ultrasounds during consultation, and only 25% work directly with their institution’s MFM’s. There was agreement at only 50% on important diverse clinical topics including: diagnosis of fetal renal dilatation, intervals for follow up prenatal ultrasonography testing, likelihood of newborn findings if fetal dilation progressed during pregnancy. The agreement was even lower at only about 30% on prognosis of clinical newborn outcomes in two common case scenarios. Post Survey. Of 13 subjects who accessed the e-learning intervention, there was a significant increase in agreement by concordance on: diagnosis of fetal renal dilatation (p< 0.003), recognition of the value of working with the institutional MFM (p<.02), and in prognosis of clinical newborn outcomes in the same two common case scenarios (P<0.0001).

Conclusion: We show the routine of training residents for prenatal consultation by clinical immersion is associated with clinical management practice discordance as attendings. After access to e-learning there is significant increase in concordance. We plan to extend the use of e-learning to train performance of such consultation in order to improve concordance of clinical management practices.

20) 12:16 PM Perceptions of Competence in Pediatric Urology after Residency Training

Michaella M. Prasad, MD1, Jessica T. Casey, MS, MD1, Jennie Mickelson, MD, FRCS1 and Elizabeth B. Yerkes, MD, FAAP1, (1)Division of Urology, Children’s Memorial Hospital, Chicago, IL, (2)Department of Urologic Sciences, University of British Columbia, Vancouver, BC, Canada

Purpose: The American Board of Urology approved a subspecialty Certificate of Added Qualification (CAQ) for Pediatric Urology (PU) in 2008 to recognize additional training and completion of a certifying examination. There have been concerns that this would adversely impact the practice of the general urologist. We issued a survey to assess the perceptions among urologists at different stages in their careers regarding how likely they would be to perform certain pediatric procedures now that the CAQ is in place. We would like to determine which procedures graduates feel competent to perform without further fellowship training and compare that with the practice patterns of established urologists.
Methods: A survey was emailed to 8,889 American members of the American Urological Association (AUA). Demographic data was collected including age, gender, amount/quality of PU training, practice setting and AUA section. The respondents were directed to specific surveys based on his/her reported level of expertise (resident/fellow (RF), practicing urologist (UR), practicing pediatric urologist (PED), program director (PD)) and asked to comment on the CAQ and its effect on their current or intended patient population. Respondents were then asked to rate their expected/current technical competence for 24 pediatric procedures and whether they do or expect to perform those procedures in practice on patients <16 years of age.

Results: A total of 876 respondents completed the survey (9.85%) with the following levels of expertise represented: 42 PD (33.33%), 107 PED (14.70%), 124 RF (8.08%), 603 UR (9.28%). Respondents were overwhelmingly male (87.2%) and 83.4% were between 31-60 years of age. Across all groups, the average time spent on training today’s graduating residents will perform more pediatric procedures without additional training (8 and 7, respectively) then a majority RF expect to do (6) and more than UR (4) currently perform. These procedures are all in the Minor index category of residents’ case logs. Furthermore, a majority of PD felt that today’s residents were technically competent to perform more procedures (18) of higher complexity without additional training, in contrast to PED (11), RF (14) and UR (15). The majority of PD (64.3%) advise their residents to operate on patients <16 years of age without a fellowship, if they are referred to them.

Conclusion: PD continue to support graduating residents’ ability to operate on pediatric patients and a majority of PED view today’s residents as technically competent to perform minor PIU procedures without further fellowship training. However, a majority of UR only perform 4 minor PIU operations routinely. Exposure to PIU remains an important component of residency instruction which may be utilized in practice, despite the CAQ.

Computer Enhanced Visual Learning (CEVL) Module Significantly Improves Resident Training In a Basic Pediatric Urology Procedure: Sleeve Circumcision
Blake W. Palmer, MD1, Bradley Kropp, MD1 and Max Maizels, MD2, (1) Pediatric Urology, University of Oklahoma, Oklahoma City, OK, (2) Urology, Children’s Memorial Hospital, Chicago, IL.

Purpose: We are researching tools to teach and assess pediatric urology resident surgical training because our specialty will need such tools to determine objectively if trainees have met set standards. Herein, we research the impact of the Computer Enhanced Visual Learning
(CEVL) method on training residents to perform a basic pediatric urology procedure, sleeve circumcision.

**Methods:** The study design is prospective nonrandomized comparison of training of surgical skills in two groups (CEVL-naïve vs. CEVL aware). Briefly, the CEVL method is as follows. First, a CEVL e-learning is created as a multimedia online interactive instructional module that guides the resident step by step through the procedure as performed by the local institution. Next, residents access CEVL to study the procedure during on or off duty hours. They suffice an online surgical readiness test prior to surgery. Skill performance scores (Likert ratings 1-7) drive the provision of feedback and remediation. To permit intergroup statistical comparisons the performance score was scaled (0-100) then modulated for both case difficulty (1-5) and the percentage of the procedure the resident performed as the lead surgeon. CEVL modules show face and content validity being judged as realistic and a useful educational tool by residents.

Performance of Sleeve Circumcision: From 9/1/11 to 4/10/12 residents were evaluated on their performance after each sleeve circumcision as either CEVL naïve (before 1-31-2012) or CEVL aware (after 2-1-2012). The CEVL naïve group prepared for circumcision using traditional methods; the CEVL aware group accessed CEVL to prepare for circumcision. All residents were informed that their performance was being evaluated. For each case done one author (BP) assessed performance of the 10 procedure components and an inventory of 7 general surgical abilities. Attainment of training “proficiency” was defined as a score of > 80% and of “skilled” as > 90%.

**Results:** All Urology residents (7) enrolled in the study performed 62 circumcisions (PGY 2=1, PGY 3=50, and PGY 4=11). Overall, the CEVL aware group showed a higher score (mean=92.7) vs. CEVL naïve (mean=79) (t (48) =5.35, p<0.0005). Additionally, subgroup analysis of PGY3 residents shows scores of the CEVL aware PGY3 residents was significantly higher (mean=92) than the CEVL naïve subgroup scores (mean=78) (t (43) =5.26, p<0.0005). Training as assessed by attainment of proficiency and skill required fewer cases for CEVL aware group than the CEVL naïve group (mean=1 vs 11.2 cases for proficiency and 2.6 vs 15 cases for skill acquisition, respectively).

**Conclusion:** We show resident utilization of a CEVL module to prepare for sleeve circumcision improves training as demonstrated by significantly higher surgical performance scores and fewer cases performed in order to attain proficiency and skill. We propose further research using the CEVL method will help develop “gold standards” to train pediatric urology residents to do surgery.
Pediatric Robotic Urology Training: When Does the Going Get Good?
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**Purpose:** Achieving technical proficiency during surgical training is demanding secondary to exponential growth in technology as well as restrictive work hours. The advent of robotic surgery has created a new “learning curve” for attending urologists. However, little is known about the number of robotic cases needed to reach proficiency during fellowship training in pediatric urology. We hypothesize that fellows can approach near expert level within the two-year time frame of pediatric urologic fellowship.

**Methods:** We prospectively collected the surgical console times in 20 consecutive robotic pyeloplasty cases of four pediatric urology fellows when they performed 75% or more of the console time. The console times were compared to 20 consecutive robotic pyeloplasty cases where the attending alone (PC) performed 100% of the console time. All times were validated post procedure by viewing the surgical video and confirming times of console switching. Console times were rounded up to the nearest minute. The time for surgeon exchange was included in the procedure time. Only console time was evaluated; positioning, prepping and draping the patient, obtaining laparoscopic access, and wound closure were excluded due to participation of other team members.

**Results:** The mean console time for the attending operating alone was 54 minutes. The operative times for the cases in which the fellow performed 75% of the case decreased with increasing number of cases done (Figure 1). Assuming the trend of increasing efficiency continues at the same rate, operative times for fellows are projected to be equal to that of the attending urologist once 42 cases have been performed (Figure 2). All pyeloplasties were successful as demonstrated by post-operative radiologic improvement and there were no complications.

**Conclusion:** Operative times for robotic pyeloplasty performed by fellows consistently decreased with increasing experience. We believe that with the appropriate exposure to robotics, the learning curve for robotic pyeloplasty can be overcome during a two-year pediatric urology fellowship, enabling newly graduated fellows to be proficient in robotic surgery.
Figure 1. Fellow console time consistently decreased by doing more cases

SESSION 6: MISCELLANEOUS I

23) 1:45 PM

Reduction in Patient Radiation Exposure during Ureteroscopy Through the Use of a Pre-Fluoroscopy Checklist

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Purpose: Medical radiation exposure is a significant concern, particularly in the pediatric population. Previously, we prospectively measured radiation exposure during retrograde ureteroscopy (URS) for urolithiasis in children, and documented substantial exposure to these patients. Based on these findings, we identified potential sources of excess exposure and developed an intervention centered around a checklist. We sought to evaluate whether implementation of this systematic intervention...
would reduce radiation exposure during pediatric URS.

Methods: Using the factors identified in our prospective radiation measurements, we developed pre-fluoroscopy quality checklist to be used in the operating room during pediatric URS for urolithiasis. This checklist was instituted as part of a larger quality improvement initiative. The checklist specifically addresses issues regarding positioning of the patient and c-arm, settings on the fluoroscope, and communication between surgeon and technologist. Pre-operative patient characteristics, operative factors, fluoroscopy settings and radiation exposure were recorded before and after implementation of the checklist. Primary radiation exposure outcomes were entrance skin dose (ESD, in mGy) and midline dose (MLD, in mGy), calculated based on output from the fluoroscopy unit and positioning and size of the patient.

Results: Results of 37 procedures performed during the pre-intervention phase were compared with those of 23 procedures during the intervention phase. Pre- and post-checklist groups were similar with regard to patient age (mean 14.8±4.0 vs 15.3±5.8 yrs), total surgical time (mean 72.8±45.4 vs 71.5±36.4 min), or patient thickness (mean 18.6±4.3 vs 17.7±3.5 cm). Mean ESD was reduced by 87% (mean 46.4±48.0 vs 6.4±8.5 mGy, p<0.01) and mean MLD by 86% (mean 6.2±5.0 vs 0.9±0.8 mGy, p<0.01). Significant improvements were noted among the major determinants of radiation dose including the total fluoroscopy time reduced 66% (mean 2.7±1.8 vs 0.9±0.9, p<0.01), dose rate setting appropriately reduced setting in 91% vs 51% (p<0.01), and excess skin to intensifier distance reduced by 74% (mean 12.3±6.7 vs 3.2±5.1, p<0.01).

Conclusion: Implementation of a pre-fluoroscopy checklist, as part of an intervention aimed at reduction in radiation exposure, resulted in statistically and clinically significant reductions in radiation exposure to patients during pediatric ureteroscopy. This simple tool, and the larger awareness of radiation issues it promotes in the operating room, can have a dramatic impact in exposure to children undergoing endourologic procedures.

24) 1:51 PM
High Incidence of Urologic Manifestations in Duchenne Muscular Dystrophy
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Purpose: Duchenne muscular dystrophy (DMD) is a dystrophinopathy with multiple organ system complications. Patients are seen by a multi-disciplinary team of physicians, most commonly including a neurologist, pulmonologist and cardiologist. Improvements in care have altered the clinical course
and extended the life expectancy of patients. Despite this improved longevity the disease continues to progress with age, thus affecting additional organ systems. A variety of anecdotal urologic complications of DMD have been reported but until now no large review of all urologic manifestations of DMD existed. We retrospectively reviewed our DMD patient population to identify the urologic diagnoses, interventions, and follow-up.

**Methods:** After institutional review board approval, medical charts of 135 DMD patients treated by a single pediatric neurologist (KDM) were retrospectively reviewed for age, ambulatory status, respiratory status, urologic diagnoses, urologic interventions, and urologic follow-up.

**Results:** Of the 135 DMD patients reviewed, 67 (50%) had at least one documented urologic diagnosis or complaint, and 38 (28%) had multiple urologic manifestations. Presence of lower urinary tract symptoms was the most common urologic diagnosis, affecting 32% of patients, with hesitancy being the most common complaint. Nocturnal or daytime enuresis was the second most common diagnosis, affecting 17% of patients. Twelve patients (9%) required a urologic intervention, most commonly due to nephrolithiasis. Four patients (3%) had congenital adrenal hypoplasia with contiguous gene deletion syndrome in Xp21. Urologic morbidity increased with DMD disease progression. Lower urinary tract symptoms were present in 19% of ambulatory patients compared to 41% of non-ambulatory patients. Similarly, patients with no requirement for respiratory assistance, those requiring non-invasive respiratory support and those with a tracheostomy with ventilator support had lower urinary tract symptoms with frequencies of 25%, 38% and 53%, respectively. Likewise, urologic intervention became more likely as DMD progressed with 4%, 15% and 24% of these same groups requiring intervention, respectively. Only 28% of patients with urologic diagnoses were referred to a urologist. Referral was more common in patients with multiple urologic diagnoses and in those potentially requiring surgery.

**Conclusion:** We report the first comprehensive review of the incidences of all urologic manifestations in a DMD population. Lower urinary tract symptoms constituted the most common diagnosis, occurring in nearly one-third of patients. With advancing disease patients were more frequently diagnosed with a urologic manifestation and more likely to undergo urologic interventions, highlighting the progressive nature of DMD. As these patients transition into adolescence and adulthood, urologists need to play an increasing role in the multidisciplinary care of this unique patient population.
Barriers and Facilitators Encountered During Transition of Care for Adult Patients with Congenital Chronic Genitourinary Conditions

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Purpose: Advances in medicine and multidisciplinary care have resulted in increased life expectancy and improved quality of life for patients with chronic health conditions. In the 1970s less than 1/3rd of patients with Spina Bifida (SB) survived to age 20. Nowadays survival for patients with SB, bladder extrophy and genitourinary (GU) cancers into adulthood approaches 80%. There are currently no model systems established to ensure appropriate transition of care (TOC) for these patients. Recently we undertook the creation of a multi-institutional program to optimize the TOC for patients with chronic GU conditions from pediatric to adult urology providers. We present various barriers and facilitators that we encountered during this process.

Methods: A steering committee consisting of faculty from both the University and Childrens hospital was established to oversee the creation of a multi-institutional TOC program. After a comprehensive review of the literature and identifying the barriers and facilitators of TOC, the committee established urological pathways for TOC to be implemented in the partnering institutions.

Results: In our experience we identified that, for the successful development of a multi-institutional TOC program, there must be a collective relinquishing of individual subspecialty authority to the TOC program by the healthcare team and the patient’s family. Additional barriers and facilitators that we identified and addressed are presented in the table below.

Conclusions: True clinical integration and collaboration in the creation of TOC programs is an example of “disruptive innovation” that will positively impact patients with chronic GU conditions, the healthcare professionals that care for them and translational research. The intent of this article is to aid other programs as they develop and implement TOC programs that can provide seamless, world class patient-centered care to the aging population of individuals with congenital GU conditions. On a national scale, institutions seeking to develop TOC programs need to engage policy makers to create national guidelines and funding mechanisms for TOC systems.
Barriers to Developing a TOC Program  
- Lack of evidence about what really works
- Lack of funding
- Administrative indifference
- Turf battles/Territorial boundaries
- Disciplinary ethnocentrism (sense of unique knowledge and skills possessed by ones subspecialty)
- Unclear goals and mission
- Structural and cultural differences amongst Pediatric and Adult Hospitals
- Reluctance of patients to transfer care away from pediatric providers
- Failure to integrate essential administrative and financial functions

Facilitators of a Successful TOC Program  
- Leadership
- Administrative sanction and support
- Shared/participative governance
- Common business plan
- Complementary mission
- Aligned and well stated goals
- Process of professional socialization
- Faculty development
- Interdisciplinary curriculum for participants (i.e. pre-clinic huddles and grand rounds)

26) 2:03 PM

Innovative Use of an Amnioport to Maintain Amniotic Fluid Volume in Fetuses with Lower Urinary Tract Obstruction

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Purpose: One of the therapeutic aims of fetal interventions (FI) of lower urinary tract obstruction (LUTO) has been to restore amniotic fluid volume (AFV) in order to promote pulmonary development. Despite several proposed FI, pulmonary hypoplasia due to oligohydramnios remains a major cause of neonatal demise. Recently, a Cochrane review showed that serial amnioinfusion (AI) in fetuses with oligohydramnios due to premature rupture of membranes had an 80% reduction in pulmonary hypoplasia, neonatal demise and sepsis. Serial AI is associated with an increased rate of preterm delivery due to infection, bleeding and chorioamnion separation. The objective of this study was to develop and test the efficacy of an innovative amnioport (AP) utilizing a MediPort system to avoid the complications associated with serial AI in patients with anhydramnios due to LUTO.

Methods: A prospective interventional study was undertaken by our Fetal Care Center AP was offered to five consecutive LUTO patients with normal karyotype and anhydramnios who opted to undergo FI. The protocol was approved by the IRB, and informed consent was obtained. The AP was placed at the conclusion of the FI, the catheter was tunneled to a subcutaneous pocket where the reservoir was implanted. Post-operative monitoring was performed with serial ultrasounds and AI with lactated ringers solution via the AP was undertaken to maintain the AFV in a normal range.
Results: A total of five patients had AP implanted. At initial presentation, 60% (3/5) had evidence of fetal renal failure by urine analysis, ultrasound and fetal MR imaging. Mean gestational age (GA) at time of placement of the AP was 25 weeks (range 22-30 weeks). The five patients required a total of six AP – one was replaced after the catheter became dislodged and was extra-amniotic. The mean volume infused was 384 ml (range 298 – 457 ml) and the mean number of AI procedures performed was 10.8 (range 2-21). All five fetuses survived the procedure (FI + AP placement) with five live births, two neonate subsequently expired. The mean gestational age at delivery was 33 5/7 weeks (range 31-37 weeks). Of the three surviving infants, none required oxygen supplementation, however 66% (2/3) developed renal failure and progressed onto dialysis. In our series, there were no severe maternal complications.

Conclusions: Enhanced fetal monitoring and peri-operative management have permitted improved survival outcomes with FI in the management of fetal LUTO. Failure to replenish the AFV after FI in cases of LUTO is a predictor of fetal renal failure and lethal pulmonary hypoplasia. The proactive placement of an AP to facilitate AI during the remainder of the pregnancy can improve the survival rates. In our experience implantation of the AP and serial AI had minimal morbidity to the mother.

In-Home Robots Can Effectively Engage Children and Their Parents in Post-Operative Care, and Allow for Cost-Efficient Remote Physician Monitoring

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Purpose: Patients often do not participate in their health care, delegating this responsibility to their physicians avoiding any personal involvement. Studies and experience have demonstrated improved compliance with post-operative regimens when parents and patients are engaged in their care. The objectives of this study are to assess the ability of a mobile telecommunication robotic system (VGo) to facilitate post-discharge monitoring of patients, engage patients and families in participating in their own care, improve patient-physician communication after discharge, and increase patient satisfaction with their health care.

Methods: 45 patients who underwent bilateral ureteral re-implantation, ureteroscopy with stent placement, or complex bladder reconstruction were enrolled in the study and randomized to receive the VGo system or be a part of the control group. In the VGo group, the patients were provided with a VGo and instructions, and were contacted via the machine every third day for 2 weeks. After this time, all patients completed a survey regarding their opinions of the VGo system, how many times they called the office or went to the emergency room, and
their impressions of the quality of their health care. Demographics and post-operative course were obtained from the medical record. Quantitative and qualitative analysis was performed comparing the VGo and control group.

**Results:** Patients in the VGo groups had fewer unexpected ER or clinic visits and a significant decrease in the number of phone calls to the clinic. In addition, several low risk procedures (i.e. stent removal) were accomplished at home under physician observation. Parental and physician satisfaction in the VGo group were higher than that of controls. Qualitative analysis demonstrated higher parental participation and understanding in the care of their children post-operatively in the VGo group. The VGo group did not have any technical concerns or difficulty accepting the technology, and had exceptional positive patient response to the machines. The participating clinicians found the machines easy to use, and interactions with their patients to be natural.

**Conclusion:** The VGo telecommunication system is successful in increasing patient satisfaction with their post-operative care and reducing the incidence of patients seeking additional health care before their scheduled post-operative visit. It allows for basic physician-monitored basic procedures to be performed at home rather than in clinic. The use of the VGo system may allow for earlier discharge and less costly care in the future, without any loss of patient safety. The modular platform of the robot will also allow for technological expansion in the future, incorporating miniaturized medical devices and offline patient interaction software applications.

**SUNDAY, OCTOBER 21**

**SESSION 7: ONCOLOGY**

28) 8:00 AM

**Feasibility and Potential Impact of Using CT Volume As a Predictor of Specimen Weight in a Subgroup of Patients with Low Risk Wilms Tumors Registered On COG Study AREN03B2**

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**Purpose:** Patients with favorable histology Wilms tumor (stage I, age ≤2 years, tumor < 550 grams) may not require therapy beyond primary nephrectomy. Accurate estimation of specimen weight prior to nephrectomy allows for preoperative planning with the family regarding staging and informs the decision of whether or not to place a central venous access device for chemotherapy. The study’s aims were to determine if a linear relationship existed between tumor weight and CT estimated tumor volume and, if so, to describe the accuracy of the slope intercept equation in estimating tumor specimen weight in a sample population.

**Methods:** On-study age, gender, tumor weight, and port placement were abstracted from 105 age ≤2 patients enrolled in COG study AREN03B2. One radiologist estimated tumor size using each subject’s CT scan. Volume (length x width x height) was calculated for tumor mass, linear regression performed, and a slope-intercept equation calculated. Equation estimated tumor weight was determined from the slope-intercept equation. Then using sample population weight, positive predictive value (PPV), or test precision, was calculated for both the equation and the actual outcome (line placement yes or no).

**Results:** Gender was evenly distributed (50% male, 50% female). Median on-study age was 14 months (range >1-24 months). Median volume was 653 cc (range 4-2,252 cc), and median tumor weight was 409 grams (range 37-1,366 grams). Fifty-five ports were actually placed, twenty-nine potentially unnecessarily (tumor weight <550 grams), and six were not placed in patients requiring them (tumor weight >550). Linear regression demonstrated a strong relationship between tumor volume and tumor weight, and a statistically significant slope (p<.001) (Fig. 1). A slope-intercept equation for weight (W) based on volume (V) was calculated: \( W = 0.54(V) + 58.75 \) (C.I. 0.50-0.58(V) + 21.02–96.47). PPV for the equation was 0.8437 vs 0.4727 actually seen in the sample population.

**Conclusions:** A strong relationship exists between tumor volume and weight, allowing for a viable slope-intercept equation. Precision of the equation was 84% compared to a precision of 47% in our sample population, granted not all factors influencing port placement could be abstracted. Twenty-nine ports (28%) potentially could have been avoided (Type I error), and six ports (6%) were not placed that may have been (Type II error). If applied to the study population, the equation’s Type I and Type II errors would have been five cases (5%). If the slope-intercept equation had been used to determine need for port placement, twenty-four fewer ports may have been placed, while one child would not have been exposed to additional surgery for port placement. As the slope-intercept equation’s accuracy is limited by the accuracy of radiological measurements, precision may vary due to inter-rater reliability.
Urologic Co-Morbidities Associated with Sacrococcygeal Teratoma and a Rational Plan for Urologic Surveillance

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Purpose: Sacrococcygeal teratoma (SCT) is one of the most common neonatal and fetal tumors. They are typically recognized prenatally or immediately post-partum and are resected promptly. However, because of pelvic mass effect or the need for aggressive surgical resection, there is potential for urologic co-morbidity. The presence of urologic co-morbidities has been traditionally under-recognized, partly because of a lack of surveillance or investigation. We reviewed our institutional experience with SCTs in order to propose a rational plan for urologic surveillance.

Methods: We retrospectively reviewed all SCT patients evaluated at our institution from 2004-2012. We collected data on the Altman Classification, presence or absence of early urologic evaluation, hydronephrosis, vesicoureteral reflux (VUR), neurogenic bladder (NGB), and chronic kidney disease (CKD). Associated urologic co-morbidity observed after resection was defined as: hydronephrosis, VUR, NGB or ≥CKD Stage 2. We collected data on the need for reconstructive surgery related to the urologic co-morbidity, the time to detection of urologic co-morbidity, and the length of follow-up. A Kaplan-Meier curve was constructed to assess time-to-event data related to the detection of urologic co-morbidity.
**Results:** We identified 28 patients (20F:8M) evaluated during the study period with a median follow-up of 3.1yrs (Range 0.14-13.4). The Altman Classifications were: I – 7(25%), II – 15(53.6%) and III – 6(21.4%). Eighteen (64.3%) patients had an associated urologic co-morbidity during the study period: 11 (39.3%) patients had hydronephrosis, 10(35.7%) with VUR, 12(42.9%) had NGB, and 2(7.1%) developed ≥CKD2. Eleven (39.3%) patients had delayed urologic evaluation, and 5 (17.9%) required later reconstructive surgery for their associated urologic condition.

We observed a median time to detection of urologic co-morbidity of 1.28 years (95%CI 0.33-2.23) (Figure 1A). When comparing Altman Classification via log-rank test, there was a trend towards more urologic co-morbidity in Altman II/III patients, p=0.06 (Figure 1B). We observed that 4 of the 11 (36.4%) patients that underwent delayed urologic evaluation required reconstructive surgery as opposed to 1 of 17 (5.7%) receiving prompt evaluation, p=0.06.

**Conclusion:** Urologic co-morbidities are common in children with SCT and appear most common in patients with more pelvic tumor involvement (≥Altman II). Given this risk, we recommend renal-bladder ultrasound (RBUS) at delivery and 2 weeks after SCT resection. For patients with structural abnormalities on RBUS or those with ≥Altman II lesions, we also recommend fluoroscopic VCUG (fVCUG) after resection. All patients are followed until toilet training and clinical evaluations should include calculation of Glomerular Filtration Rate. Altman I patients or those without structural abnormalities on RBUS may be followed with annual RBUS. Patients with ≥Altman II lesions or with structural abnormalities also receive annual fVCUG. In the setting of delayed toilet training, we recommend urodynamics.

**Figure 1:** Time to the Detection of Urologic Co-morbidity (A) Overall Population, (B) Compared by Altman Classification.
Impact of the AAP Guidelines for the Management of Urinary Tract Infections in Children on the Diagnosis of VUR: Evaluation Using a Historical Series

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Purpose: Since the publication of the 2011 AAP Clinical Practice Guideline for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2 to 24 Months, concerns have been raised about the consequences they might have on the diagnosis of patients with vesicoureteral reflux (VUR). We examined the impact of those guidelines on a historical series to see if they would have lead to children with clinically significant VUR being missed.

Methods: After obtaining IRB approval, retrospective review was performed on children with VUR diagnosed and managed between 2002 and 2004. 329 children with VUR were identified, of whom 60 (18%) were 2 to 24 months old at diagnosis made following a single fUTI. This cohort included 51 girls and 9 boys.

Results: Average age at presentation for children with 1 fUTI was 10.5 ± 0.8 months, and average duration of management was 30.7 ± 3.2 months. Mean VUR grade per affected kidney was 2.69 ± 0.15 (median 3). 19 patients (31.7%) had grade 4 VUR in at least one kidney. The ultrasound results for 56 children were known, 21 of which (37.5%) were abnormal. Nearly half of the children with sonographic abnormalities had scintigraphic evidence of renal damage when evaluated with dimercaptosuccinate renal imaging. While fewer patients with normal ultrasound also damage (20%), the difference was not statistically significant (p = 0.163). Children with an abnormal ultrasound were 5.5x more likely to undergo surgical correction of VUR than children with a normal ultrasound (1.6 – 18.7, p = 0.007).

Conclusion: 37% of children in this series had abnormal ultrasounds at initial evaluation and therefore would have been identified by the current guidelines. However, more concerning is the fact that 20% of children with normal ultrasound had VUR and renal injury identified on renal scanning. Further, although ultrasound based anomalies were a harbinger for the need for surgery, one of six children with a normal ultrasound also required surgical management. These findings raise concern that the new guidelines may lead to some children with clinically significant VUR being missed or delaying their diagnosis until a second or third febrile infection that may potentially cause further renal injury.
Vesicoureteral Reflux in Siblings: A Longterm Prospective Study
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Purpose: The familial nature of vesicoureteral reflux (VUR) is well recognized and siblings of index patients with VUR are known to have an increased incidence of reflux. Reflux associated nephropathy is an important cause of hypertension and end stage renal disease. A major goal of screening siblings is to identify children who may be at risk of recurrent urinary tract infections and reflux nephropathy. With the lack of information on observational familial VUR studies, screening siblings for VUR remains controversial. We investigated the outcome of screening siblings in a large cohort of familial VUR.

Methods: In 1998, we were granted ethical approval from our institution to prospectively screen siblings of index patients with VUR. Parents of index patients with grade III to V VUR were asked permission to screen siblings who were younger than 6 years of age. VUR was diagnosed by voiding cystourethrography and renal scarring was evaluated by dimercaptosuccinic acid (DMSA) scan.

Results: 315 siblings (177 girls and 138 boys) in 272 families were enrolled in the study. Families with 2, 3, 4, and 5 affected children were 234, 34, 3 and 1, respectively. 257 (81.6%) siblings were younger than 3 years of age and 58 (18.4%) were 3 to 6 years old. There were a total of 503 refluxing units in 315 siblings. VUR was unilateral in 127 and bilateral in 188 siblings. The grade of VUR was grade I, II, III, IV, V VUR in 26, 38, 223, 195 and 21, respectively. 46% of the refluxing units were grade IV and V VUR in siblings younger than 3 years of age compared to 29% in siblings between 3 to 6 years old (p=0.004). DMSA scan revealed renal scarring in 22.5% of siblings compared to 38% in the index patients (p<0.001).

Conclusion: To our knowledge this is the largest prospective, observational study on sibling vesicoureteral reflux. The highest incidence of sibling VUR occurs in children under the age of 3 years. Siblings younger than 3 years of age have a significantly higher grade of VUR. This information may be useful when counseling parents about the risk of familial VUR.

Assessment of Post-Operative Pain and Discomfort in Children Undergoing Open Ureteral Reimplantation Surgery
Guilherme A. Rossini1, Lorenzo F. M. Trevisani1, Brian M. Rosman1, Vitor C. Zanetta1, Sabrina T. Reis1, Gustavo N. C. Inoue1, Carlos A. O. Buchalla1, Daniela C. J. Sanchez1, Constance S. Houck2, Petra M. Meier2, Carlos Munoz-San Julian, MD3, Carlo C. Passerotti2 and Hiep T. Nguyen1, (1)Urology, Children’s Hospital Boston, Boston, MA, (2)
Purpose: Open ureteral reimplantation has an excellent success rate (>95%) in the correction of vesicoureteral reflux (VUR) in children. However, some physicians believe that more conservative options are preferable to surgery due to the high associated post-operative morbidities for the patient. The aim of this study was to evaluate the intensity of post-operative pain and incidence and severity of bladder spasms after open ureteral reimplantation surgery and assess the overall impact of this surgery on the patients’ quality of life (QoL).

Methods: All patients who underwent open ureteral reimplantation at our institution from 2010-2011 were approached for the study. Patients had a standard anesthetic which included a caudal block with bupivacaine and clonidine and intravenous morphine intraoperatively. Pain scores were obtained from subjects prospectively by the nurses in the post-anesthesia care unit and on a scheduled basis until 24 hours postoperatively, using the faces pain scale or verbal pain scale (0-10). The highest pain score and pain characterized as bladder spasm were considered for analysis. Parents were instructed to record bladder spasm episodes prospectively by using a standardized time-flow diary system: 0 = no spasm; 1 = mild; 2 = moderate; and 3 = severe. A 6-month follow-up QoL survey was administered by mail. The survey assessed 5 life domains, each with 1 to 7 questions. A Likert scale accompanied each question, with a score of 0 indicating “very much,” 1 “quite a bit,” 2 “somewhat,” 3 “a little bit,” 4 “not at all” and 5 “not applicable.” For statistical analysis we combined the answers into 4 categories. Statistical analysis of the responses was performed with Chi-square and T-test using SPSS 20.0, and significance was set at $p \leq 0.05$.

Results: 79 patients were enrolled in the study, 13 (16.5%) were male and 66 (83.5%) were female, with a mean age of 6.2 (±1.5) years. The majority (75.9%) of the patients had postoperative bladder spasms during the hospital stay, however after 24 hours, 88.3% had no pain. Bladder spasms were generally in the mild to moderate range. 67 QoL surveys were returned by parents and showed that the answer “a little bit/not at all” was the most frequent in all categories (Figure-1A). Moreover, most patients had no postoperative complications.

Conclusion: Patients undergoing open ureteral reimplantation surgery reported mild to moderate incisional pain and bladder spasms post-operatively, which had mostly resolved within 24 hours of surgery. Parents overwhelmingly reported that the surgery had minimal impact on their child’s quality of life. Based on our experience, the postoperative morbidities associated
with open re-implantation do not appear to be a deterrent in the management of children with VUR.

### Table-1

<table>
<thead>
<tr>
<th></th>
<th>PACU</th>
<th>At 24hours</th>
<th><strong>p-value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain scores 0-10 (n=79)</td>
<td>4.49</td>
<td>0.47</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>First 12 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bladder spasm severity 0-3 (n=53)</td>
<td>1.91</td>
<td>0.43</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

33) 9:18 AM

**Prevalence and Predictors of Renal Functional Abnormalities in High Grade Vesicoureteral Reflux**

*Manuela Hunziker and Prem Puri, Our Lady’s Children’s Hospital, National Children’s Research Centre, Dublin, Ireland*

**Purpose:** Vesicoureteral reflux (VUR) is the most common urological anomaly in children. The association of VUR, febrile UTIs and renal parenchymal damage is well recognized. The aim of this study was to determine
the prevalence and predictors of renal functional abnormalities in high grade VUR.

Methods: We retrospectively reviewed the medical records and dimercaptosuccinic acid (DMSA) scans of 774 consecutive children (301 males, 473 females) with primary high grade VUR (grade IV to V) seen at our institution between 1998 and 2011. Reflux was diagnosed by voiding cystourethrography and DMSA scan was performed to evaluate renal functional abnormalities. For multivariate analysis variables associated with renal functional abnormalities, such as history of presentation, age, gender and grade of VUR were analyzed in logistic regression model.

Results: 698 (90%) children had grade IV VUR and 76 (10%) had grade V VUR. Evidence of DMSA scan abnormalities consistent with reflux nephropathy was present in 291 (37.6%) children. Renal scarring was observed in 244 (35%) of the patients with grade IV VUR and 53 (70%) of the patients with grade V VUR. Univariate analysis revealed that older children (p<0.001, OR: 5.89), grade V reflux (p<0.001, OR: 4.09) and a history of preoperative bladder/bowel dysfunction (p=0.026, OR: 2.94) were significant predictors associated with renal functional abnormalities. Multivariate analysis showed that older children (p<0.001 OR: 4.95) and grade V reflux (p<0.001, OR: 3.45) were the most significant independent predictors associated with renal functional abnormalities.

Conclusion: Our study shows that there is increased risk of renal scarring in older children and grade V VUR. Furthermore patients with a history of bladder/bowel dysfunction are at greater risk of renal scarring. Early detection and treatment of high grade VUR may prevent renal parenchymal damage and limit progression of renal damage in congenital reflux nephropathy.

34) 9:24 AM

Endoscopic Correction of VUR Utilizing Vantris as a New Non-Biodegradable Tissue Augmenting Substance: Three Years of Prospective Followup

Boris Chertin, MD, Wael Abu Arafeh and Stanislav Kocherov, Pediatric Urology, Shaare Zedek Medical Center, Jerusalem, Israel

Purpose: Recently, intriguing data regarding high recurrence rate following successful Dx/HA treatment of VUR was presented prompting the search for different injectable substances with non biodegradable nature. We have evaluated the efficacy of Vantris in children with VUR after three years of the prospective follow up.

Methods: Over the last 3 years 109 children (72 female and 37 male) with a mean age of 6.2± 3.4 years (mean± SD) underwent endoscopic correction of reflux utilizing Vantris. VUR was unilateral in 53 and bilateral in 56 patients comprising 165 renal refluxing units (RRU). Of these, primary VUR was present in 139 (84.2%) RRU and 26 (15.8%) were complex cases. VUR was Grade I in 10,
Grade II in 23, Grade III in 110, Grade IV in 13 and Grade V in 9 RRU. US was performed one month, one year and 3 years after injection, VCLIG was performed 3 months, one year and 3 years after endoscopic correction.

**Results:** The reflux was corrected in 153 (92.7%) RRU after a single injection, after second injection in 7 (4.2 %) RRU. In 5 (3.1%) RRU VUR downgraded to Grade I (3RRU) and Grade II (2RRU) and they were taken off antibiotic prophylaxis. Two (1.8%) patients suffered afebrile UTI. Two (1.8%) developed febrile UTI. VCLIG was performed in 28 (39.4%) of 71 children who completed one year and in 2 (28.6%) of 7 who completed 3 years of follow up. None showed VUR recurrence. One patient demonstrated De-novo reflux. US demonstrated normal appearance of kidneys in all but two (1.8%) patients. One required stent insertion due to deterioration of hydronephrosis resulted in complete resolution of obstruction and another one required ureteral reimplantation.

**Conclusion:** Our data show that Vantris injection provides a high level of reflux resolution with no recurrence during prospective follow up.

**SESSION 9: VESICOURETERAL REFLUX II**

35) 9:37 AM

**Trends in Use of Antibiotic Prophylaxis in Children with Vesicoureteral Reflux**

Vijaya M. Vemulakonda, MD, JD1, Duncan T. Wilcox, MD1, Anne M. Libby, PhD2, (1)Department of Pediatric Urology, Children’s Hospital Colorado, Aurora, CO, Pediatric Urology, Children’s Hospital Colorado, Aurora, CO (2)Pharmaceutical Outcomes Research, Department of Clinical Pharmacy, University of Colorado School of Pharmacy, Aurora, CO

**Purpose:** Various studies have been published evaluating the use of antibiotic prophylaxis in children with vesicoureteral reflux (VUR). These studies are conflicting with regards to the potential benefit of antibiotic prophylaxis in preventing febrile urinary tract infection (UTI) or renal scarring and are suggestive of an association between prophylaxis use and antibiotic resistance. The objective of this study is to assess whether, given recent controversy regarding the benefit of prophylaxis, the prevalence of prophylactic antibiotic use in children with VUR has changed over the past ten years.

**Materials and Methods:** After IRB approval was obtained, we conducted a retrospective cohort study using a 10% random sample from the PHARMetrics database (LifeLink/IMSHealth), a nationally representative patient-centric integrated claims database of managed care enrollees. Children were included if they had an initial diagnosis of VUR (ICD-9 codes 593.7, 593.71, 593.72, 593.73) within the study period, were 0-12 years of age, had a minimum of 2 years follow up after initial diagnosis, and were enrolled continuously in the managed care plan for 6 months prior to initial
diagnosis if they were older than 1 year of age at time of initial diagnosis. We calculated the annual prevalence of antibiotic prophylaxis use and adjusted annual prevalence for age at initial diagnosis, gender, region, payer type, and provider type. Changes in the prevalence of antibiotic prophylaxis use over the study period were analyzed using the Cochran-Armitage trend test.

**Results:** A total of 5796 children meeting study criteria were identified. Overall, 1270 children (21.9%) were found to be on antibiotic prophylaxis for at least one year during the ten-year study period. The percentage of children with VUR on antibiotic prophylaxis declined from 46.3% in 2000 to 9.8% in 2010 (Figure 1), with a significant downward trend in prophylaxis use ($Z=8.878; p<0.0001$). This trend remained significant when adjusting for age ($Z=9.925; p<0.0001$), gender ($Z=8.562; p<0.0001$), region ($Z=9.229; p<0.0001$), payer ($Z=10.247; p<0.0001$), and provider ($Z=9.161; p<0.0001$) on univariate analysis and multivariate analysis ($Z=6.872; p<0.0001$).

**Conclusions:** Use of antibiotic prophylaxis in children with VUR has declined over the past decade. This declining trend in antibiotic use is independent of age at initial diagnosis, gender, region, payer type, and type of provider. Further studies are needed to evaluate the impact of this change in practice pattern on incidence of febrile UTI and on trends in surgical treatment for children with VUR.

**Figure 1.** Prevalence of Antibiotic Prophylaxis Use with 95% Confidence Interval
Purpose: Lower urinary tract (LUT) dysfunction is a common pediatric urologic problem and often is associated with UTIs. We sought to determine the incidence of history of UTI in children with LUT dysfunction and its association, if any, with gender, bowel dysfunction, and VUR. In addition, we wanted to see if there was a predilection for UTIs in any particular LUT condition.

Methods: We retrospectively reviewed the charts of 623 consecutive neurologically and anatomically normal children diagnosed and treated by us for a LUT condition. Each LUT condition was diagnosed on the basis of clinical history, voiding diaries and uroflowmetry with simultaneous electromyography (Table 1). History of UTI +/- fever, gender, prevalence of bowel dysfunction, presence of VUR and specific LUT condition were noted.

Results: Two hundred and seventeen of the 623 (35%) children (mean age 9.1 yrs, range 3-18; 257M, 366F) had a history of UTI. Of the 217, 88 (14% overall) had at least one febrile UTI (60 with two or more febrile UTIs); 61 underwent VCUG or VUDS and 41 (67%) were found to have vesicoureteral reflux (VUR). In 109 of the 217 (17% overall), all UTIs were afebrile; 15 had VCUG or VUDS and 4 children (27%) had VUR. 194 of the 217 patients with UTI were female. Overall, 53% of the girls had a history of UTIs but only 5% of boys (p<0.001). Amongst the 194 girls, the highest percentage of patients with a history of UTIs was in those diagnosed with DUD (68%) followed by DV (58%) (Table 2). Patients with DUD were statistically more likely to present with history of UTI than patients with IDOD or PBND (p=0.002 and p=0.008, respectively). Those with a history of UTIs had a higher PVR at presentation (24.2cc vs. 16.8cc, p=0.04) than those without a UTI history. Sixty-nine of the 217 children (32%) with history of UTIs also had a history of constipation, while 9 (4%) had a history of encopresis.

Conclusions: Females with LUT dysfunction have a much higher incidence of UTIs than males (53% of females vs. 5% of males) and this association in girls is most often with those LUT conditions in which urinary stasis occurs - DUD and DV. VUR was found in the majority of girls with a history of a febrile UTI; therefore, those girls with a history of LUT dysfunction and a febrile UTI should undergo VCUG or VUDS. Since VUR was identified in over one-quarter of girls with only “afebrile” UTIs evaluated for VUR, performing VCUG or VUDS in some of these girls with recurrent afebrile UTIs, in order to identify VUR, may not be unreasonable.
Table 1. Definitions of non-neurogenic LUT conditions

<table>
<thead>
<tr>
<th>LUT Condition</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dysfunctional voiding (DV):</td>
<td>Hyperactive pelvic floor or external sphincter during voiding, +/- associated detrusor overactivity</td>
</tr>
<tr>
<td>2. Idiopathic detrusor overactivity disorder (IDOD):</td>
<td>Overactive bladder (i.e., urgency) with documented detrusor overactivity, pelvic floor quiet during voiding</td>
</tr>
<tr>
<td>3. Detrusor underutilization disorder (DUD):</td>
<td>Volitional infrequent voiding, large bladder capacity, quiet pelvic floor during voiding</td>
</tr>
<tr>
<td>4. Primary bladder neck dysfunction (PBND):</td>
<td>Impaired bladder neck opening, prolonged time between relaxation of pelvic floor and start of urine flow</td>
</tr>
</tbody>
</table>

Table 2. Prevalence of history of UTIs (febrile and febrile) in 623 children with LUT conditions based on gender and LUT condition.

<table>
<thead>
<tr>
<th>LUT Condition</th>
<th>No. of patients</th>
<th>Hx of Afebrile UTIs</th>
<th>Hx of Febrile UTIs</th>
<th>Hx of UTIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DV</td>
<td>85</td>
<td>27 (32%)</td>
<td>22 (26%)</td>
<td>49 (58%)</td>
</tr>
<tr>
<td>IDOD</td>
<td>195</td>
<td>33 (28%)</td>
<td>28 (19%)</td>
<td>91 (47%)</td>
</tr>
<tr>
<td>DUD</td>
<td>77</td>
<td>31 (41%)</td>
<td>21 (27%)</td>
<td>52 (68%)</td>
</tr>
<tr>
<td>PBND</td>
<td>9</td>
<td>1 (11%)</td>
<td>1 (11%)</td>
<td>2 (22%)</td>
</tr>
<tr>
<td>Total</td>
<td>366</td>
<td>102 (31%)</td>
<td>82 (22%)</td>
<td>194 (53%)</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DV</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IDOD</td>
<td>183</td>
<td>4 (2%)</td>
<td>4 (2%)</td>
<td>8 (4%)</td>
</tr>
<tr>
<td>DUD</td>
<td>24</td>
<td>2 (8%)</td>
<td>2 (8%)</td>
<td>4 (17%)</td>
</tr>
<tr>
<td>PBND</td>
<td>46</td>
<td>1 (2%)</td>
<td>0</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Total</td>
<td>257</td>
<td>7 (3%)</td>
<td>6 (2%)</td>
<td>13 (5%)</td>
</tr>
</tbody>
</table>

37) 9:49 AM

New Contralateral Vescicoureteral Reflux after Unilateral Reimplantation: Predictive Factors and Clinical Outcomes

Katherine C. Hubert, MD, MPH\(^1\), Paul J. Kokorowski, MD, MPH\(^1\), Lin Huang, PhD\(^2\), Michaela M. Prasad, MD\(^1\), Ilina Rosoklija, MPH\(^1\), Alan B. Retik, MD\(^1\) and Caleb P. Nelson, MD, MPH\(^1\), (1)Department of Urology, Children’s Hospital Boston, Boston, MA, (2)Clinical Research Program, Children’s Hospital Boston, Boston, MA

Purpose: Although unilateral ureteral reimplantation for vescicoureteral reflux is highly successful, a few patients will develop new contralateral vescicoureteral reflux (C-VUR). There are few data regarding risk factors for C-VUR, and its clinical significance is uncertain. We examined predictors and clinical outcomes of C-VUR.

Methods: We reviewed all patients who underwent non-tapered unilateral reimplantation for primary VUR at our institution (1/90 – 12/02), and identified those with C-VUR on postoperative cystogram. We analyzed the association of patient/procedure characteristics with incidence of C-VUR, postoperative urinary tract infection (UTI), and time to resolution of C-VUR. Multivariable models were developed to control for variables associated with incidence and time to resolution of C-VUR in patients with >1 postoperative cystogram. VUR was graded on a 3-point scale.
Results: 395 patients (77.2% female) had non-tapered unilateral reimplantation at a median age of 5.3 years. Preoperative VUR was grade 1 in 2.8%, 2 in 56.6%, 3 in 40.6%. Overall technical success rate (no VUR on reimplanted side) was 95.4%. Post-reimplantation, 39 patients had new C-VUR (9.9%): grade 1 in 7, grade 2 in 27, grade 3 in 5. (Five patients with C-VUR also had ipsilateral VUR). On multivariate analysis, younger age (<=6 years: OR 3.7, 95% CI 1.5-9.2, p=0.006) and low observed bladder capacity (BC) as % of predicted BC [(<=50% predicted BC: OR 6.3, 95% CI 1.3-31.5, p=0.02) and (50-100% predicted BC: OR 1.7, 95% CI 0.8-3.7, p=0.1)] were significant predictors of C-VUR. Gender, race, clinical presentation, preoperative VUR grade, surgical technique and duplex system were not associated with C-VUR. Among the 39 with C-VUR, median follow-up was 51.8 months. 12/39 patients (31%) had no subsequent cystography; of these, 4 were grade 1, 7 were grade 2, 1 was grade 3. Of 27 with subsequent cystography, C-VUR resolved in 23 (85.2%) at a median of 21.5 months; the 4 with persistent CVUR were all grade 2. Only 2 patients had reimplantation for CVUR. Of the 39 with C-VUR, 4 (10.3%) had postoperative febrile UTI (median 26 months postoperatively). All had resolution of C-VUR on subsequent imaging (median 9.5 months post-UTI).

Conclusion: Few factors reliably predict C-VUR after unilateral reimplantation, but younger patients and those with low observed BC (vs. predicted) may be at increased risk. However, a majority of C-VUR will resolve spontaneously, and the clinical course is typically benign.

38) 9:55 AM (Poster 16)
Sensitivity of Renal Ultrasound for the Detection of Grade 5 Vesicoureteral Reflux
Robert C. Orth, MD, PhD1, A. Chantal Caviness, MD, PhD2, Alan Schlesinger, MD, FAAPI and James Crowe, MD1, (1) Edward B. Singleton Department of Pediatric Radiology, Texas Children’s Hospital, Houston, TX, (2)Section of Emergency Medicine, Department of Pediatrics, Baylor College of Medicine, Houston, TX

Purpose: The American Academy of Pediatrics (AAP) recently updated its Clinical Practice Guideline for the diagnosis and treatment of infants and children aged 2-24 months with a first febrile UTI and now recommends these patients undergo renal and bladder ultrasound (RBUS) and subsequently undergo voiding cystourethrography (VCUG) only if abnormalities are found on RBUS. A false-negative rate of up to 40% has been reported for the diagnosis of grade IV vesicoureteral reflux (VUR) by RBUS. Data on the sensitivity of RBUS for detection of the highest grade of VUR, grade V, are lacking. The purpose of this study was to determine the sensitivity of RBUS for grade V VUR.

Methods: An institutional electronic medical record was searched to identify all patients diagnosed with grade V VUR by VCUG between January 1, 2010 and December
Studies were included if they were performed on patients ≤ 24 months of age at the time of VCUG and if a RBUS had been performed on the same patient within 30 days of the VCUG. Exclusion criteria were a prior VCUG at our institution or a known history of genitourinary surgery or anomaly. Two pediatric radiologists independently reviewed the VCUG examinations to confirm correct classification of VUR grade using the International Reflux System, and a third pediatric radiologist resolved discrepant readings. Ultrasound images were reviewed by a single pediatric radiologist and designated abnormal if any of the following were present: renal pelvic dilatation >8 mm on transverse images, caliectasis, ureteral dilatation >10 mm, duplicated collecting system, or ureterocele. Sensitivity of RBUS for grade V VCUG was calculated.

**Results:** During the study period, 4970 VCUG examinations were performed, 92 were diagnosed with grade V VUR in the original radiology report, and 44 were included in the study. Of the 92 originally identified as having grade V VUR, 10 were re-classified as having VUR grades less than V. Of the remaining 82 examinations, 27 did not have RBUS within 30 days of VCUG, and 11 had previous GU history or did not meet the age criteria. Of the 44 VCUG-RBUS examination pairs included in the study, 7 ultrasounds were normal with a sensitivity of RBUS for grade V VUR of 84% (95% CI: 70-93%).

**Conclusion:** The diagnostic sensitivity of RBUS is high for grade V VUR, supporting the recent AAP Practice Guideline recommendation that infants and children aged 2-24 months with a first febrile UTI forgo VCUG if their RBUS is normal.

**Is Renal Ultrasound Enough? Risk for Abnormal DMSA Despite Normal Renal Ultrasonography after One Febrile UTI**

Nicol Corbin Bush, MD¹, William A. Smith¹, Janelle Traylor², Karen Pritzker², Anjana Shah², Carlos A. Villanueva, MD¹ and Warren T. Snodgrass, MD¹, (1)Pediatric Urology, Children’s Medical Center, Dallas, TX, (2)Pediatric Urology, Children’s Medical Center Dallas, Dallas, TX

**Purpose:** The American Academy of Pediatrics released new guidelines suggesting renal ultrasound (RUS) as the only evaluation after initial febrile UTI in infants aged 2-24 months, which will delay the diagnosis of vesicoureteral reflux (VUR). However, VUR is associated with a higher risk for renal scarring, and some patients with a normal RUS may have renal damage that can be detected with DMSA. We evaluated the risk for DMSA-detected abnormalities (diminished function +/- scar) in patients aged 2-24 months with normal RUS after a febrile UTI, as well as those >24 months anticipating that pediatricians may extend the guidelines to older patients.

**Methods:** Consecutive patients referred with a history of a single febrile UTI underwent DMSA >3 months after the infection in addition to their baseline RUS.
Data including gender, age, #UTIs, and RUS and DMSA results were prospectively recorded. Patients with solitary kidney, neurogenic bladder, valves, exstrophy, UPJ, UVJ, ureterocele, and/or ectopic ureter were excluded. Abnormal RUS was defined as any hydronephrosis, renal cortical defects, or size asymmetry >1cm. Abnormal DMSA was defined as presence of ipsilateral diminished function <45% and/or any focal cortical uptake defects. VCUG was recommended in patients with abnormal DMSA.

Results: Of 344 consecutive patients with a single febrile UTI (77.9% female, median age 18.5 months), 268 had normal RUS. Of these, 13.4% had diminished function +/- scar on DMSA. Age ≤24 months: Of 146 patients with normal RUS, 12 (8.2%) had abnormal DMSA, of whom 11/12 (91.7%) had VUR, ranging from grades 1-5 in 1, 2, 4, 3, and 1, respectively. Age >24 months: Of 122 patients with normal RUS, 24 (19.7%) had abnormal DMSA, of whom 18/22 (81.8%) who underwent VCUG had VUR, ranging from grades 1-4 in 1, 7, 6, and 4, respectively.

Conclusion: Renal damage (diminished function +/- scar) after one febrile UTI was detected by DMSA in 13.4% of patients despite normal renal ultrasound. VUR was present in 85% of these children. By the current AAP guidelines for 2-24 month-olds with febrile UTI, 1 out of every 12 patients with an abnormal DMSA, potentially at risk for further renal damage, will be missed by RUS alone. If primary care providers expand the current guidelines to patients older than 2 years, 1 in 5 patients could be missed by RUS alone. In addition to RUS after febrile UTI, we recommend non-acute DMSA (and VCUG when abnormal) in order to identify patients at risk for additional renal damage who might benefit from earlier diagnosis and therapy when VUR is identified.

SESSION 10: BLADDER

40) 10:55 AM
Changes in Urinary Substance P Level Is Correlated with Post-Operative Bladder Spasms Following Bladder Surgery
Guilherme A. Rossini1, Brian M. Rosman1, Caio M. Oliveira1, Constance S. Houck2, Petra M. Meier2, Carlos Munoz-San Julian2, Sabrina T. Reis1, Carlo C. Passerotti1 and Hiep T. Nguyen1, (1)Urology, Children’s Hospital Boston, Boston, MA, (2)Anesthesiology, Perioperative and Pain Medicine, Children’s Hospital Boston, Boston, MA, (3)Urology, University Nove de Julho, São Paulo, Brazil

Purpose: Children undergoing ureteral re-implantation surgery for vesicoureteral reflux (VUR) frequently experience post-operative bladder spasms. Substance P (SP) is a neuropeptide that is considered to be a major initiator of neurogenic inflammation and has been shown to have both sensory and efferent functions in the bladder. The aim of this study was to determine if changes in urinary SP are correlated with the severity of postoperative bladder spasms.
Material and Methods: Patients older than 4 years of age undergoing bladder surgery were enrolled in this study after informed consent was obtained. Patients received a standard anesthetic and postoperative pain management regimen including caudal analgesia with bupivacaine and clonidine and round-the-clock IV ketorolac postoperatively. A urine sample was collected at the time of catheter placement (prior to incision) and set as the baseline. Additional urine samples were collected at 0.5, 1, 2, 6, 12, and 24 (if the catheter was still in place) hours after surgery from the Foley catheter and centrifuged and stored at -20 C until analysis. SP levels were analyzed via Parameter™ Substance P ELISA Assay. Pain was assessed via VAS or Face pain scale as soon as the patient was able to respond appropriately in the PACU, and repeated at 4, 8, 12 hours postoperatively, along with the character of the pain. For statistical analysis, pain scores were combined as mild (0-3), moderate (4-6) and severe (7-10). Statistical analysis was performed with Chi-square and using SPSS ver. 20.0, and significance was set at p≤0.05.

Results: To date, 65 patients have been enrolled in the study, (54 female,11 male), with a mean age of 6.2(±1.5) years. Patients were categorized into two different groups according to the greatest change in SP relative to baseline. Group 1 (n=24) consisted of patients that had a change in urinary SP of <50% (above or below baseline), and patients in Group 2 (n=41) had a >50% change in SP relative to baseline. The majority (83.3%) of patients that had severe pain were in Group 2 (p=0.039) (Figure 1).

Conclusion: Our study demonstrates that patients that had the most change in urinary SP levels compared to baseline experienced more severe bladder spasms postoperatively. This suggests that urinary SP has the potential to serve as an effective biomarker for bladder spasm severity and could potentially be used to aid in both basic science and clinical studies evaluating the effectiveness of treatments for this type of spasmodic pain.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valium(mg)</td>
<td>*0.799</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>1.83</td>
<td>2.01</td>
<td></td>
</tr>
<tr>
<td>Morphine(mg) in PACU</td>
<td>*0.619</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>0.50</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>Morphine(mg) in floor</td>
<td>*0.544</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2.26</td>
<td>2.74</td>
<td></td>
</tr>
<tr>
<td>Oxycodone(mg)</td>
<td>*0.301</td>
<td></td>
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</tr>
<tr>
<td>Mean</td>
<td>1.81</td>
<td>2.50</td>
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*Chi-square
Single Center Experience with OnabotulinumtoxinA Endoscopic Detrusor Injection for the Treatment of Neurogenic Bladder in Children: Effect of Dose Adjustment, Multiple Injections and Avoidance of Reconstructive Procedures

Victor H. Figueroa1, Rodrigo LP Romão, Clinical, Fellow2, Joao L. Pippi Salle1, Luis H. Braga, MD, PhD3, Martin A. Koyle4, Darius J. Bagli2 and Armando J. Lorenzo1, (1) Division of Urology, The Hospital for Sick Children, Toronto, ON, Canada, (2)Division of Urology, Department of Surgery, The Hospital for Sick Children, Toronto, ON, Canada, (3) Department of Surgery/Urology, McMaster University, Hamilton, ON, Canada, (4)Urology, The Hospital for Sick Children, Toronto, ON, Canada

Purpose: Treatment for neurogenic bladder (NGB) has been expanded with the introduction of intra-detrusor onabotulinumtoxinA injections. Herein we review our experience with this procedure for cases in which maximal anti-cholinergic therapy failed or was not tolerated.

Methods: We prospectively enrolled 17 patients who underwent onabotulinumtoxinA injections over a 4-year period. Demographic information, number of injections, and dose of onabotulinumtoxinA employed were captured. Children were monitored with baseline and post-injection renal ultrasound, urodynamics, and assessed for side effects, satisfaction and symptom improvement.

Results: A total of 43 sessions were performed with injections repeated every ~6 months. Mean patient age was 10.7 years (3-17). Following the first injection, mean bladder capacity adjusted for age and compliance improved by 27% (p=0.039) and 45.2% (p=0.041). After subsequent injections, with a higher mean dose of 21.1 units these values increased to 35.7% (p=0.043) and 55.1% (p=0.091) respectively. Clinical improvement of ≥50% was seen in 10 children (76.9%). However, 3 patients in whom the dose of onabotulinumtoxinA
was reduced to 200 units all complained of recurrent symptoms. Fourteen children (82.3%) avoided surgical reconstruction as a second line of treatment. No complications or upper tract deterioration were found associated to this procedure.

**Conclusion:** Intra-detrusor onabotulinumtoxinA injection is a promising intervention for management of NGB in selected children who would have otherwise been candidates for surgical reconstruction. Our data demonstrates improvement in symptoms and urodynamic parameters. Although an optimal dose has not been determined for pediatric patients, we found better response with treatment close to 10 units/kg.

42) 11:07 AM

**Intravesical Botulinum Toxin Injection in Children with Neurogenic Bladder**

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**Purpose:** Neurogenic bladder dysfunction may occur from a variety of causes such as spina bifida and spinal cord injury. The characteristic poor compliance and/or detrusor overactivity are usually managed initially with anticholinergic medication. If medical therapy fails, patients often require bladder augmentation to protect renal function and achieve continence. Recently, endoscopic intravesical injection of botulinum toxin (BT) has emerged as an option for the management of the neurogenic bladder. However, there are relatively limited data regarding its use in children. The aim of this study was to evaluate the efficacy of intravesical BT for the treatment of neurogenic bladder dysfunction in pediatric patients.

**Methods:** We conducted a retrospective chart review of all patients who received intravesical BT at our institution from 2007 to 2012. Recorded data included patient demographics, BT dosing, urodynamic studies (UDS), and continence. Results were analyzed using the t-test (SPSS 20); a p value of <0.05 was considered significant.

**Results:** 21 patients (52% female) received intravesical BT (Type A, Allergan) at a median age 9.9 years. Mean follow up was 14.4 months (range 0 - 41.8 months). Pre-operative diagnoses included spina bifida (17), spinal lipoma (1), tethered cord (1), VACTERL association (1) and spinal cord lymphoma (1). Preoperatively, 20/21 patients were on anticholinergic medications and performed intermittent catheterization (IC). 18/21 patients received a single BT injection; 1 of 21 received 2 and 2 of 21 received 4 injections. BT dosing was 10 IU/kg with a maximum of 300 IU. The mean BT dose was 190 IU (range 60 - 300 IU). 18 patients had complete pre- and post-operative UDS data available; UDS was...
performed at a mean of 3 and 9 months postoperatively. On the first postoperative UDS, there was no statistically significant change in mean bladder capacity (232 ml vs. 236 ml, p=0.84). Similarly, there was no significant change in maximum detrusor storage pressure (32.1 cm H2O vs. 40.2 cm H2O, p=0.48). Of 6 patients with detrusor overactivity (DO), 5 had complete resolution and one showed considerable improvement. There were no significant differences in UDS data at 3 and 9 months. One patient developed de novo DO following BT injection; this had resolved at the 9 month UDS. Anticholinergic medication was able to be discontinued in 3/20 (15%) patients. 13 patients had incontinence preoperatively, and only one achieved complete continence after BT injection. The one patient who was voiding spontaneously preoperatively required IC following BT. No patient developed new upper urinary tract changes postoperatively. There were no complications.

**Conclusion:** Intravesical BT appears to have limited efficacy in increasing bladder capacity, reducing urinary storage pressures, and improving urinary continence in children with neurogenic bladder dysfunction. Larger and long-term randomized studies are needed to fully interrogate this treatment option.

43) 11:13 AM

**Cost Savings from Not Catheterizing Newborns with Spina Bifida**

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**Purpose:** One published option for urologic management of newborns with spina bifida is universal therapy, placing all patients on clean intermittent catheterization (CIC) and anticholinergic medication (AC). An alternative is selective therapy based on initial urodynamic studies (UDS), placing only those with end-fill pressures (EFP) > 40 cmH2O on CIC+AC. Here, we detail the cost savings of selective therapy in newborns with spina bifida.

**Methods:** We prospectively managed infants with spina bifida based on initial UDS obtained before 6 months of age. Those with EFP < 40 cmH2O were followed expectantly, while those with EFP > 40 were placed on CIC+AC. Follow-up UDS were performed at age 1 year or for clinical indications (new hydronephrosis, recurrent febrile UTI); those being observed who demonstrated new EFP >40cm H2O had CIC+AC instituted. Cost savings from not performing CIC+AC from birth until age 3 years, when therapy for social continence often begins, were calculated.

**Results:** Of 61 infants (30 female) prospectively managed since birth with minimum follow-up of 12 months (median 41), 12 (20%) with EFP > 40 were assigned CIC+AC at mean age 3 months. Of 49 expectantly managed, 6 (12%) developed new EFP > 40 at median
age 9 months and began CIC +AC. No other expectantly managed patients developed adverse UDS changes or clinical symptoms. Therefore, 30% of patients began medical therapy as newborns or within the 1st year of life, while the other 70% did not begin medical therapy until 3 years of age for continence. For simple cost analysis, we only calculated costs that would have been incurred in those 70% had they been treated with CIC +AC since birth. Savings for one patient, using Texas Medicaid reimbursement rates, from not performing CIC for one year was $4363.20 ($2.02/catheter x CIC 6x/day x 30 days x 12 months), and for not prescribing AC (0.2mg/kg BID) for one year was $480 ($40/month x 12 months). Thus, total cost savings for not performing CIC+AC for one year in one child was $4843.20, or $14,529.60 for 3 years. Savings for 43 patients was $624,772.80. 

**Conclusion:** Only 20% of newborns had high pressures on initial UDS, and only 12% of those initially observed developed high pressures warranting CIC+AC. The remaining 70% had no UD or clinical indication for therapy until desire for continence. Not performing CIC+AC in this group saved over $600,000. Selective therapy in these newborns with spina bifida was not only clinically safe, but also cost-effective.

**SESSION 11: KIDNEY/HYDRONEPHROSIS I**

44) 12:45 PM

**Prediction of Clinical Outcomes in Infants with Unilateral and Bilateral Isolated Hydronephrosis Diagnosed Antenatally**

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**Purpose:** Antenatal hydronephrosis (ANH) is diagnosed in 1% to 5% of all pregnancies and its natural history is diverse. Previous studies have correlated the grade of hydronephrosis and the need for surgical intervention. However, there has not been any systematic and detailed analysis of ultrasound (US) findings and clinical outcomes in patients with isolated ANH. This study aims to evaluate the predictive value of the first postnatal US findings in predicting clinical outcomes in a large population.

**Methods:** We retrospectively examined 1,909 patients at our institution, diagnosed with ANH, between 1988 and 2011. Patients without sufficient follow-up and those that had surgery due to parental preference were excluded, leaving 1,315 patients for analysis. The variables assessed included the Society for Fetal Urology (SFU) grading system, parenchymal thickness, echogenicity, and renal length. Univariate and multivariate analysis were performed using Kruskal-Wallis, Pearson’s chi-square test
Results: Patients were categorized into three outcome groups: spontaneous resolution (78.6%, group 1), persistent hydronephrosis as defined by the final SFU grade of 2 (7.9%, group 2), and progression of disease as defined as a final SFU grade of 3 or 4, had surgery or UTI (13.5%, group 3). The mean follow-up time was 32.6 months. There was a significant difference (p<0.05) in outcome between the three groups for both unilateral and bilateral ANH (Figure 1). In addition, the multivariate analysis demonstrated that initial SFU grade of 3 or 4 and increased renal length are independent predictors of a poor outcome of ANH in both unilateral and bilateral disease (Table 1). On univariate analysis, all four US parameters were significantly associated with a worse outcome of ANH.

Conclusion: The majority of patients with ANH resolved spontaneously. On univariate analysis, increased echogenicity, renal length, parenchymal thickness, and SFU grade were significantly associated with progressive disease and worse outcome. Unilateral and bilateral ANH appear to have different natural histories, reflected in different resolution rates per SFU grade. The data obtained from this study allows for more precise parental counseling as to the clinical outcome of infants with ANH.

Table 1: Multivariate analysis of variables affecting resolution

<table>
<thead>
<tr>
<th>SFU Grade</th>
<th>Bilateral</th>
<th>p value</th>
<th>HR</th>
<th>CI (95.0%)</th>
<th>Unilateral</th>
<th>p value</th>
<th>HR</th>
<th>CI (95.0%)</th>
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<tr>
<td>SFU-1</td>
<td>0.000</td>
<td></td>
<td>2.391</td>
<td>0.660</td>
<td>8.659</td>
<td>0.001</td>
<td>0.88</td>
<td>0.220</td>
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<td>0.184</td>
<td>0.000</td>
<td>20.707</td>
<td>6.239</td>
<td>68.727</td>
<td>0.004</td>
<td>0.277</td>
<td>0.114</td>
</tr>
<tr>
<td>SFU-3</td>
<td>0.000</td>
<td>0.000</td>
<td>26.058</td>
<td>7.758</td>
<td>87.522</td>
<td>0.092</td>
<td>2.340</td>
<td>0.870</td>
</tr>
<tr>
<td>SFU-4</td>
<td>0.003</td>
<td>1.618</td>
<td>1.172</td>
<td>2.235</td>
<td>1.604</td>
<td>1.172</td>
<td>1.964</td>
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</tbody>
</table>

Figure 1.
Society of Fetal Urology (SFU) Recommendations for Postnatal Evaluation of Antenatal Hydronephrosis: Will Fewer Voiding Cystourethrogram’s Lead to More Urinary Tract Infections?

Melissa A. St.Aubin, Medical, Student¹, Katie H. Willihnganz-Lawson, M¹, Briony K. Varda, M¹, Matthew Fine, MD², Jane M. Lewis, MD¹, Tracy Prosen, M³ and Aseem Shukla, MD¹, (1)Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN, (2)Department of Urologic Surgery, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN, (3)Maternal Fetal Medicine, University of Minnesota Amplatz Children’s Hospital

Purpose: There is no consensus on the extent and mode of postnatal imaging after a diagnosis of antenatal hydronephrosis (ANH). The need for antibiotic prophylaxis and incidence of urinary tract infections (UTI) is also unclear. The purpose of this study was to validate our practice paralleling the current SFU recommendations in limited use of VCUG’s during the postnatal workup of ANH, and to examine a single institutional experience with the rate of urinary tract infections in those evaluated infants.

Methods: A consecutive cohort of infants with a history of ANH was evaluated in accordance with SFU recommendations guidelines, and outcomes were retrospectively reviewed. Third trimester antenatal ultrasonography (US) was used to evaluate SFU grade, laterality, and anteroposterior diameter (APd) of the renal pelvis. Postnatally, all patients underwent ultrasonography by 4 weeks of age, and only those with bilateral moderate to severe ANH (SFU grade II-IV), or unilateral high grade hydronephrosis (SFU grade III-IV) underwent VCUG. Prophylactic antibiotics were administered until follow-up imaging at one month, and then continued if VUR was present. The incidence of UTI was also examined across SFU grades, APd, and in
the presence or absence of vesicoureteral reflux (VUR). We used Cox proportional hazard model and Chi square analysis to evaluate predictors for resolution and surgical intervention.

**Results:** A total of 117 consecutive infants were evaluated for ANH, and results retrospectively reviewed. Thirty infants with multicystic dysplastic kidney, posterior urethral valves, ureteroceles, and primary obstructive megaureter were eliminated, so 87 infants (148 renal units) with ANH were included in the final analysis with a median follow-up of 33.5 months (range 18-64). The median time to physiologic resolution of ANH was 8 months (Range: 0.25-38 months), while the median time to progression to surgery for 20 infants (16.2%) requiring correction of ureteropelvic junction obstruction was 4.5 months (Range: 0.25 - 18 months). Postnatal VCUG was obtained in 42 infants, of which 7 patients and 12 renal units (16.7% of those tested) had VUR. There was no relationship between ANH SFU grade, APd, laterality, or gender and VUR. Six infants (0.08%) developed a febrile UTI over the follow-up interval. No UTI's occurred in an infant with VUR, and UTI's occurred immediately after a VCUG in 3 infants.

**Conclusion:** Adherence to SFU recommendations in evaluating infants with ANH led to VCUG’s being avoided in about one-half of evaluated infants. Fewer VCUG’s, and the subsequent diminished cohort with diagnosed VUR was associated with a minimal incidence of UTI’s, and catheterization at time of VCUG was proximately associated with UTI’s in 50% of the cases. Diagnostic modalities that eliminate the need for catheterization are needed, and use of VCUG’s may be actively curtailed in contemporary evaluation of ANH.

**Should Prenatal Hydronephrosis That Resolves Before Birth Be Followed Postnatally? An Analysis and Comparison to Persistent Prenatal Hydronephrosis**

Patrick Scarborough, MD¹, Elizabeth Ferrara, MD², Douglas W. Storm, MD³,  (1) Urology, Naval Medical Center San Diego, (2) Pediatric Nephrology, Naval Medical Center San Diego, (3) Pediatric Urology, Naval Medical Center, San Diego, CA

**Purpose:** The advent of prenatal ultrasonography has greatly enhanced our ability to detect congenital genitourinary abnormalities. While children with persistent prenatal hydronephrosis are typically imaged and followed postnatally, it remains unclear if hydronephrosis that resolves prior to birth should be treated in a similar fashion. We sought to determine postnatal abnormalities associated with prenatal hydronephrosis that resolves prior to birth (RPH) and compared this group to those with prenatal hydronephrosis that persists throughout pregnancy (PPH).
Methods: We performed a retrospective review of all consecutive patients evaluated for prenatal hydronephrosis over 24 months. Patients were followed prenatally with serial ultrasounds and with ultrasonography and a voiding cystourethrogram (VCUG) after birth.

Results: A total of 126 patients were evaluated. Of these, 54 children were found to have hydronephrosis that resolved prior to birth. The average anterior-posterior (AP) renal pelvis length was statistically longer (p=0.01) in children with PPH (5.39 mm) versus those with RPH (4.86 mm). 47% of children with RPH were actually found to have hydronephrosis on postnatal ultrasound. 5% of children with PPH and 9% of children with RPH were found to have vesicoureteral reflux. With a mean follow up of 131 days (10-601 days), 39% of PPH resolved after birth, while 40% of the postnatal hydronephrosis identified within the RPH cohort resolved after birth. The mean time to resolution within the PPH (99 days) group was statistically quicker (p=0.02) as compared to the RPH group (185 days). Five PPH patients were found to have abnormalities requiring surgical intervention, while no RPH patients needed surgery.

Conclusion: A significant number of children with RPH had hydronephrosis on postnatal studies, but despite a slower resolution time, no children within the RPH cohort were found to have abnormalities requiring intervention. In addition, prenatal hydronephrosis is a poor indicator of postnatal vesicoureteral reflux, whether the hydronephrosis resolves prenatally or persists. Given the lack of associated pathology, children with hydronephrosis that resolves prior to birth may not need to be imaged postnatally.

47) 1:03 PM

Approach to the Failed Pyeloplasty In Children: Revisiting the Unknown
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Purpose: Pediatric pyeloplasty has a high success rate. However, reasons for failure and the ideal approach to the management of the failed pyeloplasty (FP) are poorly understood. We sought to identify risk factors as well as perform a critical analysis of the management of FP in a large tertiary care center.

Methods: Retrospective chart review of children undergoing pyeloplasty from 2000-2010. All cases that required any type of reintervention, excluding stent removal, were reviewed. Data collected included: demographics, indication for and modality of the initial surgery, presence of crossing vessels, mode of diagnosis of failure, type(s) and success rate of the re-intervention(s).

Results: 455 patients underwent pyeloplasty in the study period and 27 failed (5.9%). Open (20/330)
and laparoscopic (7/115) pyeloplasty yielded identical failure rates (6%); likewise, age and initial indication for pyeloplasty did not have an impact on failure (age: 17/287, 5.9% 0-5 years; 10/168, 5.9% >5 years; 15/230, 6.5%; indication: worsening antenatal hydronephrosis, 9/128, 7% pain and 3/38, 7.9% incidental finding).

Indications for reintervention were: worsening asymptomatic hydronephrosis 16/27 (59%), pain 7/27 (26%), urosepsis 2/27 (7.5%) and other 2/27 (7.5%). 7/21 (33%) patients had a postoperative nuclear scan with documented decrease in differential renal function by at least 5%. Eight of the 27 patients (30%) improved with one intervention, 14 (52%) required 2 interventions and 5 (18%) had 3 interventions (see figure 1 for details). Mean interval between the first operation and subsequent interventions was 19.3, 24.9 and 27 months for the 1st, 2nd and 3rd reinterventions, respectively. All 7 patients with documented decrease in renal function had at least 2 interventions. Success rates for each modality of re-intervention were as follows: double – J stenting alone: 1/16 (6%); endopyelotomy: 9/18 (50%); redo pyeloplasty: 12/13 (92%); uretero-calycostomy: 4/4 (100%). Only one patient (7%) had a documented missed crossing vessel. All patients eventually improved after a mean follow-up of 56 months following the initial pyeloplasty.

**Conclusions:** Pyeloplasty is a highly successful procedure. Age and initial indication for pyeloplasty do not influence the risk for failure. More invasive and definitive techniques, such as redo pyeloplasty and uretero-calycostomy are more successful than minimally invasive ones to treat FP and should probably be offered sooner rather than later.
Variability in Initial Urologic Evaluation of Infants with Congenital Hydronephrosis: A Multi-Center EPIC Database Study

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Purpose: Prior studies have shown that significant variability exists in the timing of surgical intervention for infants with congenital hydronephrosis; the underlying etiology of this variation remains unclear. The primary objective of this study is to evaluate whether there is significant geographic variability in the initial radiographic evaluation of these infants. The secondary objective of this study is to determine the feasibility of utilizing automatically collected data from the EPIC electronic medical record (EMR) to conduct multi-center research in this population.

Methods: After institutional review board approval was obtained, we performed a retrospective review of patients age 0-12 months with a primary diagnosis of congenital hydronephrosis (ICD-9 code 591) or prenatal hydronephrosis (ICD-9 code 753.29) who were seen as a new patient from October 1 2010 to September 30 2011. Data were obtained from three tertiary pediatric urology practices that utilize the Epic EMR system as part of routine clinical practice (University of Virginia Hospital (UVH), Rady Children’s Hospital (RCH), and Children’s Hospital Colorado (CHC)). Data were extracted from the EMR at each site using standard automated electronic data extraction techniques based on ICD-9 diagnosis codes and CPT E&M and radiologic procedure codes. Data acquired included: patient age at initial visit and radiographic tests ordered and billed in conjunction with the initial visit. All data were de-identified at each site prior to inclusion in a multicenter data base for analysis. Proportions were analyzed using Pearson’s goodness of fit or Fisher’s exact testing as appropriate. Medians were compared using Kruskall-Wallis testing.

Results: 217 patients met study criteria. The majority of patients were diagnosed with congenital hydronephrosis, with children seen at CHC more likely to have prenatal hydronephrosis (p<0.001). Median patient age was 2.3 months and did not differ across sites (p=0.87). Median number of tests performed was 1. Ultrasound was ordered in the majority of patients (81.6%) and did not differ across sites (p=0.2). Use of voiding cystourethrography (VCUG) significantly varied across centers (13.9%-85.2%; p<0.001) with children at UVH most likely to have a VCUG. Lasix renography also varied across sites (7.4-23.8%) with children at RCH most likely to have a Lasix renogram; this difference was not statistically significant (p=0.06).
Conclusions: This study is the first to demonstrate the feasibility of multi-center research utilizing automatic data extraction from the Epic EMR system in the pediatric urology setting. Although the majority of infants with congenital hydronephrosis are evaluated with renal ultrasound, significant variability exists in the use of additional radiographic studies at the time of initial urologic evaluation. Whether this variability is due to underlying clinical and/or geographical differences and whether this variability is associated with differences in treatment will be the subjects of future multi-center Epic EMR studies.

SESSION 12: KIDNEY/HYDRONEPHROSIS II

49) 1:22 PM
Robotic-Assisted Laparoscopic Dismembered Pyeloplasty and Vascular Hitch Technique in Children: Comparison of Outcomes

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Purpose: While dismembered pyeloplasty is standard for intrinsic ureteropelvic junction obstruction (UPJO), surgical management of extrinsic crossing vessel UPJO without intrinsic disease has been debated between dismemberment or the Hellstrom vascular hitch technique. Given the utility of the robotic platform, we contrasted the surgical demographics and outcomes of robotic-assisted laparoscopic dismembered pyeloplasty (RAL-DP) and vascular hitch (RAL-VH) in pediatric patients with UPJO.

Methods: We retrospectively reviewed records of 73 patients who underwent RAL-DP or RAL-VH for UPJO from November 2008 to March 2012, excluding reoperations and horseshoe kidneys. Data collected included pre- and post-operative patient and surgical characteristics. In patients with crossing vessels at the UPJ, the vascular hitch technique was performed if renal pelvis decompression with ureteric peristalsis was observed after mobilization of vessels, suggesting no intrinsic UPJO. Otherwise, dismembered pyeloplasty was performed. Successful outcome at follow-up was defined as an asymptomatic patient with stable or improved ultrasound findings and/or no obstruction on nuclear medicine lasix renogram. Two tailed chi-square analysis was used for comparison.

Results: Of 76 cases in 73 patients (3 bilateral), 27 had crossing vessels of which 24 met intraoperative criteria for RAL-VH; 3 (11%) did not exhibit decompression of renal pelvis after mobilization of crossing vessels and RAL-DP was done. The remaining 49 cases without crossing vessels also underwent RAL-DP. Median age at surgery was 6 (0.4-17) years in RAL-DP and 9.5 (0.6-20.1) years in RAL-VH. Median operative time was 162 (64-359) and 114 (50-226) minutes, respectively (p=0.01). Estimated blood loss was similar in both groups (mean 5mL). There were no intraoperative complications. Average
hospital stay was 1.2 days after RAL-DP and 0.9 days after RAL-VH (p=0.04); 3 RAL-VH patients were dismissed the day of surgery. After RAL-DP, 4/37 (11%) patients had complications (calcified stent, pyelonephritis, urine leak, malpositioned stent); no RAL-VH patients had complications. Of 35 RAL-DP with follow-up data thus far, 33 (94%) had successful outcomes at median follow-up of 6.5 (2.9-25) months. Of 15 RAL-VH patients with follow-up data thus far, all 15 (100%) had successful outcomes at median follow-up of 6.1 (3-18) months.

**Conclusion:** In patients with crossing vessel UPJO without intrinsic UPJO based on strict intraoperative criteria, the vascular hitch technique has similar success as RAL-DP with significantly shorter operative times and length of hospital stay. Only 11% of cases with crossing vessels did not have visible decompression of the renal pelvis after mobilization of the crossing vessels, thus warranting dismembered pyeloplasty. While RAL pyeloplasty overall is highly successful, our modest series at early follow-up supports an individualized surgical treatment approach to extrinsic UPJO.

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**50) 1:28 PM**

**Inter-Rater Reliability of Ultrasound Interpretation in Infants with Congenital Hydronephrosis**

Vijaya M. Vemulakonda, MD, JD, Susan J. Staulcup, MPH, Michelle R. Torok, PhD, Amy H. Hou, MD, Jeffrey B. Campbell, MD and Duncan T. Wilcox, MD, (1)Department of Pediatric Urology, Children’s Hospital Colorado, Aurora, CO, (2)University of Colorado Denver, Aurora, CO

**Purpose:** The two most commonly used systems of measuring hydronephrosis and stratifying risk of surgical intervention are the anterior-posterior diameter (AP diameter) and Society for Fetal Urology (SFU) grading system. Prior studies have shown that the SFU grading system has good intra-rater but modest inter-rater agreement when tested among pediatric urologists and trainees. The objective of this study is to compare the reliability of the AP diameter measurement to the SFU grading system and to identify potential factors, such as focal parenchymal thinning and renal echogenicity, which may influence the use of the SFU grading system.

**Methods:** After IRB approval was obtained, infants referred to the Department of Pediatric Urology with a primary diagnosis of prenatal or congenital hydronephrosis were prospectively evaluated with renal ultrasound at age three months. Ultrasound images were then de-identified and reviewed by four pediatric urology fellowship trained physicians. Data collected included AP diameter, SFU grade, renal asymmetry, hydroureter, increased echogenicity, associated focal or global parenchymal thinning, and degree of parenchymal thinning. Data were then reviewed to estimate inter-rater variability using the intra-class correlation measure for the AP diameter and Kendall’s coefficient of concordance for SFU grade. The association between SFU grade and
other ultrasound findings was tested using $X^2$ or Fisher’s exact tests as appropriate.

**Results:** A total of 119 kidneys in 60 patients were reviewed. Inter-rater agreement of AP diameter measurement was noted to be moderate with 49% agreement (ICC= 0.49). Inter-rater agreement of the SFU grading system was noted to be high with 85% agreement (Kendall’s coeff=0.85; $p<0.0001$). When reviewing the association between SFU grade and other ultrasound findings, renal asymmetry ($p=0.007$), increased echogenicity ($p<0.0001$), presence of global parenchymal thinning ($p<0.0001$) and $>50\%$ parenchymal thinning ($p<0.0001$) were associated with grade 4 hydronephrosis.

**Conclusion:** The SFU grading system is associated with relatively high inter-rater agreement compared to the AP diameter among pediatric urology fellowship trained physicians, suggesting that it is a reliable classification system. Classification of grade 4 hydronephrosis appears to be associated with ultrasound findings that are not explicitly included in the SFU system. Further investigation is needed to determine if incorporation of additional ultrasound findings would improve reliability of this metric.

51) 1:34 PM

**Urinary NGAL Levels Correlate with Differential Renal Function in Patients with Ureteropelvic Junction Obstruction Undergoing Pyeloplasty**

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**Purpose:** Urinary obstruction from Ureteropelvic Junction Obstruction (UPJ-O) can lead to renal damage. However, because the degree of UPJ-O detected by anatomic imaging such as ultrasound is not always related to renal injury, it can be difficult to determine which patients require prompt intervention versus those who may safely be observed. Recent investigation has elucidated the potential benefit in patients with UPJ-O of urinary neutrophil gelatinase-associated lipocalin (NGAL), which is known to be a sensitive biomarker for acute kidney injury. The purpose of this study is to evaluate urinary NGAL levels in the affected renal pelvis and bladder of children with UPJ-O undergoing dismembered pyeloplasty.

**Methods:** A prospective cohort study was performed of patients treated at a single institution with dismembered pyeloplasty from 2010-12. Urinary samples were obtained intra-operatively from the bladder and the obstructed renal pelvis. Samples were analyzed using a commercially available ELISA for NGAL. Urinary NGAL levels were normalized to urine creatinine from the same specimen. Normalized urinary NGAL (uNGAL) from the renal pelvis and bladder in each patient were compared using a Wilcoxon signed-rank
A ratio was calculated between uNGAL from the renal pelvis and bladder specimens. This ratio was then correlated with clinical endpoints using a Pearson Correlation.

**Results:** A total of 26 males and 14 females were enrolled and had both bladder and renal pelvic aspirates sent for NGAL measurement. Median age at surgery was 1.36yr (Range 0.12-18.7). All patients had unilateral UPJ-O at the time of surgery. Median bladder uNGAL was 15.0ng/mg (1.4-1650.8) and median renal pelvic uNGAL was 16.0ng/mg (1.31-18034.5), p=0.15. The median ratio of renal pelvic to bladder uNGAL was 1.73 (0.16-85.3). The median differential renal function by nucleotide renography was 47% (12-57) and the median T1/2 drainage was 29.6min (2.8-323).

The correlation between the ratio of renal pelvic to bladder uNGAL and the following data-points were: Patient age (r=-0.031, p=0.849), T1/2 drainage (r=0.059, p=0.738), and Differential Renal Function (r=-0.489, p=0.001), Figure 1. As a reference, the correlation between T1/2 drainage and Differential Renal Function was r=-0.415, p=0.012.

**Conclusion:** We observed that a ratio of renal pelvic to bladder uNGAL correlates with the relative function of the affected kidney in the setting of unilateral UPJ-O. In our prospective study analyzing uNGAL in patients with UPJ-O undergoing dismembered pyeloplasty we have found a significant correlation between higher renal pelvic uNGAL levels relative to bladder uNGAL and a decreased ipsilateral differential renal function. While this initial data requires further validation, we believe it reveals potential for uNGAL as a biomarker in children with UPJ-O.

**Figure 1:** Scatter Plot of the Ratio of Renal Pelvic to Bladder uNGAL versus Ipsilateral Differential Renal Function with Pearson Correlation Calculated.
Comparison between Ultrasound and Dimercaptosuccinic Acid Scintigraphy in the Evaluation of Renal Scars
Maryse Marceau-Grimard1, Christian Côté2, Stéphane Bolduc1, Marcel Dumont2 and Katherine Moore1, (1)Urology, CHUL-CHUQ, Université Laval, Québec City, QC, Canada, (2)Nuclear medicine, CHUQ, Université Laval, Québec, QC, Canada

Purpose: Dimercaptosuccinic acid (DMSA) scintigraphy is the gold standard in the evaluation of renal scars and is widely used for this purpose in the pediatric population even if it necessitates radiation exposure. A few studies have compared, with opposite results, the sensitivity and specificity of renal ultrasound to DMSA scans in the detection of renal scars, to simplify the clinical management of patients. With more sensitive ultrasound equipment purchased in our tertiary pediatric center, our objective is to evaluate if renal ultrasounds performed in our practice could be sufficient and equivalent to the information provided by DMSA scintigraphy regarding renal scars.

Methods: The radiological charts of all 284 patients that had undergone a DMSA scintigraphy between January 2009 and February 2012 have been reviewed. Correlation between ultrasound and DMSA scans results for the search of renal scars was the main focus. Two hundred fifty (250) patients and 467 renal units have been included after exclusion of patients with difference higher than a year between the ultrasound and nuclear studies or anatomical features that invalidate one of the studies.

Results: Of the 467 renal units evaluated, 46 (9.9%) presented scarring on ultrasound examination and 118 (25.3%) on DMSA scintigraphy (ultrasound sensibility (se) 29.7%, specificity (sp) 96.9%). Thirty-five (35) of the 46 (76%) kidneys with a scar on ultrasound examination had scarring confirmed on the nuclear exam. The results are similar when we compare ultrasound evaluations performed with newer to older machines (older: se 31.6%, sp 96.8%; newer: se 21.7%, sp 97%). When considering only the ultrasound and DMSA scans evaluations done in the same week, the results remain in the same range. Globally, if result are analyzed by patient for more clinical significance, of the 250 patients, 41 (16%) demonstrated scarring on ultrasound compared to 99 (39.6%) on scintigraphy.

Conclusion: In our center, the actual use of the ultrasound data is not powerful enough to give reliable information about renal scarring, even with more sensitive instruments. Even with its inconvenient, DMSA scintigraphy is still mandatory in the evaluation of renal scars to help in our clinical decision making.

Hydronephrosis In Patients with Spina Bifida – Can It Predict Vesicoureteral Reflux?

Hydronephrosis In Patients with Spina Bifida – Can It Predict Vesicoureteral Reflux?
Woojin Kim, Hiroko Suzuki, Yoshiyuki Shiroyanagi and Yuichiro Yamazaki, Urology, Kanagawa Children’s Medical Center, Yokohama, Japan

**Purpose:** Standardized evaluation of patient with spina bifida in our institution included renal ultrasound (US) and video-urodynamic study (VUDS). To our knowledge, there is no report to evaluate the association between hydronephrosis and vesicoureteral reflux (VUR) in patients with spina bifida who catheterize. We assessed the association between hydronephrosis and findings of VUDS in patients with spina bifida.

**Methods:** We retrospectively reviewed the records of spina bifida patients with clean intermittent catheterization from August 2009 to February 2012. The patients who underwent both US and VUDS within three months were included in this study. SFU classification was used to assess hydronephrosis. To evaluate the association between hydronephrosis and VUR, we performed the following investigations. 1) To compare patients with and without hydronephrosis. Analysis included age, gender, Pdet max, bladder trabeculation and the presence or absence of VUR. 2) To compare kidneys with and without hydronephrosis. The presence or absence of VUR of each kidney was analyzed. Chi square and student-t test were used for statistical analysis.

**Results:** There were 104 patients (58 girls, 46 boys) who met study inclusion criteria. Median age at US was 8.3 years (range 0 to 23). Underlying diseases included open myelomeningocele in 89, closed myelomeningocele in 2 and conus lipoma in 13. A total of 17 kidneys (14 patients) had hydronephrosis, including Grade 1 in 13, Grade 2 in 2, Grade 3 in 2. A total of 27 kidneys (22 patients) had VUR, including Grade I in 4, Grade II in 11, Grade III in 6, Grade IV in 4, Grade V in 2. Tables showed the results of the comparison between patients (table1), kidneys (table 2) with and without hydronephrosis. To compare patients with and without hydronephrosis, age and Pdet max was significantly differed. As for the presence or absence of VUR, there was no statistically significant difference in the hydronephrosis and no hydronephrosis groups.

**Conclusion:** Although patients with hydronephrosis had significantly high Pdet max, hydronephrosis could not predict VUR in patients with spina bifida who catheterize.

**Table 1. Comparison between patients w/ and w/o hydronephrosis**

<table>
<thead>
<tr>
<th></th>
<th>Hydronephrosis group</th>
<th>No hydronephrosis group</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>6.1 ± 3.8</td>
<td>8.8 ± 5.6</td>
<td>0.04</td>
</tr>
<tr>
<td>Gender (male/female)</td>
<td>7/7</td>
<td>39/51</td>
<td>0.86</td>
</tr>
<tr>
<td>Pdet max (cmH2O)</td>
<td>54.8 ± 24.8</td>
<td>35.0 ± 25.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Bladder trabeculation (yes/no)</td>
<td>6/8</td>
<td>36/53</td>
<td>0.90</td>
</tr>
<tr>
<td>VUR (yes/no)</td>
<td>3/11</td>
<td>19/71</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2. Comparison between kidneys w/ and w/o hydronephrosis

<table>
<thead>
<tr>
<th></th>
<th>Hydronephrotic kidney</th>
<th>Normal kidney</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VUR (yes/no)</td>
<td>3/14</td>
<td>23/166</td>
<td>0.79</td>
</tr>
</tbody>
</table>

SESSION 13: MISCELLANEOUS II

54) 2:30 PM
Radiation Exposure to Children During Videourodynamics: How Low Can We Go?
Andrew J. Combs, RPA-C, Jason P. Van Batavia, MD and Kenneth I. Glassberg, MD, Division of Pediatric Urology, Department of Urology, Columbia University College of Physicians and Surgeons, Morgan Stanley Children’s Hospital of New York - Presbyterian, New York, NY

Purpose: While videourodynamics (VUDS) are an important tool in the evaluation of children with a variety of neurogenic, anatomic or functional disorders, real concerns regarding amount of radiation exposure and potential long term cancer risks exist. These concerns are further magnified when children require repeated VUDS testing or other radiographic imaging studies over time. There are also concerns as to where these studies are performed and by whom. In recent years we have made a concerted effort to bring the dose of radiation down as low as possible and still achieve a worthwhile, informative study. We report our radiation exposure data prospectively collected for all children undergoing VUDS procedures during the past year.

Methods: Cumulative radiation dose and total exposure time, all as a function of field of view, were analyzed, as was relation to diagnosis and bladder capacity. All fluoroscopy (OEC series 9800 C-arm) was performed in the Urology unit by urology resident or attending physicians in concert with a single experienced urodynamicist.

Results: A total of 157 videourodynamic studies were performed (98M, 59F; mean age 8.5 yrs, range 0.1-21.5). The most common diagnosis was anatomic abnormality (37%), followed by functional/non-neurogenic bladder dysfunction (32%) and neurogenic bladder (28%). Mean total fluoroscopy time was 9.8 seconds (range 2.3-26.3) and mean total radiation exposure was 0.29 mGy (range 0.06-1.77 mGy). Total fluoroscopy time and radiation exposure by diagnosis is shown in table 1. Children with neurogenic bladder had significantly less total radiation exposure than children with either anatomic abnormalities or functional bladder disorders (0.19mGy vs. 0.35mGy and 0.31mGy, respectively, both p<0.003). Bladder capacity influenced total radiation exposure with mean exposure 0.24 mGy for capacity <250mL vs. 0.34 mGy for capacity ≥250mL (p=0.03). No study was deemed to have inadequate imaging quality affecting interpretation either by the attending or outside referring urologist.
Conclusions: Radiation exposure during VUDS can be lowered to levels well below those previously reported without sacrificing study quality. Total radiation exposure during VUDS in this study was significantly less than previously reported; on average equivalent to the radiation exposure of three chest x-rays or 1/5 of a standard VCUG and demonstrate that urologists too can adhere to the principle of ALARA ("as low as reasonably achievable"). The lower exposure times in neurogenic bladders likely reflects lesser need for multiple voiding images compared to other conditions. Bladder capacity does appear to factor into increased radiation dosing as previously reported but this effect can be diminished by turning off the auto contrast feature once a scout image has been obtained. The key elements to reducing radiation are attention to detail, use of low dose setting and the substitution of static images of very short duration whenever possible in place of video clips.

Table 1. Primary diagnostic groups for 157 videourodynamic studies and comparison of total fluoroscopy time and total radiation exposure based on diagnosis.

<table>
<thead>
<tr>
<th></th>
<th>No. of patients</th>
<th>Age in years (range)</th>
<th>Total Fluoroscopy Time (sec)</th>
<th>Total Radiation Exposure (mGy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>157 (98M, 59F)</td>
<td>8.5 (0.1 – 21.5)</td>
<td>9.8 (2.3 – 26.5)</td>
<td>0.29 (0.06 – 1.77)</td>
</tr>
<tr>
<td>Neurogenic Bladder (i.e. SB, VATER, SCI)</td>
<td>44 (21M, 23F)</td>
<td>8.9 (0.2 – 21.5)</td>
<td>6.9 (2.8 – 13.3)</td>
<td>0.19 (0.06 – 0.80)*†</td>
</tr>
<tr>
<td>Functional Disorders (i.e. DV, PBND)</td>
<td>51 (21M, 30F)</td>
<td>10.0 (2.2 – 20.0)</td>
<td>9.8 (4.2 – 16.5)</td>
<td>0.31 (0.08 – 1.30)*</td>
</tr>
<tr>
<td>Anatomic Abnormalities (i.e. PUV, strictures)</td>
<td>58 (55M, 3F)</td>
<td>6.9 (0.1 – 17.1)</td>
<td>11.9 (2.3 – 26.3)</td>
<td>0.35 (0.07 – 1.77)†</td>
</tr>
<tr>
<td>Others</td>
<td>4 (2M, 2F)</td>
<td>8.5 (2.5 – 10.8)</td>
<td>10.9 (7.2 – 14.1)</td>
<td>0.31 (0.16 – 0.48)</td>
</tr>
</tbody>
</table>

* p=0.003  † p<0.001

SB = spina bifida, SCI = spinal cord injury, DV – dysfunctional voiding, PBND = primary bladder neck dysfunction, PUV = posterior urethral valves

55) 2:36 PM
Feasibility of Integrating Research Data Collection into Routine Clinical Practice Using the Epic Electronic Medical Record
Vijaya M. Vemulakonda, MD, JD, Department of Pediatric Urology, Children’s Hospital Colorado, Aurora, CO, Duncan T. Wilcox, MD, Pediatric Urology, Children’s Hospital Colorado, Aurora, CO and Michael G. Kahn, Clinical Informatics, Children’s Hospital Colorado, Aurora, CO
Purpose: With the widespread use of electronic medical records (EMR) in the United States, studies have suggested the potential use of the EMR as a data collection tool for pediatric clinical research. The primary objective of this study is to evaluate the feasibility and completeness of data collection using research data fields integrated into the clinical note in the Epic EMR.

Methods: After institutional review board approval was obtained, we incorporated data fields in the history and physical exam portions of the clinical notes template for patients seen by the Department of Pediatric Urology at Children’s Hospital Colorado. Compliance with templates was not measured; however use of the templates is standard practice in our department. We then retrospectively reviewed use of these data fields from 11/1/2011 to 4/15/2012. Data were extracted from the EMR using standard automated electronic data extraction techniques. Data fields assessed included location of clinic visit, primary complaint, and genital exam. Fields included in the history were limited to a series of discrete options; fields included in the physical exam portion of the note included both discrete options as well as a wild card free text option. Data extracted from the integrated research fields were then assessed for overall use, as well as differences in use based on location of the research field and availability of designated options and wild card free text. Data were evaluated using the Student’s t-test.

Results: A total of 1375 notes for 1270 discrete patients were examined. Of data fields included in the history portion of the template note, 82.7 were filled out using a discrete choice option. The data field was deleted in 17.3% of cases. Of data fields included in the physical exam portion of the template note, 75.1% were filled out and 24.9% were deleted. Of fields filled out in the physical exam, 32.3% utilized the wild card free text option. The difference in use of history fields compared to use of physical exam fields was statistically significant (t=4.88; p<0.001).

Conclusion: This study is the first to demonstrate the feasibility of integrating research data collection into routine pediatric urologic clinical practice by incorporating data fields into the clinical notes template in the Epic EMR system. This study also suggests that physicians are more likely to use research data fields with discrete choice options in the history portion of the note than in the physical exam portion of the note. Further studies are needed to determine if this method of data collection is feasible to establish a research network across multiple sites with multiple EMR configurations.
Antegrade Continence Enema: Which Bowel Segment Is Better?
Jonathan S. Ellison, MD, A. Neil Haraway and John M. Park, Urology, University of Michigan, Ann Arbor, MI

Purpose: Antegrade continence enemas (ACE) are utilized for refractory fecal dysfunction in the pediatric neuropathic population. Various bowel segments have been used for ACE, including the original description by Malone of appendicocoeostomy. Depending on the overall colonic motility and redundancy, the optimal bowel segment for achieving efficient enemas remains unknown. We reviewed our experience of the ACE procedure, investigating patient factors, functional outcomes, and complications associated with the use of various bowel segments.

Methods: An IRB-approved retrospective chart review of 109 consecutive ACE procedures by a single-surgeon from 2000-2011 was performed. The choice of colon segment used for ACE reconstruction was determined by the surgeon’s discretion intra-operatively. Pre-operative patient characteristics, intra-operative techniques, and post-operative outcomes were reviewed and statistical analysis performed.

Results: A total of 90 patients undergoing 109 ACE procedures were included for analysis. Average age at operation was 13.8 years. Myelomeningocele was the most common pre-operative diagnosis. Most patients underwent simultaneous urinary reconstruction. Stomal complications (49%) were most common. A sub analysis compared outcomes of proximal (cecal, N = 48) and distal (sigmoid colon, N = 55), excluding those sited at the transverse colon (N =6). Left sided distal ACE stomas were associated with shorter flush times compared to the right-sided proximal stomas (37.2 vs. 61.2 minutes, p < 0.001). Eight patients underwent conversion from an original cecal ACE to a more distal location due in part to protracted flush times and abdominal colic, while 3 patients underwent conversion of a distal sigmoid colonic ACE to a cecal location for stomal complications. Use of appendix was associated with a higher, though not statistically significant, stomal complication rate (42%) as compared to colon (25%) channels.

Conclusion: Use of either cecal, transverse or colonic location for ACE results in acceptable and comparable stoma outcomes, although left sided colonic ACE is associated with significantly shorter flush times and may have lower stomal complications. Stomal complications, especially stomal stenosis, remain a frustrating reality of the ACE procedure.
Table: Comparison of sigmoid versus cecal location for ACE reconstruction.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Sigmoid (N = 55)</th>
<th>Cecal (N = 48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE at Operation</td>
<td>14.9 ± 7.9</td>
<td>12.1 ± 6.2</td>
</tr>
<tr>
<td>BMI at Operation</td>
<td>21.5 ± 5.5</td>
<td>21.6 ± 7.7</td>
</tr>
<tr>
<td>Admission for Bowel Preparation</td>
<td>46 (84%)</td>
<td>46 (98%)</td>
</tr>
<tr>
<td>Urinary reconstruction</td>
<td>46 (84%)</td>
<td>42 (88%)</td>
</tr>
<tr>
<td>Functional Outcomes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fecal continence</td>
<td>54 (98.2%)</td>
<td>46 (95.8%)</td>
</tr>
<tr>
<td>Not Using ACE</td>
<td>3 (5.5%)</td>
<td>3 (6.3%)</td>
</tr>
<tr>
<td>Flush time</td>
<td>37.2 ± 16.4</td>
<td>61.2 ± 35.8</td>
</tr>
<tr>
<td>Enema volume</td>
<td>937 ± 625</td>
<td>815 ± 328</td>
</tr>
</tbody>
</table>

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Characteristics of Unscheduled Pediatric Urology Consultations: Effects of Day, Month and Diagnosis

Julian Wan, MD, Chang He, Heather Crossley, Vesna Ivancic, John M. Park, Kate H. Kraft and David A. Bloom, Urology, University of Michigan, Ann Arbor, MI

Purpose: Much data are available about the planned clinical activities of pediatric urologists from the logs of scheduled operations and clinic appointment lists. Little however is known about unplanned clinical activity, which we term consultations. We wondered if the frequency of consultations varied with the day of the week or month of the year. Would frequency be affected by holidays? Would the method of consult staffing (same day, within 24 hours, by phone) vary with day or month? Were some diagnoses more likely to occur in patients with repeat consultation?

Methods: We retrospectively reviewed data of patients in our consult database for years 2008-2010. The age, date, and diagnostic category were noted. Statistical analysis was done using Tukey multiple comparison adjustment and a negative binomial distribution model.

Results: There were 932 consults from 736 patients over 1095 days. The mean age was 8.9 years. There were 512 (47%) days with no consults, 32% with 1, 19% with 2-3, and 2% with 4+. Statistical significance was found in the following: more consults were made on Monday and Tuesday than Saturday and Sunday, more consults were in July, August and January, staffing method was found to be related to day of week and month. Phone management was 1.47 more likely on the weekend as compared to a weekday (95% CI 1.24, 1.75). The attending staff was more likely to staff consults out the same day or within 24 hours during July or August as compared to other months. (p = 0.001) It was 1.7 times more likely to be staffed out directly (95% CI 1.23, 2.33) as opposed to any other month. Holidays (religious, national, secular) had
no effect. There was no pre-holiday or post-holiday effect seen. The three most common diagnoses overall were infection (UTI), hydronephrosis, and lower urinary tract symptoms/neurogenic bladder. Calculi were only 7th most common overall. The diagnosis of UTI (p=0.004) and calculi (p =0.02) were the most common diagnoses in the patients with 4 or more consults. The diagnosis of UTI was 2.1 times more likely in these repeat patients (95% CI 1.28, 3.51), and stones was 2.33 times more likely (95% CI 1.13, 4.80).

**Conclusion:** Consults were more frequent in July, August and January and on Mondays and Tuesdays. There was a corresponding rise in staffing the same day or within 24 hours. This may be partly related to new residents starting in July. There was no holiday effect. UTI and calculi were the diagnoses most common in recurrent patients with 4 or more consults. Calculi are disproportionally represented in recurrent patients being 2.1 times likely to occur. Patterns of unplanned consultations should be considered in future staffing and treatment planning. They may also assist in identifying changing trends in diagnoses.

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**Contemporary Epidemiology of Complex Genitourinary Defects**

Jonathan C. Routh, MD, MPH¹, Brant A. Inman, MD¹, Patricio C. Gargollo, MD², Jessica C. Lloyd, MD³, Sherry S. Ross, MD¹ and John S. Wiener, MD¹, (1)Division of Urology, Duke University Medical Center, Durham, NC, (2) Urology, Children's Medical Center and University of Texas Southwestern, Dallas, TX

**Purpose:** Anecdotal evidence would seem to suggest that complex genitourinary birth defects are occurring less frequently. However, little data from population-based epidemiological studies are available to confirm or refute this suggestion.

**Methods:** The Kids’ Inpatient Database (KID) is a national, all-payer database of 2-3 million inpatient pediatric hospitalizations per year, including both complicated and uncomplicated in-hospital births, at up to 4,121 hospitals in 44 states. We reviewed KID to evaluate the birth prevalence of spina bifida, posterior urethral valves, bladder exstrophy, epispadias, prune belly syndrome, ambiguous genitalia, and imperforate anus among in-hospital births. For posterior urethral valves and prune belly syndrome, we limited our search to newborn males only. We used ICD-9 diagnostic codes to identify patients in the 1997, 2000, 2003, 2006, and 2009 KID (with the exception of prune belly, for which 1997 was not used due to ICD-9 coding changes). Poisson regression models were used to estimate trends in birth prevalence over time.

**Results:** During the study period, 4.5 million in-hospital births were captured by the KID database. Of these, 3,413 newborn infants were diagnosed with spina bifida, 214
with bladder exstrophy, 1,127 with epispadias, 726 with ambiguous genitalia, 180 with prune belly syndrome, 578 with posterior urethral valves, and 4,040 with imperforate anus. We identified no significant changes in the birth prevalence of spina bifida (from 33.9 new spina bifida births/100,000 uncomplicated in-hospital births in 1997 to 29.0/100,000 in 2009, p=0.08), posterior urethral valves (10.4-11.0/100,000, p=0.51), prune belly syndrome (4.8-3.3/100,000, p=0.44), or ambiguous genitalia (5.82-5.87/100,000, p=0.38). However, there was a significant decrease in birth prevalence of bladder exstrophy (2.4-1.6/100,000, p=0.01) and a significant increase in epispadias (8.0-11.6/100,000, p=0.04) and imperforate anus (33.6-35.0/100,000, p=0.04) during the study period.

**Conclusion:** The birth prevalence of spina bifida, posterior urethral valves, prune belly syndrome, and ambiguous genitalia appear to be stable over the last 12 years. Epispadias and imperforate anus have been more commonly diagnosed in newborns over the same time period, while bladder exstrophy has been less commonly diagnosed in newborns.

<table>
<thead>
<tr>
<th>Year</th>
<th>Spina Bifida</th>
<th>Exstrophy</th>
<th>Epispadias</th>
<th>Intersex</th>
<th>Imperforate Anus</th>
<th>Prune Belly</th>
<th>Posterior Urethral Valves</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>33.93</td>
<td>2.35</td>
<td>7.95</td>
<td>5.82</td>
<td>33.58</td>
<td>10.39</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>27.86</td>
<td>1.75</td>
<td>7.69</td>
<td>6.38</td>
<td>32.44</td>
<td>4.77</td>
<td>9.10</td>
</tr>
<tr>
<td>2003</td>
<td>26.84</td>
<td>1.76</td>
<td>8.75</td>
<td>5.36</td>
<td>32.40</td>
<td>3.23</td>
<td>9.02</td>
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<tr>
<td>2006</td>
<td>26.62</td>
<td>1.58</td>
<td>9.64</td>
<td>5.67</td>
<td>33.06</td>
<td>3.32</td>
<td>8.24</td>
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<td>2009</td>
<td>29.01</td>
<td>1.63</td>
<td>11.58</td>
<td>5.87</td>
<td>34.98</td>
<td>3.28</td>
<td>11.02</td>
</tr>
</tbody>
</table>

59) 3:00 PM

**External Sphincterotomy to Improve Bladder Emptying In Prune Belly Syndrome**

*Douglas E. Coplen, MD, FAAP, Pediatric Urology, Washington University School of Medicine, Saint Louis, MO*

**Purpose:** Megacystis and incomplete bladder emptying in the absence of fixed urethral obstruction is identified in up to 50% of males with prune belly syndrome (PBS). Urodynamics show decreased detrusor contractility and relative outflow resistance that in combination prevents effective bladder emptying. The voiding dysfunction can be progressive and while urinary diversion with a cutaneous vesicostomy is commonly utilized in infants in diapers this is not a good option in a toilet trained child. Clean intermittent catheterization is a preferred management but can be difficult in boys with normal penile sensation. We report our experience with external sphincterotomy to reduce outflow resistance in toilet trained males with PBS.

**Methods:** We retrospectively reviewed our patient database for patients with PBS ICD-9 code (756.71) and a history of external sphincterotomy CPT code (52276). Sphincterotomy was performed using a pediatric resectoscope and a single incision at the twelve o’clock position using a pure cutting current. An indwelling catheter was left for 24-48 hours after the procedure. Patients were followed at 6 month intervals. Patient demographics, indications for sphincterotomy and
clinical outcomes were tabulated. Post-void residual volumes were determined by either catheterization or US. **Results:** Six sphincterotomies were performed in five toilet trained males with PBS between 1995 and 2010. All patients had progressive hydronephrosis on US. In four cases intermittent retention or urinary tract infections were additional indications to improve bladder emptying. In all cases parents/children were unable/refused to perform CIC. Hydronephrosis returned to baseline in all patients after sphincterotomy. No patient had recurrent urinary retention. None of the patients developed incontinence after sphincterotomy. All but the oldest patient is currently active in our clinic.

| Age (yrs) | L’ indication | Pre-procedure PVR (ml) | Post-procedure PVR (ml) | Pre/post peak flow rate (ml/sec) | Follow-up
<table>
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<tbody>
<tr>
<td>1</td>
<td>Progressive hydronephrosis</td>
<td>2500</td>
<td>500</td>
<td>not available</td>
<td>recurrence @ 3 yrs now on CIC</td>
</tr>
<tr>
<td>2</td>
<td>UTI’s</td>
<td>350</td>
<td>50</td>
<td>two/nine stable @ 12 yrs</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Intermittent retention</td>
<td>360</td>
<td>100</td>
<td>not available</td>
<td>no recurrence @ 5 yrs</td>
</tr>
<tr>
<td>4a</td>
<td>Intermittent retention</td>
<td>2200</td>
<td>500</td>
<td>six/nine progressive hydro @ 3 yrs</td>
<td></td>
</tr>
<tr>
<td>4b</td>
<td>Progressive hydronephrosis</td>
<td>1400</td>
<td>250</td>
<td>three/ten well @ 12 months</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>UTI’s</td>
<td>2000</td>
<td>50</td>
<td>two/ten well @ 6 months</td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion:** External sphincterotomy can effectively treat incomplete bladder emptying in select patients with PBS. It decreases renal dilation and urinary tract infections while protecting renal function and can eliminate the need for CIC.

60) 3:06 PM (poster 5) **Utilizing a Serosal-Trough for Fashioning a Continent Catheterizable Stoma: Technique and Outcomes**

*Nima Baradaran, MD1, Andrew A. Stec, MD2, Angela Gupta, MD1, Michael A. Keating, MD, FAAP3 and John P. Gearhart, MD, FAAP4, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)Urology, Medical University of South Carolina, Charleston, SC, (3)Division of Pediatric Urology, Walt Disney Pavilion at Florida Hospital for Children, Orlando, FL*

**Purpose:** To evaluate the efficacy and potential complications of the serosal-trough (ST) technique for the implantation of a continent catheterizable stoma (CCS) during enterocystoplasty in children with bladder exstrophy.

**Methods:** Using an IRB-approved departmental database, children with bladder exstrophy, born after 1990 were selected and patients, who underwent urinary diversion with a CCS created with the ST technique, were identified. Demographic characteristics, as well as the eventual clinical outcomes, were retrospectively reviewed.
Results: A total of 135 patients with urinary diversion were identified, of whom 26 (13 males) had CCS implantation using the ST technique. Patients included 14 classic exstrophies, 10 cloacal exstrophies, and 2 epispadias. The appendix and tapered ileum was utilized for creation of CCS in 11 and 15 cases respectively. The median age at creation of CCS was 10.7 years (range: 4.4 – 17.4). At the time of CCS creation, 21 patients underwent initial enterocystoplasty, 4 had repeat augmentations, and 1 had a CCS on a previously augmented bladder. Ileum (average length 18cm) was used in 24/25 augmentations and was selected due to lack of redundant sigmoid in 52% of cases and intraoperative surgeon preference in the remaining. In one case of cloacal exstrophy, a hindgut remnant was utilized. In 24 (92%) cases, initial CCS resulted in complete continence of the catheterizable channel. After median 2.5 years (range: 0.2 – 7.5) of follow-up all patients are dry via intermittent catheterization. The CCS failed at postoperative months 6 and 21 and required complete revision in two cases. The details of the procedure are illustrated in figures 1 and 2.

Conclusion: Utilizing a serosal-trough to provide a strong backing for a catheterizable channel is an excellent option when a channel must be placed in ileum, hindgut, or in an area of an augment where muscular backing is not available. This technique provides a reliably catheterizable tunnel, durable continence mechanism and good success rate when creating a CCS in combination with a urinary diversion.

Figure 1:
Two parallel longitudinal incisions only on the serosa are made to expose the underlying mucosa (A). The two incisions are caudally joined forming a U-shaped incision. Tacking sutures help to fan out the serosal layer and define the limits of the trough (B, C).

**Figure 2:**

The tabularized conduit is placed on the newly created trough (E, F). Tacking sutures are used to wrap the trough, covering the new continent catheterizable stoma with over 5:1 ratio in length to width. Pulling the sutures too hard may cause over compression of the catheterizable stoma and compromise the function of the conduit (G). The catheterizable stoma is attached to the reservoir with an end-to-end anastomosis and then the stoma is matured on the abdominal wall.

**SESSION 14: POSTERIOR URETRAL VALVES**

61) 4:50 PM

**N-of-1 Studies to Optimize the Clinical Outcomes of Individual Patients with Posterior Urethral Valves**

Pramod Reddy, MD, W. Robert DeFoor, MD and Curtis Sheldon, MD, Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH

**Purpose:** Patients with posterior urethral valves (PUV) represent a cohort with wide variability in their clinical presentation. The management of these patients thus varies depending on the severity of pathology. Optimizing
the clinical outcomes of individual patients with PUV is challenging in the most severely affected patients. The effectiveness and suitability of aggressive medical treatment with clean intermittent catheterization (CIC) is often questioned by the patient, their family, as well as other healthcare providers. N-of-1 studies are prospective, multiple crossover comparisons of alternative treatment options in a single patient. The main emphasis of the N-of-1 study design is to improve the care being delivered to an individual patient. The objective of this N-of-1 trial was to determine if patients with PUV could be allowed to void and be toilet trained or if they needed to continue with CIC to optimize their renal health. **Methods:** A prospective IRB-approved N-of-1 study was performed to determine the efficacy of CIC and anti-cholinergic medication in the management of boys with PUV. After discussing the treatment options and selecting a clinical care plan, we collected baseline and post-intervention data. The response to intervention was measured by serum creatinine, cystatin C GFR and renal imaging. The results were shared with the parents and the next phase of the study was decided based on the clinical response. After a series of interventions were studied, the patients were maintained on the intervention that provided them with the best response to therapy. Parents were interviewed after the study to discern their satisfaction with the trial and its processes. **Results:** The graph represents the response of two of our patients to withdrawal of CIC with elevation of their GFR indicating hyperfiltration, considered to be an early marker of reversible renal injury. With re-institution of CIC and oxybutynin, the GFR returned to baseline levels. Parents that participated in the N-of-1 trials reported increased knowledge, awareness, and understanding of PUV and its renal implications. This was attributed to involving the families in data collection and also enabling them to actively participate in therapeutic decision-making during the trial. **Conclusions:** N-of-1 trials aid in the shared decision making and enhance patient-centered care, by offering objective evidence of individual benefit and harm. These trials increase the involvement of the patient and their family thereby enhancing compliance in patients with chronic conditions such as PUV. We believe that N-of-1 trials are a way of avoiding the arbitrary physician-based decisions prevalent in clinical practice and aid in the development of personalized care plans and objectively help establish the most effective clinical pathway for a given patient. Widespread utilization of this research tool would greatly aid in achieving evidence-based everyday clinical practice, ultimately benefiting all of our patients.
Using Improvement Science to Optimize Documentation of Outcomes in the Management of Patients with Posterior Urethral Valves

Pramod Reddy, MD, Shumyle Alam, MD, Deborah Reeves, Katherine Pandolfi and Curtis Sheldon, MD, Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH

Purpose: Measuring the quality of health care delivery is a fundamental step towards healthcare improvement. The focus to date has been on common conditions such as diabetes; the number of measures that apply to urological conditions is therefore very limited. To address the need for determining the clinical outcomes of a specific chronic urologic condition, we have developed measures of care and outcomes for patients with posterior urethral valves (PUV). The purpose of this study is to optimize the documentation of these measures in order to track the efficacy of care, with the ultimate goal being improvement in the clinical outcomes and enhanced value for the patient.

Methods: A prospective IRB approved study was undertaken at our institution between 2011 and 2012. A panel comprised of quality improvement consultants, and faculty from the pediatric divisions of Urology and Nephrology identified candidate measures to use as metrics of clinical outcomes for patients with PUV; serum Creatinine (Cr), Cystatin C GFR (cGFR) and chronic kidney disease stage (CKD). Additionally we created an institutional ‘Best Practice’ care plan for these patients, to reduce the variability of care between providers. Analysis of the processes involved in successful implementation of the care plan was performed (Fig 1). Interventions to improve documentation of the selected measures and care plan were undertaken. The interventions included education about the ‘Best Practice Plan’, passive alerts in the electronic medical record (EPIC alerts), performance feedback, and increasing visibility of the measures within our system. Tests of change, Plan-Do-Study-Act (PDSA) ramps of the interventions were conducted on every PUV patient encounter during the study period, and successful interventions were adopted and made operational.
**Results:** The baseline reporting levels of the selected measures for PUV outcomes included; Cr = 57%, cGFR = 31% and CKD = 33.3%. At the completion of the interventions over a six month period, the rate of reporting of all selected measures had improved; Cr = 95.5% (Fig 2), cGFR = 73.9% and CKD = 60%. The interventions included pre & post-education test of knowledge which showed a statistically significant improvement for nurses and Nephrologists.

**Conclusions:** The Best Practice plan for patients with PUV was widely accepted by the Urology and Nephrology teams with an increased awareness of timing and appropriateness of diagnostic testing. The interventions with the highest reliability demonstrated early and sustained adoption by the staff i.e. EPIC alerts. These results showed an improved continuity of care for the patients, reduction in duplicated testing and an overall cost saving. Improvement science is a powerful tool that can be utilized to define quality care, decrease variability and increase value to both the patient and the healthcare system.

**Figure 1.**
MONDAY, OCTOBER 22
SESSION 15: DISORDERS OF SEX DEVELOPMENT

63) 8:45 AM
DNA Copy Number Variations in 46, XY Disorders of Sexual Development
Steven M. Harrison, and Linda A. Baker, MD, Urology, University of Texas Southwestern Medical Center, Dallas, TX

Purpose: Less than 50% of cases of 46, XY disorders of sexual differentiation (DSD) are found to have a known genetic cause after DNA sequencing of causal genes known to regulate gonad development. Disease causing DNA changes can vary from chromosomal alterations detectable by karyotyping to point mutations detected by DNA sequencing. More recently discovered, copy-number variations (CNV) are deletions or duplications that affect the number of copies of a gene. CNV are missed by DNA sequencing and karyotyping but have been shown account for previously unexplained genetic diseases. Recent genomic advances include copy number variation (CNV) testing by comparative genomic hybridization (CGH). We assessed cases of 46,XY DSD by CGH for novel disease-causing genomic variants detectable by CNV testing.

Methods: From 2008-current, blood samples from cases of 46, XY DSD were prospectively tested by whole genome CGH using the array version current at the time of ascertainment (Baylor Medical Genetics Laboratory, Houston TX). In cases wherein novel genomic CNVs were detected, parental and extended family testing (FISH, CGH, or MPLA) was performed to identify whether de novo or inherited and co-segregating. Genes within and adjacent to detected CNVs were screened by functional databases to assess for disease-causing status.

Results: Of the 17 cases of 46,XY DSD undergoing CGH testing, 3 cases had 0.076-0.263Mb microduplications of Xp, 15q, and 4q, all which were likely benign. More importantly, 2 had a DSD-causing CNV, both being maternally inherited microdeletions. One case with a
maternal family history of congenital heart disease was found to have a co-segregating microdeletion of 0.245Mb on 8p23.1 upstream of GATA4, a known DSD and congenital heart disease-causing gene. Another case with a maternal history of premature ovarian failure had a co-segregating 0.25Mb microdeletion on 9q33.3 involving NR5A1/SF1 gene. Point mutations in NR5A1 or GATA4 are known to cause DSD in 46, XY cases while point mutations in NR5A1 are known to cause premature ovarian failure in 46, XX cases. **Conclusion:** CNVs involving or adjacent to known 46, XY DSD-causing genes lead to 46, XY DSD in 2 of 17 (12%) of previously unexplained cases. CNV testing is an important test for urologists to perform for unexplained 46, XY DSD cases, given CNVs can be passed to offspring of procreating males.

64) 8:51 AM
**Stress Is Differentially Associated with Parenting Style and Mental Health of Caregivers of Children with a Disorder of Sex Development**
Cortney Wolfe-Christensen, PhD1, David A. Fedele, MS2, Katherine Kirk, RN3, Larry L. Mullins, PhD1, Yegappan Lakshmanan, MD, FAAP4 and Amy B. Wisniewski, PhD5, (1)Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI, (2)Psychology, Bradley/Hasbro Children’s Research Center, ], (3)Nursing, University of Oklahoma College of Nursing, Oklahoma City, OK, (4) Psychology, Oklahoma State University, Stillwater, OK, (5) Pediatric Urology, University of Oklahoma Health Sciences Center, Oklahoma City. OK

**Purpose:** Caregivers of children with chronic medical conditions are at increased risk for higher levels of psychological distress and maladaptive parenting capacities. Two frequently studied parenting variables include perceived child vulnerability (PCV; i.e., perceiving the child as sick and vulnerable) and parenting stress (PS; i.e., stress related to relationship between the parent and child, as well as to characteristics of both the parent and child). There is evidence that high levels of PCV and PS can indirectly negatively affect the child’s emotional, behavioral, and social functioning. The goal of the current project was to examine the relationships between level of PCV, PS, and depressive and anxious symptoms in caregivers of children with a Disorder of Sex Development (DSD).

**Methods:** Participants included 127 caregivers (87 F, 40 M) of 89 children (Sex of Rearing: 64 F, 25 M) with a DSD. The caregivers ranged in age from 19 to 68 years old (M=35.35, SD=8.68). Caregivers completed the Child Vulnerability Scale (assessing PCV), Parenting Stress Index – Short Form (PSI), Beck Depression Inventory–2nd Edition (BDI-2), and Beck Anxiety Inventory (BAI) as part of a battery of measures for a larger study of parental adjustment.

**Results:** Theoretically chosen covariates included: child age, child’s sex of rearing, caregiver sex, and total family income for all analyses. Partial correlations revealed strong associations between PCV, PS, and depressive
and anxious symptoms, so exploratory analyses were conducted to better elucidate the roles of these variables. Analyses for the role of PS as a mediator and/or moderator of the relationships between PCV and psychological distress were conducted. Results revealed that PS mediated the relationship between PCV and depressive symptoms (Sobel Test $p<.001$; Figure 1), but moderated the relationship between PCV and anxious symptoms. Specifically, the relationship between PCV and anxious symptoms was only significant for caregivers who reported high levels of parenting stress ($p=0.18$; Figure 2).

**Conclusion:** Parenting stress plays important, yet differential roles in the relationships between PCV and depressive and anxious symptoms. Specifically, parenting stress is the pathway by which PCV is translated into depressive symptoms, whereas level of PCV is related to anxious symptoms only for caregivers with high levels of parenting stress. Given these relationships, reducing parenting stress could be an important target of clinical interventions for caregivers of children with DSDs.

**Figure 1.** Mediating role of Parenting Stress on the relationship between Perceived Vulnerability and Depressive Symptoms. Note: Values on paths are path coefficients (standardized betas). Path coefficients inside parentheses are standardized partial regression coefficients from equations that include the other variable with a direct effect on the criterion. **$p=.001$; ***$p<.001$.**

**Figure 2.** Moderating role of Parenting Stress on the relationship between Perceived Vulnerability and Anxiety
Complexities of Müllerian Anatomy in 46XX Cloacal Exstrophy Patients

Kristina D. Suson1, Janae Preece, MD2, Heather N. DiCarlo, MD3, Nima Baradaran4 and John P. Gearhart4, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)Division of Urology, University of Maryland Medical Center, Baltimore, MD, (3)Urology, Stony Brook University Medical Center, Stony Brook, NY, (4) Division of Pediatric Urology, The Johns Hopkins Hospital, Baltimore, MD

Purpose: 46XX patients with cloacal exstrophy often exhibit complex abnormalities of the Müllerian structures. However, little is known about their incidence and management. The authors questioned which anomalies were present in patients treated at an institution with a long term interest in exstrophy and an established prospective database, and how they were managed.

Methods: After obtaining IRB approval, a list of 42 genetic females with cloacal exstrophy was generated from a prospectively maintained, institutionally approved exstrophy database. Of these, records were available for 35 patients, 31 of which included detailed evaluation of Müllerian anatomy. Data points included Müllerian structures, method of evaluation, management, and sexual activity.

Results: Four patients (12.9%) had no identified abnormalities. Vaginal anomalies were divided into abnormalities of number, formation or location. Three patients (9.7%) had vaginal agenesis, while 13 (41.9%) had duplication. Of the patients with 1 vagina, five patients had atresia or hypoplasia, and one had a right-sided orifice and associated Müllerian system. One patient with two vaginas also had distal atresia. Two patients experienced vaginal prolapse. 71.4% of the cervices evaluated were duplicated, 3 of which were associated with a solitary vagina. 72% of the uteri were duplicated; 11% were associated with one vagina, while 5% were associated with no vagina. Most patients were diagnosed with anomalies either through physical exam or in the operating room. Imaging used to assess internal structures included ultrasound, CT and MRI. While 5 patients required imaging to fully characterize their anatomy, 7 patients had studies which failed to identify Müllerian structures. One MRI incorrectly identified 1 vagina and uterus where two vaginas and uteri were described intraoperatively. The most commonly performed reconstructive surgeries included vaginoplasties, incisions of vaginal septa, colporrhaphies, and hysterectomies. Of note, reasons cited for hysterectomy included concern for adequate drainage of menses, connection to the ureters, and patient-requested sterility. Sexual activity was only confirmed for three patients. Two of these patients conceived, one of whom had a spontaneous abortion. The other delivered a healthy baby but later requested hysterectomy secondary to concerns about having future children.
Conclusion: Most female patients with cloacal exstrophy exhibit abnormalities of the Müllerian system, most commonly uterine duplication. The best way of diagnosing these anomalies is a good physical exam, including endoscopy. Axial imaging and ultrasound are helpful adjuncts but do not replace careful assessment in the operating room. Accurate and early characterization of the anatomy is vital, as planning for later reconstruction should start at a young age. Future studies of sexual activity and fertility are warranted.

Using a National Pediatric Hospital Database to Assess the Practice Pattern of Clitoroplasty from 1992-2011 in the United States

Blake W. Palmer, MD1, Amy B. Wisniewski, PhD1, Kevin Kierl1, Dominic Frimberger, MD1, Bradley P. Kropp, MD1 and Christopher C. Roth, MD2, (1)Pediatric Urology, University of Oklahoma Health Sciences Center, Oklahoma City, OK, (2) Urology, Louisiana State University Health Sciences Center, New Orleans, LA

Purpose: Much debate is had over the optimal time for female genitoplasty for girls with a Disorder of Sex Development (DSD). The 2006 Consensus Statement on management of DSD cautioned on performing clitoral surgery on any girl except the most virilized (Prader III-IV) but cited literature to support that cosmetic surgery in infancy aids in parental distress and improves attachment. To date however little has been reported to understand what the normative practice patterns are for clitoral surgery and whether those patterns have changed over time.

Methods: We searched the Pediatric Health Information Systems hospital database to identify patients who had clitoral surgery between: 1992-2011. We used associated procedure and diagnostic codes to describe the practice pattern of female genital surgery in the United States for the last 2 decades.

Results: The PHIS database query revealed 504 operations on the clitoris. Clitoral procedures were done at less than 1 year of age in 29.2% (147/504) and at less than 3 in 49% (247/504) with only 11.3% (57/504) occurring after the age of 14. In those patients with a specific diagnosis of CAH 60.0% vs. 45.4% of non-CAH girls had surgery at <3 years of age (p=0.005; x²=8.037, df=1). There is trend of decreasing incidence of clitoroplasty that occur at <3 years of age in the cohort when comparing 1992-1996 (62.5%), 1997-2001 (56.1%), 2002-2006 (47.5%), 2007-2011 (40.9%) (p<0.0005; x²=12.88, df=3). There were no regional variations seen in the cohort with the incidence of clitoroplasty surgery at less than the age of 3 with the West (50.0%), Midwest (53.6%), South (47.1%) and Northeast (43.7%) (p=0.140).

Conclusion: Our study demonstrates that the incidence of clitoral surgery at ages less than 3 has been decreasing
for the past 2 decades. The PHIS database does not offer the ability to assess why this change is occurring but emphasizes the importance of further study as to the long term impact and psychosocial factors associated with DSD surgery.

67) 9:07 AM (poster 29)
**Psychosocial Adjustment of Children with DSD**
Amy Wisniewski, Stephanie Hullmann, MS and Larry L. Mullins, PhD, (1) Pediatric Urology/Child and Adolescent Psychiatry, University of Oklahoma Health Sciences Center, Oklahoma, OK, (2) Psychology, Oklahoma State University, Stillwater, OK

**Purpose:** Disorders of sex development, or DSD, are medical conditions in which affected individuals experience discordance between their genetic, gonadal, and/or phenotypic sex (Hughes et al., 2006). Anecdotal reports from parents of children with DSD suggest that these children show increased aggression and behavior problems. They may also be at risk for internalizing disorders, such as depression and anxiety, due to low self-esteem, shame, and inability to fit in with peers. However, very few studies have examined the psychosocial adjustment of children with DSD empirically. The goal of the current study is to determine if children with DSD are, indeed, at risk of experiencing behavioral, emotional, and social concerns by having their parents complete standardized measures of child psychosocial functioning.

**Methods:** Participants were caregivers (N = 12) of children (50% male sex of rearing) ages 2-18 (M = 7.30, SD = 3.99) with DSD. Diagnoses included Congenital Adrenal Hyperplasia (CAH; 66%), Complete Adrenal Insensitivity Syndrome (CAIS; 16.7%) and 46,XY DSD of unknown cause (16.7%). Most of the children (58.3%) had received genital surgery. With regard to race and ethnicity, the majority of participants self-identified as Caucasian (66.7%), 8.3% self-identified as African American, 16.7% as Native American, and 8.3% as Asian American. Parent participants completed measures of child behavior, including the Behavioral Assessment System for Children Parent Report Scale (BASC-PRS) and Vanderbilt ADHD Diagnostic Parent Rating Scale (VADPRS).

**Results:** Results of the VADPRS were examined for caseness using the clinical cutoff scores defined by the authors (Wolraich et al., 2003). With regard to ADHD clinical cutoff scores, 36.4% of the sample met caseness for ADHD (9.1% inattentive type, 16.6% hyperactive type, 9.1% combined type), and 75% of those children were raised female. The majority of the sample (54.5%) met clinical cutoff criteria for Oppositional Defiant Disorder (ODD). Further, 66.7% of those children were raised female. Independent samples t-tests were conducted to compare children with male and female sex of rearing on externalizing and internalizing problems as well as overall behavior problems and adaptive functioning. There was a
trend for children reared female (M = 57.33, SD = 13.49) to exhibit greater externalizing symptoms than children reared male (M = 45.67, SD = 6.98), t (10) = -1.88, p = .089. There was another trend for children reared female (M = 57.83, SD = 13.01) to exhibit more behavior problems than children reared male (M = 45.17, SD = 9.60), t (10) = -1.92, p = .084.

Conclusion: This preliminary work suggests that children with DSD may be at risk for exhibiting significant inattentive, hyperactive, and oppositional behaviors. Female children with DSD may be at a particular risk for exhibiting externalizing behaviors and other problem behaviors at greater rates than those who have been raised male.

68) 9:11 AM (poster 56)

Transcriptome Analysis of the Fetal Gubernaculum Following DHT Exposure Identifies Common Androgen and Insulin-Like 3 Targets

Julia Spencer Barthold, Alan Robbins, Yanping Wang, Jack Pike, Erin McDowell, Kamin Johnson and Suzanne M. McCahan, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE

Purpose: Androgen receptors (ARs) within the developing gubernaculum are essential for testicular descent. In order to better define the target pathways involved in AR signaling, we analyzed gene expression in response to in vitro androgenic stimulation of the fetal rat gubernaculum.

Methods: Microdissected pairs of GD17 rat gubernacular bulbs were cultured on a Millicell CM membrane in Dulbecco modified Eagle medium/Ham, 2% charcoal stripped fetal bovine serum, 1× insulin-transferrin-selenium-X supplement and 1× antibiotic-antimycotic. Cultures were maintained in basal medium for 24 hrs and for an additional 6 or 24 hours in basal or dihydrotestosterone-(DHT, 1, 10 or 30 nM) supplemented medium prior to harvesting. RNA was extracted, labeled and hybridized to Affymetrix microarrays (5-6 replicates/group). Differential expression was determined by the LIMMA linear model approach with a false discovery rate of 5% using the limma package in Bioconductor. Analysis for overrepresented functional categories was performed with DAVID. Genes of interest were analyzed in independent samples using TaqMan gene expression assays and data analyzed using ANOVA after log transformation.

Results: DHT was associated with differential expression of 0 and 2533 probesets after 6 and 24 hours’ exposure, respectively; 55% were also regulated by INSL3 as noted in our previous experiments. Functional analysis of 1336 probesets upregulated by DHT (1098 DAVID IDs) showed overrepresentation of extracellular matrix (ECM) and basement membrane; of 34 ECM genes, 8 were collagens. For 1197 downregulated probesets (900 DAVID IDs), WNT signaling; biological processes related
to cellular transport, RNA processing and transcription; nucleus and organelle (cellular components) and beta-catenin, SMAD and ion binding (molecular functions) were overrepresented. Using qRT-PCR we confirmed upregulation of Has2 and Adh1 (known AR-regulated genes) and neuromuscular developmental genes including Crlf1, Chrdl2 (both similarly upregulated by INSL3), Slit3 and Syne2. Transcripts confirmed as downregulated by DHT include Wnt4 (upregulated by INSL3), Ar, Myh7, Bmp4, Cxcl12 and Tgfβ2. We were unable to validate a significant response of Npy or Sfrp2 transcript levels to DHT.

**Conclusions:** We identified WNT and BMP signaling as common targets in the DHT- and INSL3-regulated transcriptome of the fetal gubernaculum, and confirmed differential expression of transcripts known to be androgen responsive in other contexts. These observations support other data suggesting synergy between INSL3-RXFP2 and AR signaling in the gubernaculum. We expected that 6-hr exposure to DHT would identify direct transcriptional AR targets, but none were observed. This absence of effect may indicate incomplete penetration of the intact organ in vitro after limited exposure, technical variation and/or a possible role for rapid, non-genomic AR signaling in the fetal gubernaculum.

**SESSION 16: VOIDING DYSFUNCTION**

69) 9:30 AM

**Incidence of Anatomic Abnormalities in Boys with Overactive Bladder Symptoms**

Joel F. Koenig, MD1, Joe Miller, MD2, John Hulsen III, MD3, Patrick H. McKenna, MD, FAAP, FACS4, (1)Surgery, Division of Urology, Southern Illinois University SOM, Springfield, IL, (2)Urology, University of California, San Francisco, San Francisco, CA, (3)Plastic Surgery, The Ohio State University SOM, Columbus, OH, (4)Division of Urology, Southern Illinois University SOM, Springfield, IL

**Purpose:** The evaluation and treatment of boys with symptoms of overactive bladder (OAB) is challenging, treatment approaches vary widely, and treatment outcomes are worse than in female patients. Urodynamics and voiding cystourethrogram (VCUG) require conscious catheterization and may fail to identify anatomic abnormalities and delay appropriate therapy. We report our experience and outcomes with an alternative diagnostic algorithm for boys with OAB which combines noninvasive uroflowmetry studies and selective cystourethroscopy in patients with specific voiding patterns.

**Methods:** With local IRB approval a prospectively collected database of 2,702 children evaluated in our clinic for lower urinary tract dysfunction was queried for boys presenting with urinary urgency, urinary frequency, or dysuria. Hospital and clinic records were reviewed. Data including age, presenting symptoms,
results of diagnostic studies, surgical and medical therapies, and symptomatologic outcomes were analyzed. Symptomatologic outcomes were based upon patient or parent report and classified as resolved, improved, or unimproved. **Results:** The SIU lower urinary tract dysfunction data base of 2,702 children was queried and yielded 349 boys evaluated for symptoms of OAB. Evaluation with uroflowmetry prompted cystourethroscopy in 79/349 (22.6%). One or more anatomic abnormalities were discovered and treated at the time of cystourethroscopy in 37 (46.8%) patients. Posterior urethral valves (PUV) were present in 34 patients, PUV and anterior urethral valves in 1 patient, PUV and urethral duplication in 1 patient and urethral stricture in 1 patient. Thirty-four of 37 (92%) patients with a surgically correctable anatomic abnormality followed up at least once postoperatively. At a mean follow-up of 14.9 months (range 1.0 to 63), symptoms had resolved in 15/34 (42.8%). Fifteen patients (45.7%) were classified as improved. Four of 34 (11.8%) patients were unimproved. Twenty-two of 34 (64.7%) patients with at least one postoperative evaluation also had postoperative uroflowmetry. Among these 22 patients, mean peak flow rate increased by 42.2 % (p=0.002), mean average flow rate increased by 44.4 % (p=0.0002), mean voiding time decreased by 32.2 % (p=0.04), and post-void residual volume decreased by 46.7.7 % (p=0.06) compared to preoperative values. **Conclusions:** 46.8% of boys with symptoms of overactive bladder evaluated with cystoscopy were found to have one or more anatomic abnormality. This approach avoids conscious catheterization and identifies and treats the significant number of anatomic abnormalities in a timely fashion. Initiating medical treatment without excluding anatomic abnormalities may contribute to the historically high rate of treatment failure in this group.

70) 9:36 AM
**Visual Analog Scale: A Suitable Method for Assessing Voiding Dysfunction?**
*Ruiyang Jiang, Karen Pritzker, Anjana Shah, Janelle Traylor and Nicol Bush, Pediatric Urology, Children’s Medical Center Dallas, Dallas, TX*

**Purpose:** The Vancouver Symptom Score (VSS) is one tool for diagnosing bowel and bladder dysfunction (BBD). However, in clinical practice, it can be time-constraining for the parents to fill out and for the provider to calculate scores. The Visual Analog Scale (VAS) is a validated, quick and reliable tool used to determine the degree of bother for numerous conditions. Our goal was to determine if the VAS was useful for assessing BBD symptoms.

**Methods:** Patients referred to our BBD clinic were assessed using both the VSS and VAS, completed by the parent at initial evaluation and follow up. In addition,
the child completed a separate VAS. The VSS is a 14-item 5-point Likert scale questionnaire (range 0-52), demonstrating 80% diagnostic accuracy for BBD (Afshar et al, JUrol 2009). In comparison, the VAS is a linear scale with scores ranging from 0-100, corresponding to the marked line (Fig 1). Analyses were performed with Spearman’s correlation and Mann Whitney U.

**Results:** Among 363 consecutive patients presenting to the BBD clinic (female = 227; mean age = 8.4 years), 334 completed VVS and VAS. Follow-up VAS and VVS scores were available in 243 patients. Parent VAS and VSS scores were significantly correlated (r=0.48, p<0.0001). Likewise, child VAS and VSS scores were positively correlated, although with a decreased relationship trend (r=0.30, p<0.0001). Follow-up VAS and VSS scores were similarly correlated (p<0.0001), such that 58 patients with unchanged or worse VSS scores had significantly worse VAS bother scores (mean 7.5-point worsening, SD 9.99, p<0.0001) compared to 185 patients with improved VSS scores, who demonstrated mean 29.6-point improvement (SD 34.28, p<0.0001).

**Conclusion:** VAS bother scores provide a simple, quick method of assessing and following global symptoms of BBD. Both parental and child-rated VAS scores positively correlated with the VSS on initial and follow-up visits. Mean VAS bother scores worsened with unchanged or worse VSS scores, and improved nearly 30% among those whose VSS scores improved.

**Figure 1.** Example of Visual Analog Scale.

71) 9:42 AM  
**Incidence of Abnormal Imaging and Urologic Intervention after First Febrile Urinary Tract Infection in Children 2-24 Months**

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**Purpose:** The American Academy of Pediatrics no longer recommends a voiding cystourethrogram (VCUG) for children aged 2-24 months presenting with their 1st UTI if renal ultrasound is normal. We hypothesized that in this age range, younger age and more severe pyelonephritis might predict abnormal imaging findings. The primary goal of our study was to identify factors associated with abnormal imaging, recurrent pyelonephritis and need for urologic intervention.

**Methods:** We retrospectively evaluated children diagnosed with pyelonephritis between 2-24 months
using the Synthetic Derivative resource. The Synthetic Derivative includes de-identified clinical data extracted from our medical center electronic medical record. Patients were selected by ICD-9 codes and confirmed by chart review. Data collected included: age at 1st UTI, sex, race, need for hospitalization, use of intravenous antibiotics, history of abnormal prenatal ultrasound, renal ultrasound results, VCUG results, presence of recurrent UTI, and incidence of urologic surgical intervention. Statistical analyses were performed with univariate logistic regression and chi square test.

**Results:** A total of 174 patients were included. Most patients were Caucasian (56%) and female (77%). The mean age at diagnosis was 5.6 months. 83 (48%) required hospitalization and 105 (60%) received intravenous antibiotics for at least part of their treatment. 154 patients had renal ultrasound after pyelonephritis; 59 (38%) had abnormal findings. There were no identifiable factors associated with an abnormal ultrasound after pyelonephritis except for abnormal prenatal ultrasound (p=0.0001). However, many patients with reported normal prenatal ultrasounds went on to have abnormal postnatal ultrasounds. We evaluated the subset of 95 patients with normal renal ultrasounds. Of these 95 patients, 84 had a VCUG. If a patient had bilateral vesicoureteral reflux (VUR), we grouped this patient by the higher severity. Of the 84, there were no abnormalities in 46, grade 1 in 1, grade 2 in 14, grade 3 in 15, grade 4 in 4, unspecified grade in 2, and other abnormality in 2. VUR was more likely in Caucasians (p=0.002) and females (0.04). Surprisingly, VUR was more likely in older patients (p=0.03). Of the 95 patients with normal renal ultrasound, 14 had a 2nd episode of pyelonephritis and 7 went on to have surgical intervention. Only abnormal VCUG was predictive of recurrent pyelonephritis (p=0.03) and need for surgical intervention (p=0.002).

**Conclusion:** We agree that renal ultrasound should be performed after 1st UTI in this age range as over one-third had abnormal ultrasound findings. More importantly, despite a normal ultrasound, a child may still have dilating reflux and recurrent pyelonephritis which requires surgical intervention. At this point we do not have a way to predict these patients other than abnormal VCUG. If VCUG is deferred, parents should be counseled regarding the risk of recurrent pyelonephritis and potential need for urologic intervention.

72) 9:48 AM

**History of Recurrent Urinary Tract Infection Not Predictive of Abnormality on Voiding Cystourethrogram (VCUG) or Dimercaptosuccinic Acid (DMSA) Renal Scan**

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Purpose: Recent American Academy of Pediatrics Guidelines recommended delay of VCUG in children 2 months to 2 years until UTI recurrence unless the renal sonogram was abnormal. While aimed at limiting the test’s morbidity to those with higher likelihood of vesicoureteral reflux (VUR), this recommendation raised concern regarding delayed diagnosis and consequent increased risk of UTI-related renal damage from VUR. We assessed rates of abnormality on VCUG and DMSA renal scan as they related to number of prior UTIs.

Methods: We retrospectively reviewed all initial VCUGs performed at Children’s Hospital of Michigan between January and June, 2010. Patients with a prior VCUG or history of VUR were excluded. History of multiple UTIs prior to VCUG was ascertained by the presence of two or more prior positive cultures in the electronic medical record or history of “recurrent UTI” on VCUG requisition form. Remaining patients with a single positive culture or “UTI” on VCUG requisition were categorized as having a single prior UTI. Outcomes assessed were increased rates of VUR or any urologic abnormality on VCUG and abnormality on DMSA scan (renal cortical scar or split function difference >10%). ANOVA and chi-square tests were performed with SPSS.

Results: Two hundred and sixty two patients underwent initial VCUG during this period. Of the 194 with prior infection, 131 had evidence of a single UTI (83 on history alone, 5 on culture alone, 43 on both). The remaining 63 had evidence of recurrent UTI (50 on history, 7 on culture, 6 on both). VUR was detected in 56 (21.3%); urologic abnormality including VUR was detected in 72 (27.4%). A positive documented urine culture did not increase likelihood of VUR (p=0.49) or any VCUG abnormality (p=0.81). History of recurrent UTI also did not increase likelihood of VUR (p=0.11) or any VCUG abnormality (p=0.80). DMSA was performed in 26 and was abnormal in 11 (42.3%). The only predictors of DMSA abnormality were VUR on VCUG (p<0.001) or any VCUG abnormality (p=0.002). DMSA abnormality was not more likely in those with requisition history of UTI (p=0.82) or culture-positive UTI (p=0.18). History of single or recurrent UTI did not increase likelihood of DMSA abnormality (p=0.18). Recurrent UTI also did not increase likelihood of DMSA abnormality (p=0.22).

Conclusions: History of recurrent UTI did not increase the likelihood of VUR or any VCUG abnormality more so than history of single UTI. While this seemingly supports avoiding a VCUG following initial UTI (as the probability of abnormality is no greater), VCUG for recurrent UTI did not lead to increased rates of DMSA abnormalities. These findings support the decision to postpone VCUG until after UTI recurrence, as increased morbidity is not observed. Larger, prospective studies are needed to confirm these preliminary findings.
High Sodium Diet and Hypercalciuria in Children with Dysuria and/or Hematuria

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Purpose: Hypercalciuria has been reported to cause dysuria, abdominal/flank pain, enuresis, and hematuria. Presumed to occur in 4-10% of the general pediatric population, a prior study demonstrated hypercalciuria on spot urine testing in 20-30% of patients referred for dysfunctional voiding (Parekh et al. JUrol 164:1008). Urinary calcium excretion is affected by sodium intake, and high sodium diet is common among US children >1 year of age. We hypothesized that high sodium diet could contribute to urinary symptoms, and so we evaluated the prevalence of hypercalciuria and the relationship of urinary calcium and sodium among patients referred to our dysfunctional voiding clinic.

Methods: Toilet-trained patients referred to our pediatric urology dysfunctional voiding clinic with dysuria and/or microscopic or gross hematuria had non-fasting spot urine testing of calcium, creatinine, and sodium on a random diet. Hypercalciuria was defined as spot urine calcium/creatinine ratio (Ca/Cr)>0.20mg/mg. Sodium excretion was measured with sodium/creatinine ratio (Na/Cr). Urine sodium excretion is the gold standard measure of sodium intake since dietary recall typically underestimates sodium intake. Analyses were performed with Spearman’s correlation, Chi-square test and Mann Whitney U.

Results: 154 patients (53M: 101F) with an average age of 8.26 years (SD 2.9) were evaluated with spot urine testing. 31 children (20%) had hypercalciuria. There was a significant positive correlation between urinary Ca/Cr and Na/Cr ratios, such that urinary calcium excretion increased with increasing sodium excretion (R=0.39, P<0.0001). Age and gender distribution were similar between those with and without hypercalciuria. In the highest Na/Cr quartile, 32.4% of patients were hypercalciuric compared to 2.6% in the lowest quartile.

Conclusion: High sodium diet, measured by sodium excretion, contributes to hypercalciuria among patients with dysuria and/or hematuria. In addition to confirming that 20% of patients referred to pediatric urology have hypercalciuria on spot urine testing, we demonstrate there is a direct correlation with sodium excretion. Decreasing dietary sodium, and thus sodium excretion, has been shown to decrease urine calcium. Longitudinal study will demonstrate whether this simple diet maneuver can improve urinary symptoms in the subset of dysfunctional voiders with hypercalciuria.
Prospective Evaluation of Sacral Nerve Modulation in Children with Validated Questionnaires

Heidi A. Penn, MD, Stacy T. Tanaka, MD, Douglass B. Clayton, MD, John C. Thomas, MD, Mark C. Adams, MD, John W. Brock III, MD and John C. Pope IV, MD, Division of Pediatric Urology, Monroe Carell Jr. Children's Hospital at Vanderbilt, Nashville, TN

Title: Prospective Evaluation of Sacral Nerve Modulation in Children with Validated Questionnaires

Purpose: Sacral neuromodulation for refractory urinary dysfunction has been well described in the adult population and its use in the pediatric population has recently gained popularity. Most of these studies, however, have either been retrospective or have not used validated questionnaires to assess bowel and bladder dysfunction (BBD), as well as quality of life (QOL). We hypothesized that pediatric patients undergoing sacral neuromodulation with InterStim® will see a significant improvement in QOL as well as bowel and bladder dysfunction. We prospectively evaluated all patients before and after undergoing sacral neuromodulation using validated QOL and BBD questionnaires.

Methods: All pediatric patients scheduled for sacral neuromodulation were eligible to participate. All patients underwent video urodynamics and indications for surgery included patients with refractory voiding symptoms that had failed both behavioral and medical therapy. Patients were enrolled and consented prospectively and completed the age-appropriate, validated PedsQL TM 4.0 Generic Core Scales and University of British Columbia dysfunctional elimination questionnaire. The QOL questionnaire consisted of 23 items comprising 4 dimensions: physical, emotional, social, and school functioning. Scores were reported as Physical Health Summary (physical functioning), Psychosocial Health Summary (emotional, social and school functioning) and total QOL. Scores ranged from 0-100 (higher scores indicating higher QOL). The BBD questionnaire consists of 14 total questions with a score ranging from 0-52, with >11 indicating dysfunction. Total questionnaire scores were compared between the two groups using the Wilcoxon matched-pairs test. A p-value < .05 was considered statistically significant.

Results: A total of 10 patients (2 males, 8 females) were enrolled in the study from July, 2011-April, 2012 with a median age of 9.5 years. All patients underwent second stage placement of the generator. One child developed an infection and had the device removed but replaced months later. The mean pre-op physical QOL was 88.13 ± 13.7 compared to post-op 89.7 ± 9.9 (p=.87). Psychosocial QOL pre- and post-op was 73.5 ± 18.8 and 83.95 ± 15.1, respectively (p=.08). Total QOL pre and post-op was 78.6 ± 15.2 and 86.2 ± 11.9, respectively (p=.08). Mean pre and post-op BBD scores were 23.4 ± 8.7 and 10.3 ± 6.9, respectively (p=.006). Figure 1 shows
individual patients and BBD dysfunction.

**Conclusion:** Patients undergoing sacral neuromodulation for refractory urinary dysfunction had a significant improvement in BBD scores, however there was no significant difference in QOL before and after surgery. Patients with long-standing urinary dysfunction had a higher than expected QOL prior to implantation. Continuing to follow these patients in a prospective manner with validated questionnaires will strengthen the current evidence in support of sacral neuromodulation in the pediatric population.

**Figure 1**

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75) 10:06 AM (poster 32)

**Factor Analysis of the Pediatric Symptom Checklist in a Population of Children with Voiding Dysfunction/Enuresis**

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**Purpose:** Previous research has indicated that children with urinary and/or fecal incontinence are at increased risk for psychosocial difficulties and therefore should be screened for mental health problems. The Pediatric Symptom Checklist (PSC) is a parent-completed measure of psychosocial difficulties in children. The PSC was originally established for use in primary care settings, but has been validated for use in children with chronic illnesses, such as Sickle Cell Disease, Diabetes, and Gastrointestinal disorders. However, the PSC has not yet been validated for use in a population of children with voiding dysfunction and/or enuresis. The objective of the current study was to determine whether the PSC,
holds its previously-established factor structure in the population of children with voiding dysfunction and/or enuresis, or whether scores for these children should be calculated differently to identify those who are at-risk for psychosocial difficulties.

Methods: A retrospective chart review was conducted of all children between the ages of 4 and 16 who presented to an outpatient pediatric urology clinic for voiding dysfunction and/or enuresis between January and July 2011. Charts that contained a completed PSC were retained for analyses and demographic information was obtained from the clinical intake form.

Results: Three hundred patients (145 M, 155 F) with the mean age of 9.08 years were included in the study. Two confirmatory factor analyses (CFA) using previously published models in populations of children with medical conditions (e.g., Sickle Cell and Diabetes, and Gastrointestinal disorders) were conducted on the 35 items of the PSC (Table 1). The CFAs did not result in a good fit of the data in our population, so an Exploratory Factor Analysis (EFA) was subsequently conducted. The EFA resulted in a three-factor structure (e.g., Internalizing, Externalizing, and Attention problems), with all but five items evidencing substantial factor loadings (Table 2). Notably, the five items that “fell out” of the analyses were all related to school difficulties.

Conclusion: Findings from the current study indicate that the PSC is a valid measure to screen for psychosocial difficulties in children with voiding dysfunction and/or enuresis. It is suggested that a shortened version of the measure (i.e., 31 items) could be used in this population, although further research is needed to identify a specific cut-off for clinically significant levels of psychosocial problems using the shortened version. The PSC can be easily incorporated into clinical care, as it is a straightforward measure to administer and score. Children who are at-risk for psychosocial difficulties can be identified and referred for mental health follow-up so that these issues, which could contribute to poor adherence to and compliance to treatment recommendations, can be managed in addition to the child’s medical treatment.

SESSION 17: HYPOSPADIAS/PENIS I

76) 10:45 AM
Is There A Role for Prophylactic Antibiotics After Stented Hypospadias Repair?

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Purpose: Evidence supporting post operative prophylactic oral antibiotics (POA) in routine stented hypospadias repair is lacking. In light of emerging resistance patterns, drug side effects, parental anxiety and
rising health care costs, we seek to clarify the role of POA in preventing post operative infection in this population. **Methods:** After ethics board review, we prospectively collected data on all consecutive patients undergoing stented primary or redo hypospadias repair by a single surgeon from Jan 2010 – Jan 2012. All patients received single-dose intravenous antibiotics on induction of anesthesia. Prior to April 1, 2011 all patients received POA for the duration of stenting. We compared this group to the non-POA group (surgery after April 1), who received only single-dose antibiotics on induction. The primary outcome was urinary tract infection (UTI) defined by positive urine culture. Infection rates were captured by patient history, and by reviewing all hospital visits and laboratory results available at our institution. Secondary outcomes included rates of skin infection, fistula, dehiscence and meatal stenosis. **Results:** During this period, 132 patients underwent hypospadias repair, 118 of which were stented (median 7 days (1-12)). No patient was lost to follow up. Median age at surgery was 28.3 months (8-215). 110 were primary repairs, and 8 were redo operations. In the primary repair group, techniques used were tubularized incised plate (85%), staged (7%), glanular approximation (5%), and other (3%). 56 (47%) received POA, and 62 (53%) had no POA. Patients in both groups were statistically well matched for age, location of meatus, presence of chordee, use of testosterone, type of repair, and duration of stenting. No culture proven UTIs occurred in either group. 3 patients in the POA group were reported to have UTI by parent history, but 2 of these were treated empirically without culture by their pediatrician, and 1 had a negative culture. No patients in either group had documented skin infection. The overall complication rate was 2.3% in the POA group, and 1.3% in the non-POA group (p>0.5). **Conclusions:** In our cohort, there was no clear difference in UTI or complication rates between the two groups. Within the limitations of this study design, our results suggest that POA may be unnecessary in stented hypospadias repair. A further prospective study is needed to clarify these risks and benefits.

77) 10:51 AM **Resulting Trends of Non-Coverage of Elective Circumcision by Louisiana Medicaid in Boys Aged 0-5**
Joseph Ortenberg, MD, FAAP, and Christopher C. Roth, MD, Department of Urology, Louisiana State University Health Sciences Center, New Orleans, LA

**Purpose:** Louisiana Medicaid discontinued coverage of non-medically indicated circumcisions in 2005. Previous evaluations have indicated that the annual cost savings of this policy is $1.6 M per year though this estimate was based on professional fees only. Also noted was that the number of medically indicated circumcisions was trending upward. The aim of this investigation was to
further evaluate trends in data regarding circumcisions in boys with LA Medicaid who were directly impacted by the policy change, those aged 0-5. A financial analysis based on facility, anesthesia, and professional fees was also conducted to determine how cost savings would be impacted by a more practical assessment.

**Methods:** Raw data regarding the number of circumcisions conducted under LA Medicaid was obtained from LA DHH for 2002-2010. Data from 2005 was excluded as the policy change was implemented mid-year. Data specific for CPT codes 54150, 54610, and 54161 for boys 0-5 was analyzed to determine trends over the selected time period. A cost model for each procedure was created using the 2012 LA Medicaid fee schedule and calculated rates of reimbursement. For the newborn codes (54150, 54160) cost were based on professional fees only. For the non-newborn code (54161) cost was based on professional fees for both surgeon and anesthesia provider plus facility fees. Linear regression analysis was used to predict future costs.

**Results:** For the time periods 2002-2004 (pre-policy) and 2006-2010 (post-policy) 15,423 and 2,611 circumcisions were performed annually in this age group, respectively. The number of boys undergoing newborn circumcision was statistically significantly reduced. The number of boys undergoing non-newborn circumcision actually increased over the same time period though not to a statistically significant degree. The actual cost per procedure was calculated as: 54150, $88.34; 54160, $119.96; 54161, $486.76. Retrospective cost analysis indicates that annual cost for circumcisions was $1.9M for 2002-2004 and $1.0M for 2006-2010. Secondary to rising numbers of more costly non-newborn circs, $2.0 M was spent on 54161 in 2010 alone. Using cost estimates to create a linear regression model predicts that average annual spending on circumcisions in this age group will exceed pre-policy levels by 2015.

**Conclusion:** The number of non-newborn circumcisions is increasing and such procedures carry a higher financial burden on healthcare systems. Financial benefits of not covering elective circumcision are decreasing as a result. Future observation is warranted to determine if predicted trends hold true.

**Urethral Mobilization for Distal and Midshaft Hypospadias with Chordee**

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**Purpose:** Many options are available for the repair of midshaft to distal hypospadias with chordee. Reported complications of hypospadias repair include poor cosmetic appearance, persistence of chordee, meatal
stenosis, fistula, and stricture. We hypothesize that advancing intact native urethra will decrease fistula rates, allow correction of chordee and decrease overall failure rates. We report on our experience in the correction of distal and midshaft hypospadias by urethral mobilization.

**Methods:** With local IRB approval we retrospectively reviewed our records and identified patients under the age of 18 with distal or midshaft hypospadias who were repaired by urethral mobilization between July of 2003 and May of 2009. The outcomes recorded were patient satisfaction, cosmetic appearance, functional bladder drainage by bladder scan, failures, and rates of fistulae, strictures or other complications.

**Results:** We identified 83 patients with distal or midshaft hypospadias meeting inclusion criteria. Five (6%) patients had previous, failed hypospadias operations. Hypospadias location was distal, midshaft, and MIP variant in 69 (83.1%), 11 (13.3%), 3 (3.6%) patients respectively. Chordee was present in 80 patients (96.4%). Mean degree of chordee was 61.5 degrees. Mean and median age at operation were 35.7 and 18 months respectively. Follow-up ranged from 0.25 to 79 months (mean 16.2). 93% of parental responses were “pleased” or “very pleased”. Mean bladder scan was 9.7ml (range 0 to 81ml). 1 patient (1.2%) developed a fistula. There were no cases of meatal stenosis.

**Conclusions:** Mobilizing the urethra results in an excellent cosmetic appearance and a low complication rate. This technique is especially well suited for patients with prior operations or who have a deficiency of preputial skin. Utilizing the native urethra with its own blood supply, is our preferred method for repairing distal and midshaft hypospadias with chordee.

79) 11:03 AM

**Duration of Follow-up to Identify Urethral Complications after TIP Hypospadias Repair**

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**Purpose:** Optimal duration of follow-up to detect most urethroplasty complications (UC) after hypospadias repair is not defined. We analyzed time to first diagnosis of any urethroplasty complication [fistula, glans dehiscense, meatal stenosis, neourethral stricture, diverticulum formation] to determine when they were initially encountered.

**Methods:** Data on consecutive patients undergoing TIP repair by WS was prospectively recorded since 1999, and analyzed to determine the time (in months) after surgery when UC were first diagnosed. Prism 5 was used to construct a Kaplan Meier curve for timing of UC.

**Results:** 752 primary and 139 reoperative TIP repairs were done, with 78 and 37 UC, respectively. Timing of 1 UC could not be determined, leaving 114 UC to
analyze (Figure). UC was diagnosed during the first postoperative visit in 73 (64%) and/or within the first year in 89 (78%) of the 114 patients with UC, with median time to diagnosis 3.45 months (IQR 1.7-9.4). Median time to identify glans dehiscence was 2 months versus 6.3 months for other UC (p=0.001), likely because glans dehiscence is more obvious than small fistulas that comprised nearly all the other UC.

**Conclusion:** 64% UC were diagnosed at the first postoperative visit, and 78% UC were identified within 12 months. Although urethral complications are detected later, these data suggest a reasonable duration for scheduled follow-up to detect most UC is 12 months. After 12 months, 35 patients would need indefinite follow up to detect a single additional UC.

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80) 11:09 AM

**The Need for Additional Procedures in Patients Undergoing Proximal Hypospadias Repairs As Reported In the Pediatric Health Information System Database**

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**Purpose:** With the exception of single surgeon and institutional case series data, little information exists describing the need for additional surgical interventions in patients undergoing single and two-stage repairs of proximal hypospadias. Several prospective single institutional studies reported rates of repeat procedures ranging from 16% to 24%. Using population-based data, we sought to characterize the frequency and type of additional procedures required in this patient population among a larger cohort and across multiple surgeons and institutions.

**Methods:** Patients undergoing single-stage or two-stage repair of proximal hypospadias were identified by searching the Pediatric Health Information System (PHIS) database for records containing CPT codes 54316, 54312, 54308, 54332, or 54336 billed between 1/1/2005
and 6/30/2010. Patient records in which a second stage code was not preceded by a first stage code, or when single-stage codes were preceded by hypospadias-related procedural codes, were excluded from the analysis. Patient records with diagnosis or procedure codes indicating disorders of sex development or alternative urethral pathology were also excluded. The database was then queried forward to 6/30/2011 to identify additional surgical interventions identified by CPT codes reflecting additional open surgical interventions (54340, 54344, 54348, 54352), endoscopic interventions for stricture (52275, 52281), interventions for recurrent chordee (54300, 54304), cosmetic interventions (54163), or endoscopic evaluation (52000).

**Results:** Inclusion criteria identified 2,325 patients; 19% (447) of patient records met exclusion criteria, resulting in a final cohort of 1,878 patients from 37 hospitals. Follow-up ranged from 1 to 6.5 years. 84% of patients underwent single-stage repair at a median age of 10 months (range 0-214 months). In patients undergoing two-stage repair, the median interval between stages was 17 months (range 9-224 months). 19.2% of all patients required additional interventions beyond their definitive repair. Of these patients 72% had one, 19% had two, and 9% had three or more additional procedures; 80.1% of procedures were open, 9.7% were endoscopic treatment of stricture and 10.2% were endoscopic evaluation. Patients undergoing two-stage repairs were significantly more likely to undergo additional interventions than those undergoing single-stage repair (29.6% vs. 17.3%; p<0.001).

**Conclusion:** Population-based data indicates that nearly one-fifth of patients undergoing repair of proximal hypospadias in children’s hospitals required additional interventions(s) after what was thought to be their definitive repair. This result falls within the range reported in current literature, and assists in identifying a more exact rate of re-intervention among the general population. The difference in additional intervention rates between one- and two-stage repairs may be, in greater part, a reflection of illness severity than surgical method outcome, and should be interpreted with caution. These data help to create a broader framework that facilitates improved evaluation of individual case series in the context of a modern cohort of patients undergoing proximal hypospadias repair.

**SESSION 18: HYPOSPADIAS/PENIS II**

81) 11:20 AM

**Objective and Subjective Sexual Outcomes of Adult Patients Following Hypospadias Repair Performed In Childhood**

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Purpose: We aimed to evaluate sexual function and psychosexual adjustment in adult patients who underwent hypospadias repair in childhood.

Methods: Following IRB approval 119 (26.6%) of 449 adult patients who underwent hypospadias repair between 1978-1993 and responded on the following questionnaires: psychological well being and penile appearance, International Index of Erectile Function (IIEF), Self Esteem and Relationship (SEAR), Short Form 12 questionnaire (SF-12), Premature Ejaculation (PE), and Sexual Quality of Life-Male (SQoL-M) were included in our study. All patients were divided into three groups according to the primary meatus localization. Group I of 45 (37.8%) patients with glanular hypospadias, group II of 56 (48.2%) with distal hypospadias and group III of the remaining 18 (14%) children with proximal hypospadias.

Results: All patients in group I and II were satisfied with the appearance of their penises. However, only 2 (11.1%) of 18 patients in the group III were pleased with their penile appearance. In group I 8.9% of patients reported mild erectile dysfunction (ED). However 62.5% and 72.2% of patients in groups II III reported mild ED respectively. Premature ejaculation (PE) was a common finding in 99 (83.2%) of all patients with incidence of 88.9% in patients with proximal hypospadias. All group I and II patients reported excellent self-esteem and relationship. In group III most patients were satisfied with relationship and only one patient (5.6%) was not satisfied. Two-thirds of patients in group I and II reported their sexual quality of life as excellent and other patients described them as very good. In group III sexual quality of life was somewhat decreased in all patients with one (5.6%) who has bad sexual life. The physical component summary was 50.07±12.4, 52.92±6.5 and 44.4±4.3 in the first, second and third group respectively. The mental summary component was 40.64±4.4, 40.49±4 and 43.84±2.6 in the first, second and third group respectively.

Conclusion: Our data show that excluding proximal hypospadias the majority of the patients who underwent hypospadias repair during childhood are satisfy with their penile appearance. However, the high incidence of mild ED and PE should not be disregarded and require appropriate counseling before surgery and during long term follow up.

Masculine Function of Hypospadias Patients in Adulthood

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Purpose: To evaluate masculine outcome of hypospadias patients in adulthood, using patient-reported questionnaires.
**Methods:** The self-entry questionnaire was mailed to hypospadias patients who were treated at our institution from 1973 to 1998, and aged 18 years or older now. The questionnaire consisted of questions about height, weight, sexual experience, marital status, and paternity, in addition to International Index of Erectile Function (IIEF)-5 and a disease-specific questionnaire (Moriya et al. J Urol 2006). The responding patients who were initially treated in our institute during childhood by a single surgeon were included. A national survey data were used as a control of height and marriage rate.

**Results:** Evaluable responses were obtained from 108 out of 520 contacted cases (response rate 21.3%). Ninety-two cases aged 19-54 (median 28) met the inclusion criteria. Mean follow-up time was 24.3±6.8 years. Two-stage Crawford-Ikoma repair had been performed in 81, and one-stage repair like MAGPI in 11. The original types of hypospadias were 54 distal (31 glandular, 23 penile) and 38 proximal (14 penoscrotal, 21 scrotoperineal and 1 perineal). Average height of the total patients, distal cases, and proximal cases at present were 166.8±7.1, 168.0±7.5 and 164.2±7.5 cm, respectively. They were all significantly smaller than national average (one group t-test), and proximal cases were significantly smaller than distal cases. The age-stratified results for masculine function are shown in the Table 1. There was no statistical significant difference between distal vs proximal types for the listed parameters, although marriage rate in proximal cases after 25 years old was lower than distal cases and control.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Type</th>
<th>N</th>
<th>HEF-5 Mean±SD</th>
<th>Intercourse N (Rate)</th>
<th>Marriage N (Rate)</th>
<th>Paternity N (Rate)</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-24</td>
<td>Distal</td>
<td>19</td>
<td>19.6±6.2</td>
<td>13 (0.67)</td>
<td>10 (0.50)</td>
<td>1 (0.05)</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Proximal</td>
<td>13</td>
<td>17.7±6.2</td>
<td>6 (0.46)</td>
<td>10 (0.80)</td>
<td>0 (0.00)</td>
<td>0.00</td>
</tr>
<tr>
<td>25-29</td>
<td>Distal</td>
<td>10</td>
<td>17.6±5.6</td>
<td>10 (1.00)</td>
<td>5 (0.50)</td>
<td>0 (0.00)</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>Proximal</td>
<td>9</td>
<td>16.3±4.8</td>
<td>6 (0.67)</td>
<td>2 (0.22)</td>
<td>0 (0.00)</td>
<td>0.11</td>
</tr>
<tr>
<td>30-</td>
<td>Distal</td>
<td>25</td>
<td>19.9±4.5</td>
<td>22 (0.88)</td>
<td>12 (0.48)</td>
<td>0 (0.00)</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Proximal</td>
<td>16</td>
<td>18.1±4.8</td>
<td>10 (0.63)</td>
<td>6 (0.38)</td>
<td>0 (0.00)</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>41</td>
<td>19.3±4.6</td>
<td>32 (0.78)</td>
<td>18 (0.44)</td>
<td>1 (0.03)</td>
<td></td>
</tr>
</tbody>
</table>

The disease-specific questionnaire documented complaints more frequently reported in the proximal cases as shown in Table 2.

<table>
<thead>
<tr>
<th>N</th>
<th>Erection bother N (rate)</th>
<th>Ejaculation bother N (rate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Small size*</td>
</tr>
<tr>
<td>Distal</td>
<td>34</td>
<td>27 (0.5)</td>
</tr>
<tr>
<td>Proximal</td>
<td>38</td>
<td>23 (0.61)</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>50 (0.54)</td>
</tr>
</tbody>
</table>

**Conclusion:** Hypospadias patients in adulthood lead masculine life developing along the age, with marriage rate at a comparable level with national standard. However, the disease-specific questionnaire highlighted the patients’ distress more prominently seen in proximal cases.
Hypospadias and Anorectal Malformation: A Unique Problem

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Purpose: The management of hypospadias when associated with anorectal malformation (ARM) represents a unique challenge for the surgeon. Often there will be associated malformations and a need for multiple surgical procedures as well as invasive testing. The pediatric urologist must be aware of the immediate and long term needs of these patients prior to the hypospadias repair. We reviewed our experience with hypospadias in this population to propose a rational guideline for the timing of surgical management.

Methods: A retrospective chart review was performed of all male patients with the diagnosis of ARM and hypospadias evaluated since 1980. Patients with bladder or cloacal extrophy were excluded from the analysis. Data was abstracted from the medical record including level of defect, neurogenic bladder, and renal anomalies. Renal anomalies included: vesicoureteral reflux, hydronephrosis, solitary kidney, and renal dysplasia. Proximal hypospadias was defined as a urethral opening located mid-shaft or lower and distal hypospadias included glanular, subcoronal defects, and megalourethra.

Results: A total of 91 patients were identified. There were 34 proximal hypospadias patients. Of these patients, 13 (38%) had a documented neurogenic bladder and 18 (53%) had renal anomalies. 42 patients were identified as having a distal hypospadias. 12 of these patients (29%) had a diagnosed neurogenic bladder and 27 (64%) had renal anomalies. In 15 patients, the hypospadias defect was not recorded. 6 of these patients (40%) had documented renal anomalies and 2 (13%) had a known neurogenic bladder.

Conclusion: Hypospadias when associated with ARM represents a unique problem. The incidence of associated anomalies is higher than seen with hypospadias alone. A poorly timed repair or one that does not allow catheterization for invasive testing may have negative consequences including delay in diagnosis. We propose that, at a minimum, all patients have a renal ultrasound performed before surgery and strongly advise that the repair be done after the initial posterior sagittal pull through in order to ensure that the often present recto-urinary fistula is closed. We obtain a voiding cystourethrogram when necessary a few days before colostomy closure. This allows an understanding of the bladder and may help guide the decision for urodynamic testing. Ideally hypospadias repair can be performed...
a few months after colostomy closure when the renal anatomy and bladder dynamics are known. Concomitant repair is ill advised because of the severe rash that will develop for several weeks after stool touches the perineum for the first time. When a neurogenic bladder is suspected, hypospadias repair may be delayed until after catheterization has begun unless the surgeon is confident that the neo-urethra can be easily catheterized by the family. This may avoid the need for an early diversion or Mitrofanoff and prevent the potential for pressure on the repair from straining.

84) 11:38 AM

**Patient Reported Long-Term Lower Urinary Tract Symptom after Two Stage Hypospadias Repair**

Akihiro Kanematsu¹, Yoshihide Higuchi¹, Koji Yoshimura, MD², Fumihiko Ikoma¹ and Shingo Yamamoto¹, (1) Urology, Hyogo College of Medicine, Nishinomiya, Japan, (2)Urology, Kyoto University, Kyoto, Japan

**Purpose:** To evaluate long-term lower urinary tract symptoms (LUTS) in hypospadias patients treated by two-stage repair using self-reported questionnaire.

**Methods:** We requested hypospadias patients treated in our institute who reached adulthood to respond by mail to the International prostate symptom score (IPSS) and a questionnaire related with hypospadias-specific LUTS (Moriya et al. J Urol 2007). Responding patients who were initially treated by Crawford-Ikoma two-stage repair during childhood by a single surgeon were included. An age-matched population-based survey data from 892 males were used as control of IPSS for patients older than 30 years. The results reported in the above article were also used as reference data.

**Results:** Evaluable responses were obtained from 108 out of 520 contacted cases (response rate 21.3%). Of them, 79 cases aged 20-44 (median 27) years met the inclusion criteria. Mean post-operative time was 24.8 years (S.D. 6.7). The original types of hypospadias were 19 glandular, 22 penile, 14 penoscrotal, and 24 scrotoperineal. Twenty-five patients (31.6%) underwent additional reoperative procedures after the initial staged repair.

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>n</th>
<th>IPSS Storage (S.D)</th>
<th>IPSS Voiding (S.D)</th>
<th>IPSS Total (S.D)</th>
<th>IPSS QOL (S.D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>28</td>
<td>0.92 (1.50)</td>
<td>1.56 (3.34)</td>
<td>2.39 (2.99)</td>
<td>1.11 (1.23)</td>
</tr>
<tr>
<td>25-29</td>
<td>16</td>
<td>1.69 (2.42)</td>
<td>1.88 (3.05)</td>
<td>3.56 (3.89)</td>
<td>1.88 (1.36)</td>
</tr>
<tr>
<td>30-34</td>
<td>18</td>
<td>2.50 (2.47)</td>
<td>1.39 (3.46)</td>
<td>3.89 (3.02)</td>
<td>1.39 (0.98)</td>
</tr>
<tr>
<td>Control</td>
<td>5</td>
<td>1.58 (0.85)</td>
<td>0.85 (1.85)</td>
<td>2.40 (1.74)</td>
<td>1.71</td>
</tr>
<tr>
<td>35-44</td>
<td>17</td>
<td>3.06 (4.00)</td>
<td>2.88 (5.30)</td>
<td>5.94 (5.66)</td>
<td>1.88 (1.76)</td>
</tr>
</tbody>
</table>

There was a gradual increase in IPSS along the age. Hypospadias patients older than 30 years reported slightly higher IPSS score than control, but without statistical significance, and equivalent QOL score (Table). There was no significant difference in IPSS between distal vs proximal types (mean IPSS 4.39 vs 3.02 and mean QOL score 1.41 vs 1.57, respectively). The patients
reported equivalent rate of complaint as compared with the reported normal data for urine stream, urinary frequency, and urination posture. In contrast, 14 patients (17.6%) reported urinary dribbling, and 18 (22.8%) reported urinary spraying. In total, 20 patients (25.3%) were not satisfied with their LUTS, 8 for dribbling, 9 for direction of urinary stream, and for other reasons. Eight of 22 (36.3%) who underwent reoperative procedures, and 12 of 67 (17.9%) who did not, were not satisfied with LUTS (p<0.02).

**Conclusion:** In view of IPSS data, LUTS of hypospadias patients in adulthood is at a level comparable to average males. However, considerable patients experience LUTS specifically related with urethroplasty, i.e., terminal urinary dribbling and spraying, indicating the importance of disease-specific questionnaires. The present results from patients treated during staged repair era would become a reference data for evaluating current hypospadias repair techniques in the future.

85) 11:44 AM (poster 36)

**Validation of the G.M.S. Hypospadias Score: Correlation with Post-Operative Complications**

**Laura S. Merriman, Edwin A. Smith, Hal C. Scherz, Andrew J. Kirsch and James Elmore, Pediatric Urology, Emory University School of Medicine, Atlanta, GA**

**Purpose:** The GMS scale was recently developed as a means to qualitatively score the severity of hypospadias. This system assigns numeric values to specific characteristics of the Glans, Meatus, and Shaft (figure). The GMS scale (range 3 to 12) has previously been shown to have excellent inter-rater reliability. Herein we present the short-term surgical outcomes of a group of patients graded pre-operatively using the GMS scoring system.

**Methods:** An ongoing database containing the GMS scores of over 200 consecutive patients undergoing hypospadias repair at our institution was queried. The surgical outcomes of those with at least 6-months follow-up were reviewed to determine if a correlation exists between the GMS score and risk of surgical complication.

**Results:** Seventy-eight patients were identified with at least 6-months clinical follow-up. Overall, complications requiring operative revision occurred in 11 (14.1%) patients including fistula in 7, meatal stenosis in 3, and glans dehiscence in 2. The average G, M, and S scores for these three groups are shown (table). The average GMS score of patients who had a complication following surgery was 7.6. This differed significantly from the average GMS score of 5.9 for patients who did not have a complication (p=0.017). The complication rate was 27.6% for patients with a GMS score greater than 6 compared to 6.12% for those with a GMS score less than 6.

**Conclusion:** At early follow-up, a high GMS score appears to be associated with an increased risk of surgical complication following hypospadias repair. Ongoing study may enable the identification of specific glans,
meatus, or shaft characteristics that correlate to certain types of complications. The GMS scoring system may be useful for parental counseling, hypospadias discussions, and outcomes research. External validation of the scoring system is needed.

| Glans (G) Score: | 1. Glans good size; healthy urethral plate, deeply grooved |
|                 | 2. Glans adequate size; adequate urethral place, grooved |
|                 | 3. Glans small in size; urethral plate narrow, some fibrosis or flat |
|                 | 4. Glans very small; urethral plate indistinct, very narrow or flat |

| Meatus (M) Score: | 1. Glanular |
|                  | 2. Coronal sulcus |
|                  | 3. Mid or Distal shaft |
|                  | 4. Proximal shaft, penoscrotal |

| Shaft (S) Score: | 1. No chordee |
|                 | 2. Mild (<30˚) chordee |
|                 | 3. Moderate (30-60˚) chordee |
|                 | 4. Severe (>60˚) chordee |

| Table I. Average G, M, and S scores by complication type |
|-------------|-------------|-------------|-------------|
| Fistula     | 2.14 G     | 2.43 M     | 2.0 S     | 6.57 Total GMS |
| Meatal Stenosis | 3.0 G     | 3.33 M     | 2.67 S   | 9.0 Total GMS |
| Dehiscence  | 3.5 G      | 2.0 M      | 3.5 S    | 9.0 Total GMS |

Objective Criteria for Preoperative Testosterone Use before Proximal Hypospadias Repair: Evidence for Androgen Resistance

Candace F. Granberg, MD, Nicol Corbin Bush, MD and Warren T. Snodgrass, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX

Purpose: We previously reported preoperative testosterone (T) injection for subjectively small glans before proximal hypospadias repair in 14/36 (39%) cases [J Pediatr Urol, 2010]. Beginning in 2009, preoperative assessment included glans width measurement, reserving T therapy [2mg/kg for 2-3 injections] for those ≤14mm, based on our observation that median glans size in normal neonates is 14mm. Post-injection measurement indicated minimal size change in some patients, treated with an escalating scale since 2011. We report both use of preoperative T based on glans width, and prevalence of androgen resistance at commonly used T doses.

Methods: Consecutive prepubertal patients with proximal hypospadias had glans width measured preoperatively, with T injection for those ≤14mm, with the goal of enlargement to ≥15mm. Initially T dose was...
2mg/kg IM for 2-3 injections with intraoperative repeat measurement. When minimal growth was noted in some cases, the protocol changed in 2011 to initial injection with 2mg/kg with repeat measurement in 3 weeks. Those with glans size ≥15mm had no further T, whereas patients without growth next had 4mg/kg injection with repeat measurement in 3 weeks, progressing as needed to 8mg/kg, 16mg/kg, etc.

**Results:** Of 76 prepubertal patients with proximal hypospadias, mean glans width was 14.9mm (SD 2.9). T injections were given to 36 (47%) with glans width <14mm (mean 11.6, SD 1.6), including 23/50 (46%) with the standard protocol and 13/26 (50%) with the escalating protocol. Of these 13 patients, 6 required a single injection to achieve glans size ≥15mm, while 7 (54%) had no increase in glans width with 1 injection of 2mg/kg, and so had escalation: 3 patients to 4mg/kg, 3 to 8mg/kg and 1 to 16 mg/kg.

**Conclusion:** Glans width provides objective criteria for preoperative testosterone therapy, resulting in treatment in nearly half the patients with proximal hypospadias. Androgen resistance to 2mg/kg, responding to escalating doses, has been found in half those selected for T therapy, or 25% of patients with proximal hypospadias.

**SESSION 19: EXSTROPHY**

87) 1:00 PM

**A Survey to Assess Self-Image in Individuals with Bladder Exstrophy: A Call for Psychosocial Support**

Melanie C. Pennison, MPH1, Lauren Mednick, PhD2, Rosemary H. Grant, RN1, Diane Price, MSW1, Ilina Rosoklija, MPH1, Lin Huang, PhD4, Sonja Ziniel, PhD4 and Joseph G. Borer, M.D.1, (1)Department of Urology, Children’s Hospital Boston, Boston, MA, (2)Department of Psychiatry, Children’s Hospital Boston, Boston, MA, (3)Department of Social Work, Children’s Hospital Boston, Boston, MA, (4)Clinical Research Program, Children’s Hospital Boston, Boston, MA

**Purpose:** Although research conducted with patients with urological conditions has indicated that functional limitations, pain, limited mobility, and social restrictions can impact one’s self-image (Cash and Pruzincky, 2002), the influence of visibility of the condition has not been examined. We hypothesized that the presence of abdominal and genital scarring may lead to poorer body image and difficulties with self esteem. This study aims to assess the differences in self-image of patients with bladder extrophy (BE) as compared to patients with kidney stones (KS).

**Methods:** As part of a larger study examining self-image and quality of life in patients diagnosed with BE, a 25 question multiple choice Urological Body Image Questionnaire (UBIQ; for ages 13-25) consisting of questions regarding physical appearance, avoiding behaviors, disclosure of urological condition, romantic relationships and future expectations was created. A
modified UBIQ (mUBIQ) for ages 8-12 was created by removing questions regarding relationships and future expectations. Chi-squared, Fisher's exact or Cochran-Armitage Trend Tests was performed and findings of <.01 were considered significant.

**Results:** A total of 48 patients {24 bladder exstrophy (17 male, 7 female), 24 kidney stones (8 male, 16 female)} between the ages of 8-25 were included in the study. The mUBIQ was completed by 16 patients (10 with BE, 6 with KS) and the UBIQ was completed by 32 patients (14 with BE, 18 with KS). As an aggregate, compared to patients with KS (n=24), patients with BE (n=24) were significantly more likely to avoid changing clothes in front of peers (p=.0001), not tell friends about one’s condition (p=.0001) and report feeling discomfort in discussing one’s condition with friends (p=.0006). Differences were not found for avoiding activities with friends (p= 1.0), avoiding sleeping over at friends houses (p=.09) or avoiding wearing bathing suits (p=.35). Patients with BE were significantly more likely than patients with KS to think their condition would prevent them from having future romantic relationships (p=.002) and children (p=.003).

**Conclusions:** As proposed, our findings suggest that patients with BE do reveal some behaviors that may indicate a poorer self-image. They are more likely to avoid changing clothes in front of peers, less likely to disclose their condition and are more uncomfortable discussing their condition with friends. Findings may call for an individual approach to assessing and evaluating issues related to self-esteem and identity. In addition, results may highlight the importance of receiving alternative psychosocial support that can be provided through support groups. Participation in such groups allows patients to meet other individuals with similar medical challenges and offers them a venue for open discussions regarding their condition, thereby increasing opportunities for interpersonal and group engagement while decreasing feelings of social isolation for those suffering with a poorer self image.

88) 1:06 PM

**Radical Forearm Free Flap Phalloplasty Following Repair of Bladder Exstrophy**

*Eric Z. Massanyi, MD1, Angela Gupta, MD1, Sameer Goel, Student2, John P. Gearhart1 and Richard J. Redett, MD3,

(1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)School of Medicine, Johns Hopkins Hospital, Baltimore, MD, (3)Plastic and Reconstructive Surgery, Johns Hopkins University School of Medicine, Baltimore, MD*

**Purpose:** Loss of the penile tissue is a reported complication of bladder exstrophy repair, and these individuals often desire phalloplasty. Pedicled abdominal flaps have been used with mixed results; however, patients with exstrophy often have significant scarring from prior
surgeries. Radical forearm free flap phalloplasty has been used successfully for congenital aphallia in a few small series. The authors present a series of patients who have undergone phalloplasty by means of radical forearm free flap following repair of bladder exstrophy.

**Methods:** A retrospective review of 9 patients who underwent radical forearm free flap phalloplasty between 2005 and 2011 was completed. Indications for phalloplasty were classical bladder exstrophy (7) and cloacal exstrophy (2). For each subject, details of prior exstrophy repair were reviewed in addition to size of flap, donor and recipient vessels, complications, need for subsequent surgeries, and self-reported sensation and ability to orgasm.

**Results:** The mean age at time of phalloplasty was 19.6 years, and mean follow-up was 24 months. Seven patients previously underwent continent cutaneous urinary diversion. Mean flap size was 15 x 14 cm, and all 9 flaps survived. Medial and lateral antebrachial cutaneous nerves were coapted to the dorsal penile nerve and ilioinguinal nerve (3) or to both dorsal penile nerves (6). Short-term complications requiring surgical intervention occurred in 2 individuals. One individual developed a small area of partial necrosis requiring operative debridement, and another patient was found to have an arterial thrombosis requiring revascularization. One patient required excision of forearm scar and tissue expanders for adequate donor site coverage. Inflatable penile prostheses were implanted in 4 patients; however 2 were explanted secondary to erosion. All patients reported protective sensation and erogenous sensation with ability to orgasm at last follow-up.

**Conclusion:** Radical forearm free flap phalloplasty is the treatment of choice for patients with inadequate penile length secondary to bladder exstrophy. The series of patients reported in this study developed no long-term complications. Complications related to urethroplasty and penile prosthesis continue to be a challenging aspect of phalloplasty. In this population, many individuals have undergone prior urinary diversion and do not require urethroplasty. Furthermore, free flap phalloplasty results in a more sensate and cosmetic neophallus than abdominal pedicles. The long-term results with use of the forearm free flap are encouraging in this series of patients with bladder exstrophy who desire phalloplasty.

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89) 1:12 PM

**Examining Long Term Patient Reported Outcomes of Bladder Exstrophy: A 20 Year Follow up**

_Angela D. Gupta, MD1, Sameer Goel, Student2, Christopher Woodhouse3 and Daniel Wood, PhD, FRCS(Urol)3, (1) Urology, Johns Hopkins Medical Institutions, Baltimore, MD, (2)School of Medicine, Johns Hopkins Hospital, Baltimore, MD, (3)Paediatrics and Adolescent Urology, University College London Hospitals, London, United Kingdom

**Purpose:** Bladder Exstrophy (BE) is a congenital anomaly
that has become a significantly more manageable condition to treat with reconstructive surgery producing successful clinical outcomes. However, to further improve and maintain the health of these patients, it is imperative to examine patient reported outcomes focused on quality of life, urinary continence, and sexual function. The purpose of this study is to examine long term clinical outcomes in patients with a diagnosis of BE.

**Materials and Methods:** 65 patients with BE and follow up for at least twenty years were identified and mailed study protocol and consent for inclusion in the study, after ethical approval was obtained. Validated questionnaires, SF-36 Quality of Life Questionnaire, International Consultation on Incontinence Modular Questionnaire (ICIQ), and International Index of Erectile Function (IIEF), were administered to assess quality of life, perceived urinary continence and sexual function.

**Results:** 19 patients responded to the questionnaires (29% response rate). High scores in each of the 8 dimensions of the SF-36 reflected a positive perception on quality of life by respondents; scores range from 0-100. With respect to physical functioning, patients scored on average 95.5 (normal 84.2); limitations due to physical health, the average was 89.5 compared (normal 81.0). Limitations due to emotional health, the average was 91.2 (normal 81.3); energy/fatigue, the average was 53.7 (normal 60.9); emotional well being, the average was 71.7 (normal 74.7); social functioning, the average was 83.5 (normal 83.3); pain, the average was 78.1 (normal 75.2); general health, the average was 51.3 (normal 72.0). The only dimension with a significant difference demonstrated is that the study population reported their general health, subjectively, to be poorer than normal controls.

High scores from the ICIQ indicate high levels of subjective incontinence in patients, scores range from 0-21. Reporting scores of 0, 57.8% of patients perceived their continence to be normal. 42% of patients had scores greater than 2, with one patient scoring a 16. 11 patients reported no identifiable leakage during normal activities. The received 13 (25% response rate) IIEF scores were broken down into five dimensions and averages calculated; erectile function (21.5), orgasmic function (6.7), sexual desire (8.4), intercourse satisfaction (9), and overall satisfaction (6.1). The average scores of each dimension demonstrated mild to moderate dysfunction in each category, including overall satisfaction with sexual experience.

**Conclusion:** The quality of life per patient report is normal in all dimensions with an exception of perception of general health. Half of the patients perceived normal continence and had no complaints of urinary leakage. Sexual function in males is significantly affected across all dimensions, with mild to moderate dysfunction.
The Fate of the Complete Female Epispadias and Female Exstrophy Bladder: Is There A Difference?

Kristina D. Suson1, Janae Preece, MD2, Nima Baradaran1, Heather N. DiCarlo, MD3 and John P. Gearhart1; (1) Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2) Division of Urology, University of Maryland Medical Center, Baltimore, MD, (3) Urology, Stony Brook University Medical Center, Stony Brook, NY

Purpose: Complete female epispadias (CFE), occurring much more rarely than classic bladder exstrophy (CBE) in females, is thought to offer a more benign clinical course. Voided continence rates up to 80% are quoted. Given that one of the predictors of continence in exstrophy patients is bladder capacity, the authors compared the bladder capacities of girls with CFE to those of girls with CBE and evaluated continence.

Methods: After obtaining IRB approval, females with CFE or CBE were identified from an institutionally approved prospective database. Inclusion criteria included female gender, minimum of two bladder capacity (BC) measurements, and initial reconstructive surgery after 1991. For CBE, only those undergoing primary closure were included. Charts of 23 CFE and 24 female CBE (3 delayed primary closure) patients were retrospectively reviewed.

Results: CFE girls presented later than CBE girls (33.3 months vs 0.5 months, p < 0.001) and underwent their first reconstructive procedure at an older age (34.7 months vs 0.7 months, p < 0.001). There was no difference in total urologic procedures (7.8 vs 8.9, p = 0.369). CFE patients had a lower initial age-adjusted BC when compared to girls with CBE (23.8 vs 67.3 mL/year of life, p < 0.001). CFE patients also had a lower final age-adjusted BC (21.0 vs 35.0 mL/year of life, p = 0.004). Rate of bladder growth did not differ between these groups (23.5 vs 27.4 mL/y, p = 0.5). When CFE patients who underwent initial genital reconstruction and urethroplasty at one year or less are compared to those undergoing reconstruction when older than one year, there are no statistically significant differences in final age-adjusted BC or rate of bladder growth. 9% of CFE patients and 25% of CBE patients achieved at least a two hour dry interval from initial reconstruction (p = 0.245). The choice and success of continence procedure, when performed, is presented in Table 1.

Conclusion: This study suggests that CBE females have higher initial and final age-adjusted bladder capacities, with a similar rate of growth, as CFE females. This may reflect creation of outlet resistance at a younger age than those with CFE, although no difference was identified between CFE patients initially repaired ≤ or > 1 year. Females with CFE undergo similar procedures to obtain continence as those with CBE and a successful primary closure.
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Complete Female Epispadias</th>
<th>Female Bladder Exstrophy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder Neck Reconstruction ± Continent Stoma</td>
<td>64.3% (100% continent*)</td>
<td>80% (87.5% continent, 12.5% 2 hour dry interval)</td>
</tr>
<tr>
<td>Bladder Neck Reconstruction + Augment + Stoma</td>
<td>14.3% (100% continent)</td>
<td>0%</td>
</tr>
<tr>
<td>Bladder Neck Transection ± Augment + Stoma</td>
<td>21.4% (100% continent)</td>
<td>20% (100% continent)</td>
</tr>
</tbody>
</table>

*Of patients who have followed up at least 1 year after reconstruction.

91) 1:24 PM

Is Complete Primary Repair of Bladder Exstrophy (CPRE) Associated with a Flaccid Neurogenic Bladder?

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Purpose: We hypothesize that CPRE is associated with a flaccid neurogenic bladder. To test this hypothesis, we a) review our experience, b) the results of the published CPRE literature and c) the known anatomic basis upon which the mechanism of the resulting injury can be understood.

Methods: The records of all patients who underwent CPRE by the author between 1999 and 2010 were reviewed. In addition, the medical literature pertaining to CPRE and urodynamic studies was analyzed. A 3 D medical illustration of bladder exstrophy-epispadias based on published known anatomic facts, with a focus on innervation was created to better visualize the consequences of the various steps of the procedure.

Results: A) A total of 8 patients (4 males and 4 females) underwent CPRE (4 each with and without osteotomy). Follow up ranges from 2 to 13 years with a median of 7. Five patients have achieved urinary continence. 3 void by abdominal straining and of the remaining, 2 have a catheterizable channel and one in addition, an augmentation cystoplasty. All had bilateral VUR (hi grade in 5) and all had frequent febrile urinary tract infections (2 to 15/year/patient) requiring multiple hospitalizations. 5 underwent bilateral ureteral reimplantation combined with bladder neck repair (BNR) in 4. Hydroureteronephrosis of grade 2 or higher was present in 10 of 12 units at risk. Detrusor activity (or over activity) was not recorded in the 7 patients who underwent urodynamic studies. The percent predicted bladder capacity, adjusted for age, ranged from 25 to 70 % (median 60). B). None of the articles on CPRE report the presence of detrusor activity or over activity being detected during urodynamic evaluation. C) A description of the pelvic plexus anatomy in stillborn fetuses by Walsh and Donker in 1982 provides a three pronged basis for the mechanism of injury resulting in the above Results: 1) complete penile disassembly eliminates the distal fixation point of the bladder-urethral plate axis, 2) the cephalad movement of the bladder-urethral plate
following aggressive division of the intersymphseal ligaments results in permanent shearing injury to the microscopic pelvic plexus branches to the bladder, external sphincter and prostatic urethra and 3) division of the external urethral sphincter medially (as emphasized by the authors of CPRE) results in injury to the branches of the perineal artery and nerves.

**Conclusion:** Penile disassembly at the time of CPRE allows unrestricted cephalad and posterior movement of the bladder into the pelvis. The extensive mobilization and movement of the bladder-urethral plate complex results in permanent disruption of the branches of the pelvic plexus to the bladder and distally the branches of the perineal nerve. The result is a flaccid neurogenic bladder. Concern for future erectile dysfunction in the boys is raised.

**92) 1:30 PM**

**Protocol of Delayed Bladder Exstrophy Management: The Bengali Scenario**

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**Purpose:** Bladder exstrophy (BE)-epispadias complex represent a challenge in paediatric urology. Approaching these patients in a missionary hospital confront us with additional problems. We report our 20-years experience in Bangladesh.

**Methods:** In 20 years a paediatric surgical/urological team has cared patients with BE evaluating them for continence, upper tract status and cosmesis. The approach in all primary cases was the staged Jeff’s technique. Cantwell-Ransley and Mitchell epispadias repair were used. Endoscopic Bladder neck (BN) bulking procedures and bladder augmentation with BN reconstruction and continent derivation were considered.

**Results:** We treated 44 patients [males 30 (68%), females 14 (32%)] with BE, mean age 11.5 years (range 0.5-25). BE repair and epispadias repair data are showed in the table. One boy (2%) was completely dry after repair alone. Twenty-six (59%) patients [males 18 (41%), females 8 (18%)] had endoscopic BN bulking procedures with a mean of 3 treatments per patients. Relating results on urinary incontinence (UI) are showed in the table. Eight (18%) patients [males 4 (9%), females 4 (9%)] with persistence of UI underwent bladder augmentation with BN reconstruction (Young-Dees) and continent derivation (Mitrofanoff channel). Six (14%) were augmented with caecum, 2 (6%, all females) with ureter and all (16%) are now completely dry with intermittent catheterization. Ten (23%) patients [males 9, female 1] underwent endoscopic treatment for concomitant vesico-ureteric reflux. Four males (13%) required surgery for cosmetic problems.
Conclusion: Our experience demonstrates that management of BE in a limited-resources country is challenging, but possible, with regular patient follow-up. We report a low rate of BE relapse. A higher rate of female patients were completely continent compared to males. Despite widespread use of endoscopic treatment few patients benefit from these. A good management of extrophic complex can have a significantly impact on quality of life.

<table>
<thead>
<tr>
<th>Bladder exstrophy repair data</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary closure (Jeff’s technique)</td>
<td>22 (50%)</td>
<td>10 (23%)</td>
<td>32/44 (73%)</td>
</tr>
<tr>
<td>BE repaired elsewhere</td>
<td>8 (18%)</td>
<td>4 (9%)</td>
<td>12/44 (27%)</td>
</tr>
<tr>
<td>Failure primary closure</td>
<td>0 (0%)</td>
<td>1 (3%)</td>
<td>1/32 (3%)</td>
</tr>
<tr>
<td>Redo bladder closure after BE repair elsewhere</td>
<td>5 (83%)</td>
<td>1 (17%)</td>
<td>6/12 (50%)</td>
</tr>
<tr>
<td>Failure after redo bladder closure</td>
<td>1 (16%)</td>
<td>1 (16%)</td>
<td>2/6 (33%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Epispadias repair data</th>
<th>number of patients (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patient</td>
<td>27/30 (90%)</td>
</tr>
<tr>
<td>Cantwell-Ransley repair</td>
<td>24 (80%)</td>
</tr>
<tr>
<td>Mitchell repair</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Failure Cantwell-Ransley repair</td>
<td>2 (7%)</td>
</tr>
<tr>
<td>Failure Mitchell repair</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Fistula after epispadias repair</td>
<td>9/27 (33%)</td>
</tr>
<tr>
<td>Closure of fistula</td>
<td>8/9 (89%)</td>
</tr>
<tr>
<td>Redo fistula closure</td>
<td>3/9 (33%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results after endoscopic BN bulking procedures</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
<td>1 (5.5%)</td>
<td>3 (37.5%)</td>
</tr>
<tr>
<td>Completely wet</td>
<td>10 (55.5%)</td>
<td>3 (37.5%)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>7 (39%)</td>
<td>2 (25%)</td>
</tr>
</tbody>
</table>

93) 1:36 PM (poster 42)

Number of Bladder Exstrophy Closures Is Stable with No Evidence of Regionalization of Care: A HCUP/KID Database Analysis

Adejoro Oluwakayode¹, Melissa A. St.Aubin, Medical, Student², Katie H. Willihnganz-Lawson, MD³, Jane M. Lewis, MD¹ and Aseem Shukla, MD³, (1)Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN, (2)Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, St. Paul, MN, (3) Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN

Purpose: Bladder exstrophy repair remains one of the most challenging surgical endeavors in pediatric urology. While the estimates of its incidence vary, it is widely
assumed that the overall incidence is decreasing due to termination of pregnancy. The complexity of the surgery is also believed to be leading to referrals of these patients to specific centers where expertise with bladder extrophy is concentrated. We examined a large inpatient database that samples discharges from throughout the United States to interrogate these assumptions.

**Methods:** We utilized the 2003 to 2009 Health Care Cost and Utilization Project (HCUP) Kids’ Inpatient Database (KID), to examine the total number of hospitalizations under the ICD-9 diagnostic code for bladder extrophy (753.5). We then further refined our search to only include those infants from birth to 6 months of age hospitalized for bladder extrophy repair (ICD 9 procedure code 57.86). The extrophy repairs were stratified by their frequencies by year of hospitalization, race/ethnicity, insurance and income status, geographical region, teaching status of hospital and size of the treating hospital. Statistical inference was made with Chi-square tests.

**Results:** We identified 932 hospitalizations coded for the diagnosis of bladder extrophy over the study interval. Overall 238 patients (25.5%) were coded for a bladder extrophy repair between birth to 6 months of age over the same period. The frequency of patients undergoing repair remained stable at a mean of 59.5 closures per year (Ptrend=0.23). Compared to other regions, significantly more extrophy closures were performed in the geographic South (p=0.02), but there was no statistical significance in the distribution of children who had a repair by race, type of insurance and income. More patients had their procedures done in teaching hospitals compared to non-teaching hospitals (92.4 % vs 2.9%; p <.0001).

**Conclusion:** The frequency of bladder extrophy closures does not appear to be decreasing over the past decade, as the number of closures has remained constant despite a decreasing United States birth rate. The increased number of closures in the southern United States parallels the higher birth rate in that region, and there does not appear to be any trend towards regionalization of care based on perceived expertise. The perception that fewer bladder extrophy cases are being encountered even at major teaching institutions may be due to diffusion of expertise with increasing number of fellowship trained pediatric urologists in various regions, rather than regionalization of care at centers of excellence.

**SESSION 20: MISCELLANEOUS III**

94) 2:35 PM

**Identifying Urologic Injuries in Children: Is There a Correlation between Presence of Hematuria and Presence and Severity of Urologic Injury in Pediatric Trauma Patients?**

*Bayo D. Tójuola, MD, Xiao Gu, MD, Nathan R. Littlejohn,*
Jim Wan, PhD, Mark A. Williams, MD and Dana W. Giel, MD, Division of Pediatric Urology, University of Tennessee Health Science Center, Le Bonheur Children’s Hospital, Memphis, TN

**Purpose:** Hematuria is common in cases of traumatic urologic (GU) injury. Presence and degree of hematuria has been used to direct radiographic evaluation of pediatric trauma patients. However, there are conflicting reports in current literature regarding the exact relationship between hematuria and GU injury. Our goal was to determine the relationship between presence/degree of hematuria and presence/severity of GU injury in our pediatric trauma population.

**Methods:** Patients presenting to our institution with blunt trauma between January 2005-December 2010 were identified using the hospital’s Trauma Registry Database. Records were reviewed, and all patients with any degree of hematuria at presentation were included. Data collected included demographics, presence/type of GU injury, severity of GU injury, associated injuries, and presence/degree of hematuria. For this study, GU injuries were confined to renal/ureteral/bladder only. Injury grade was based on American Association for the Surgery of Trauma Organ Injury Scale; for data analysis, injury severity was grouped as low (grades 1, 2), middle (grade 3), and high (grades 4, 5). Hematuria was recorded as either gross or microscopic, and absolute cell counts were grouped as 0-25, 25-50, 50-100, and >100. Mantel-Haenszel Chi-Square Test was used to analyze data.

**Results:** 5151 children with blunt trauma were identified, 256 (5.0%) of whom presented with some degree of hematuria. Of those, 66 had renal/ureteral/bladder injury, and 190 had no diagnosed GU injuries. Patients with GU injuries comprised 1.3% of the total trauma patient population, but constituted 25.8% of trauma patients presenting with hematuria. All patients with GU injury had hematuria; 36/66 (55%) had gross hematuria. No patient without GU injury had gross hematuria. A statistically significant correlation exists between presence of any degree of hematuria and presence of GU injury (p<0.0001). The sensitivity of hematuria in predicting presence of GU injury is 100% (95% CI = 94.5-100%), with a specificity of 96.3% (95% CI = 95.7-96.7%). Neither microscopic vs. gross hematuria nor the absolute amount of blood in the urine correlates to severity of GU injury (p=0.0531 and p=0.1366, respectively).

**Conclusion:** The presence of any degree of hematuria correlates significantly with presence of GU injury in our patient population. Hematuria may be used as a predictive factor to determine likelihood of GU injury in pediatric trauma patients, especially when gross hematuria is present. However, degree of hematuria does not reliably correlate with severity of GU injury. Further prospective studies are needed to determine the exact relationship between the presence/degree of hematuria and the presence/severity of GU injury in order to
Incidental Open Inguinal Rings During Laparoscopic Varicocelectomy: How Common Are They and What Should Be Done When Found?

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Purpose: Laparoscopic varicocelectomy has become a popular operation amongst pediatric urologists. However, it is not unusual to identify an incidental open internal ring on either side at the time of the procedure. We wanted to determine the incidence of open internal rings in adolescent boys at the time of laparoscopic varicocelectomy (LV) and analyze their management.

Methods: Using our IRB-approved prospectively maintained adolescent varicocelectomy database, the operative report and charts of all patients that underwent LV were reviewed. Data was collected on each internal ring: open, partially open, or closed, and how these were managed.

Results: Of 412 patients who underwent LV since 1997, operative reports were available in 306 (mean age 15.7 years, 50 bilateral). Thirty seven internal inguinal rings (6% of all inguinal rings) were noted to be open to some degree in 34 patients (11%). Thirteen rings (2%) were open widely enough to pass the laparoscope into the canal while 24 rings were only partially open. Initially, open rings were left alone and parents were informed of a potential hernia. However, after one boy with a large right open ring presented 2 weeks post-operatively with a large inguinal hernia, our approach changed towards surgical correction. Three of the large open rings were on the left side. Of those, one was converted to an open inguinal approach to repair both the varicocele and hernia and the other two, operated on earlier in the series, were left open. Open right inguinal rings were left alone in 3 earlier patients and surgically repaired in 7 pts within the last 3 years: 3 via an open inguinal approach and 4 by laparoscopic closure of the right internal ring.

Conclusion: Open or partially open internal inguinal rings identified during LV were not an infrequent finding (11% of patients) in this series. Since 2% were found to be widely open, could 2% of the general adolescent and adult population also have widely open internal rings? In any event, there is no way to determine how many of these patients will eventually develop a symptomatic indirect hernia. For the present, however, we are laparoscopically repairing the right contralateral large open ring using the same ports when operating on a unilateral left varicocele.
Bowel Continence in Spina Bifida
Courtney L. Shepard, MD1, David B. Joseph, MD2, (1) Division of Urology, University of Alabama-Birmingham (2) Surgery/Section of Pediatric Urology, University of Alabama at Birmingham, Birmingham, AL

Purpose: As continence of bladder and bowel are often interrelated, it is often the urologist who works with the spina bifida patients on bowel management. However, due to limited research on this subject as well as the variability in the definition of continence, there is incomplete understanding of fecal continence in this population. Based on our management philosophy, we review our spina bifida population to determine who is continent/incontinent; and the popularity and effectiveness of our various bowel protocols.

Methods: 337 patients with spina bifida aged 3 months to 29 years participate in our IRB approved CDC Spina Bifida Patient Registry and trial EMR. 176 are female, 161 are male. We retrospectively reviewed their records and assessed age, gender, continence status (defined as no more than 1 incontinent episode in the past 6 months), bowel management and surgical history of these patients. The cohort that underwent an ACE procedure was additionally reviewed when incontinent to determine the etiology of persistent incontinence.

Results: 115 patients were < 7 years of age; 91 were 7-12; 81 were 13-17; and 50 were >17. Continence in patients <7 years, was 9.6%; 7-12 years was 35.3%; 13-17 years was 29.6%; > 17 years was 50%. Females tended to be more continent than males with an overall continence rate of 33.5% versus 20.6%. Continence was then assessed based on each management modality (oral medications, digital disimpaction, suppositories/enemas, antegrade enemas) this subclassification will be reviewed.

Conclusions: Fecal continence among our spina bifida population is low. A large percentage of our patients are not involved in a bowel management protocol, much greater than our perception. This could be due our philosophy on the aggressiveness of management. While patients using an ACE had a lower than expected continence rate, most patients had significant benefit, few had leakage from the channel and only one developed stenosis.
Experience with the Invance AMS Sling for the Treatment of Incontinence in Boys

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Purpose: The Invance sling was designed to treat incontinence following radical prostatectomy in adult males. We have adapted this procedure to treat incontinence in boys that arises from an incompetent bladder neck. We have used this technique for the past seven years in boys with a history of spina bifida, spinal cord injury as well as bladder extrophy and describe our results.

Methods: Since April of 2005, seventeen boys have been treated for incontinence resulting from an incompetent bladder neck. There ages at the time of surgical treatment ranged from seven to twenty years. Followup ranged from 24 months to 74 months. All patients underwent pre-operative urodynamics demonstrating adequate bladder capacity and compliance. Cystography confirmed the presence of an incompetent bladder neck. The patients underwent the placement of an out-patient perineal bulbar urethral sling (AMS Invance) and then resumed intermittent catheterization either via the urethra or through a mitrofanoff.

Results: Of the seventeen boys undergoing this procedure, 65 % (11/17) are improved. Of this number 27 % (3/11) are dry and the remaining 73 % (8/11) are damp with occasional pad use. The remaining 35% (6/17) are failures with 6/17 being completely wet of which 3 required sling removal for infection. Of
the improved patients, only one went on to bladder decompensation requiring subsequent augmentation. Of the 11 improved patients 45% (5) required some form of revision, primarily for screw displacement. No patients experienced urethral erosion and no patients had difficulty with catheterization post sling placement.

**Conclusion:** The AMS InVance sling has been employed in our patient population with mixed success. While 65% are improved, only 18% are completely dry. Of those with improvement, a significant number required revision as the result of inadequate anchor fixation. The relatively small screw size (5mm) used in the AMS InVance system may not have sufficient bone stability for the long term compressive demands in these pediatric patients. Other challenges faced by this approach include an 18% infection rate. While the compressive bulbar sling can be effective, modification to the current approach must be made before it can be generally recommended.

98) 2:59 PM

**‘Wrap’ Plication of a Megaureter around the Normal-Sized Ureter in the Management of Complete Duplex System Reimplantation**

M.M.C. van den Heijkant, MD, P. Dik, A.J. Klijn, R. Chrzan, C.F. Kuijper and T.P.V.M. de Jong, Pediatric Urology, Pediatric Renal Center, University Children’s Hospitals UMC Utrecht and AMC, Utrecht, Netherlands

**Purpose:** A duplex collecting system (DCS) is a common congenital renal tract abnormality associated with different clinical problems. We describe our experience with ureteral reimplantations of a complete DCS where one megaureter, needing recalibration, and one normal sized ureter coexist. The recalibration of the megaureter has been done by a wrap plication around the normal sized ureter.

**Methods:** Operative logs and case notes were reviewed of consecutive children with a complete DCS treated with a wrap plication of the megaureter around the normal sized ureter and reimplantation between 1997 and 2010. Postoperative reoperation rates, vesicoureteral reflux (VUR) rates and obstruction rates were assessed. To assess severity of surgical complications, the Clavien-Dindo classification system was used.

**Figure 1:** Wrap plication of a megaureter around the normal-sized ureter in duplex collecting systems, with sufficient spatulation in the normal-sized ureter
Results: 25 Children underwent a wrap plication and ureter reimplantation. Nineteen were completely successful (76%). Six out of 25 children (24%) needed a reoperation. Three children (12%) had persistent VUR, two children (8%) underwent endoscopic correction and one (4%) a re-reimplantation of the duplex system. Three children (12%) had postoperative obstruction and two (8%) underwent endoscopic incision of the ureteral orifice. Another child (4%) developed a nonfunctioning lower moiety of the kidney and therefore underwent a heminephrectomy. The severity of surgical complications is shown in table 1.

Table 1 Reoperation rates after wrap plication and reimplantation of the duplex system.

<table>
<thead>
<tr>
<th>Reoperation/N</th>
<th>Clavien-Dindo classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC persistent high-grade VUR lower pole ureter</td>
<td>8% IIIb</td>
</tr>
<tr>
<td>Endoscopic incision ureteric orifices DCS</td>
<td>8% IIIb</td>
</tr>
<tr>
<td>Re-reimplantation of the DCS</td>
<td>4% IIIb</td>
</tr>
<tr>
<td>Heminephrectomy of non-functioning lower moiety kidney</td>
<td>4% IVa</td>
</tr>
</tbody>
</table>

EC: endoscopic correction, VUR: vesicoureteral reflux, DCS: duplex collecting system

Conclusion: Wrap plication of a megaureter around the normal-sized ureter before reimplantation seems to be a relatively safe method in the surgical management of children with a complete duplex collecting system of the kidney. Sufficient spatulation of the lower pole ureter seems to be crucial.

SESSION 21: TESTES

99) 3:11 PM
Comparison of Semen Analyses amongst Youths with a History of Cryptorchidism or Varicocele
Matthew Christman, Stephen Zderic and Thomas F. Kolon, The Children's Hospital of Philadelphia, Philadelphia, PA

Purpose: Men with a history of ex-cryptorchidism have been shown to have decreased paternity rates relative to matched controls (unilateral, 90%; bilateral, 65%). Less is known about the ultimate fertility potential of male adolescents with a history of a varicocele (Vx). While semen parameters do not directly correspond to paternity, they appear to provide a relative gauge of overall paternity potential. We aimed to determine the relative semen quality of youths with these pediatric andrology diagnoses, as a surrogate for ultimate paternity potential. We hypothesize that youths with a Vx have a lower risk of subfertility, based on semen analysis (SA), than do their counterparts with surgically corrected cryptorchidism (UDT).
Methods: A retrospective review of patients with a history of UDT or Vx was performed. Patients were placed into one of three groups based on their diagnosis: Group1, untreated Vx; Group2, treated bilateral UDT; Group3, treated unilateral UDT. To be included in the study, patients submitted a SA for evaluation of fertility potential once they had reached the Tanner V stage of development. Patients were excluded if a SA was missing data, if the abstinence period preceding collection was known to be less than 3 days, or if a concurrent disease process with a potential to affect SA was present. Sperm density, semen volume, count, motility, and total motile count (TMC) were compared using a Kruskal-Wallis or ANOVA test followed by a test of multiple comparisons using a Bonferroni adjustment with an adjusted p-value of 0.00833 for significance.

Results: A total of 203 patients were identified of whom 10 were excluded. Median age [IQR] of the groups was 18.3 [18.1-19.3], 18.6 [18.3-21.0], 18.5 [18.2-19.6] years, respectively, for Group1 (n=76), Group2 (n=21), and Group3 (n=96). TMC (million sperm) for each group is shown in Fig1. No significant difference existed between the groups for age, volume (p=0.106), or motility (p=0.197). However, density (p=0.0001), count (p=0.0001), and TMC (p=0.0002) all achieved significance; for each of these parameters, a significant difference could be shown between both Group1 vs. Group3 and Group2 vs. Group3, but not between Group1 vs. Group2.

Fig1

Conclusion: Density, count, and TMC were significantly lower for male youths with a history of varicocele and ex-bilateral UDT compared to those with ex-unilateral UDT. A difference could not be shown for these semen parameters between those with a Vx compared to ex-bilateral UDT. Patients with a history of bilateral UDT have significantly lower paternity rates. The fact that there
was no difference in overall semen quality for our sub-
cohort with a history of untreated adolescent Vx when
compared to this higher risk group is very concerning and
should challenge certain paradigms of management for
adolescent varicoceles.

Elevation of Scrotal Deep Body Temperature Predicts
the Testicular Catch-up Growth after Varicocelectomy
in Adolescent Varicocele
Koji Shiraishi, MD, PhD and Hideyasu Matsuyama, Urology,
Yamaguchi University, Ube, Japan

Purpose: The major indications for adolescent
varicocelectomy are testicular asymmetry and pain; this
asymmetry sometimes involves physiological changes.
Several diagnostic modalities have been shown to be
useful in selecting a candidate for varicocelectomy;
however, none of these modalities provide information
which is sufficiently reliable to indicate the postoperative
testicular growth. In this study, we investigated the
usefulness of scrotal temperature measurement for
predicting testicular catch-up growth after varicocelectomy
in adolescents.

Materials and Methods: This study included 87
consecutive patients who had left varicocele and had
undergone varicocelectomy; the testicular temperatures
had also been measured for these patients. The varicocele
had been diagnosed after physical examination and
duplex/color Doppler ultrasonography. The preoperative
scrotal temperature had been measured using a CoreTemp
CTM204® (Terumo, Tokyo, Japan), which detected the
temperature around 5-10 mm in depth from skin surface.
The difference in the temperature of the left scrotum
for the supine and standing positions was recorded;
a difference of more than 0.5°C was considered as
elevation of scrotal temperature. Testicular volume was
measured once a year after varicocelectomy. Catch-up
growth was defined as left testicular volume at least
10% larger than the right testis in patients without
preoperative asymmetry or the asymmetry reduced within
10% difference in patients with preoperative asymmetry.
Univariate and multivariate analyses were used to
determine whether patient age, varicocele grade, testicular
asymmetry, testicular temperature, and endocrinological
results could be used as determinants of catch-up growth.

Results: A total of 87 patients (mean age 12.6 years,
range 9 to 17) were identified and the mean observation
period was 6.1 years. Fifteen, 37, and 35 patients had
grade 1, 2, and 3 varicoceles, respectively. Doppler
ultrasonography revealed the presence of reflux in all
the patients. Thirty-eight patients (44%) had 10% or
greater testicular asymmetry, and 57 (66%) had elevated
scrotal temperature in the standing position. The mean
volumes of the right and left testes were 11.9 and 10.9 ml,
respectively. Testicular catch-up growth was observed for
53 patients (61%) after microsurgical varicocelectomy;
testicular asymmetry, higher varicocele grade, and elevated scrotal temperature were significantly evident in these patients. Multivariate analysis showed that elevated scrotal temperature was the only predictor for catch-up growth ($p < 0.05$; odds ratio: 6.98).

**Conclusions:** Measurement of testicular temperature is noninvasive and is the only method by which a functional aspect of varicoceles (i.e., heat stress) can be evaluated. Our results show that measuring testicular temperature can serve as a valuable tool for predicting testicular catch-up growth. Measuring testicular temperature alone or using this method in combination with other modalities (e.g., color Doppler) may ensure better selection of candidates for varicocelectomy on a more individualized basis.

**Ultrasound Testicular Volumes Do Not Differentiate Fertility Risk in Adolescents with a Varicocele**


**Purpose:** The literature is conflicted regarding the role of scrotal ultrasound (ScrUS) in management of adolescents with a varicocele (Vx). Different studies have resulted in different conclusions regarding the usefulness of testicular volume (TV) and volume differential (TVDiff). Proposed cutoffs for surgical intervention are in need of research related to outcomes. We aimed to determine both the operating characteristics (sensitivity, specificity) for predicting subfertility based on semen analysis (SA) and the overall utility of this test for differentiating this population (likelihood ratios). We hypothesize that ScrUS is a useful test for these patients.

**Methods:** Adolescent males undergoing active surveillance of a clinical Vx with ScrUS made up the study population for this retrospective cohort study. Patients must have undergone at least 1 ScrUS and SA to be included. Subjects were excluded if they had a potential confounding abnormality of the hypothalamic-pituitary-testicular axis, if total motile count (TMC) could not be calculated due to missing data from the SA, or if the abstinence period was $\leq 72$ hours preceding the SA. Disease was defined as TMC $\leq 20$ million. Total TV (TTV), left TV (LTV), and TVDiff were determined from each ScrUS. Sensitivity, specificity, ROC curves, and likelihood ratios were calculated based off of the most recent ScrUS prior to SA for each ScrUS parameter. Testicular growth curves were based off of the longitudinal ScrUS data and were analyzed using a mixed effects linear regression model.

**Results:** A cohort of 83 subjects was assembled; 10 patients were excluded for reasons listed above. Mean (SD) age at presentation was 15.5 (2.3) years. Median follow-up was 2.7 years during which time each individual underwent a median of 3 ScrUS. Area under the ROC curve for TTV (estimate, [95%CI]) was statistically significantly more predictive than null (0.713, [0.585-0.842]); however, TVDiff was not (0.473,
Comparison between TTV and TVDiff was statistically significant (Fig 1). Results for LTV and TTV are similar. At the recognized cut point of TVDiff ≥ 20% the likelihood ratio of predicting disease was 3.1. TTV and TVDiff were both unable to predict more severe states of disease (TMC ≤ 10, TMC ≤ 5). There was no difference in the testicular growth curves between those ultimately found to have a low (≤ 20) vs. normal (> 20) TMC (Fig 2).

**Conclusion:** None of the TV parameters analyzed had a simultaneously high sensitivity and specificity. TTV performs superiorly to TVDiff for predicting TMC. Both volume and volume differential have, at best, a small to moderate predictive ability. Following TV on ScrUS over time provides a limited clinical ability to differentiate patients based on the outcome of TMC. Reliance on ScrUS to follow TV and TVDiff adds cost, but no value, in the management and screening of adolescents with a varicocele.
The Relation between Adult-Dark Spermatogonia and Other Parameters of Fertility Potential in Cryptorchid Testes

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Purpose: The fertility potential of boys with cryptorchidism may be related to the number of adult-dark spermatogonia (AD-spermatogonia) per tubular transverse section in testicular biopsies taken at time of orchiopexy. Placental-like alkaline phosphatase (PLAP) positive gonocytes in testes within the first year of life indicate the preserved ability for germ cell transformation and a good fertility potential. However, it is uncertain how these parameters relate to the total tubular germ cell number (S/T) and other factors associated to the fertility potential, such as the hormonal profile of the boys.

Methods: 89 bilateral cryptorchid boys 7 months – 3 years (median: 1.8 years) with bilateral testicular biopsy at orchiopexy and blood samples for gonadotropins and inhibin-B. The total germ cell number and the number of AD-spermatogonia per tubular transverse section and serum hormone values were compared to normal materials.

Results: In the group with presence of AD-spermatogonia a significantly higher fraction (57% (43/76)) of boys had a normal S/T compared to the fraction of 15% (2/13) with normal S/T among boys without AD-spermatogonia in the cryptorchid testes (p<0.05). Those 2 boys without AD-spermatogonia but normal S/T were also the youngest in the group (8 and 9 months) and also those with PLAP positive gonocytes. Overall, there was a medium well correlation between the number of AD-spermatogonia per tubular transverse section and the total S/T in the cryptorchid testes (pearson’s r = 0.4). 24% (21/89) of the patients had > 0.1 AD-spermatogonia (normal number) per tubular transverse section in cryptorchid testes. In the group of patients with a good fertility potential (n=29) including normal S/T, normal gonadotropins and normal inhibin-B; the number of AD-spermatogonia per tubular transverse section varied between 0.002 and 0.214 (median 0.081). This was a significantly higher figure than the number of AD-spermatogonia (0 – 0.151 (median 0.031)) in the group of patients with low fertility potential (n=39) including impaired S/T and/or low inhibin-B but no reactive increasement of gonadotropins (p<0.05). The group with intermediate fertility potential (n=21) including increased gonadotropins had AD-spermatogonia per tubular transverse section between 0 and 0.165 (median 0.063).
57% (12/21) of those patients with normal AD-spermatogonia per tubular transverse section belonged to the group with good fertility potential including normal S/T, normal gonadotropins and normal inhibin-B compared to only 25% (17/68) in the group of those with impaired number of AD-spermatogonia per tubular transverse section (p< 0.05).

**Conclusion:** The number of AD-spermatogonia per tubular transverse section is probably an additional important parameter related to the fertility potential of boys with cryptorchid testes. Within the first years of life the normal range of the number of AD-spermatogonia per tubular transverse section is age dependent and not yet fully elucidated. Further investigations in this respect are needed.

**Inpatient and Outpatient Patterns of Care in the Management of Testicular Torsion: Influence of Hospital Transfer on Testicular Outcomes**

**Jenny H. Yiee, MD, Lynne Chang, AB, Alan Kaplan, MD, Paul J. Chung, MD, MS, Lorna Kwan, MPH and Mark S. Litwin, MD, MPH, (1)Urology, UCLA, Los Angeles, CA, (2) Pediatrics and Health Services, UCLA, Los Angeles, CA**

**Purpose:** Testicular torsion is a surgical emergency with treatment delays beyond six hours increasing the likelihood of orchiectomy. As such, torsion is the third most common cause of malpractice lawsuits among teenagers. A potential source of treatment delay arises from patient transfer between hospitals because of real or perceived lack of resources at the originating hospital. If transfers contribute to poor outcomes, interventions to reduce inappropriate transfers could improve quality of care. We aimed to provide novel, comprehensive epidemiologic information on patterns of care in the treatment of torsion and to assess the relationship between inter-hospital transfers and testicular outcomes in males with torsion with the hypothesis that transfers lead to increased orchiectomies.

**Methods:** We used a retrospective cohort from the California Office of Statewide Health Planning and Development, which mandates reporting on every medical encounter occurring in a hospital, emergency department (ED), or ambulatory surgery center (ASC) in the state. Inclusion criteria included males with ICD-9 and CPT-defined testicular torsion with concomitant surgical intervention. Multivariable logistic regression assessed predictors of orchiectomy.

**Results:** During 2008–2010, 2,794 subjects of all ages had torsion for an incidence rate of 5.08 per 100,000 Californian males per year. Locations of encounter were ASC (55%), inpatient facility (36%), and ED without an inpatient stay (9%). 83% of subjects were treated at hospitals in the highest-tertile of volume; 3% at lowest-tertile volume hospitals. 60% were privately insured and 2% were transferred between hospitals. 31% underwent...
an orchiectomy; the remainder a testicular-saving procedure. Subjects treated at inpatient facilities were less likely than those at ASC’s to have private insurance (49% vs 68%, p<0.0001). The proportion of subjects undergoing an orchiectomy as an inpatient doubled the proportion undergoing such as an outpatient (47% vs 23%, p<0.0001). On multivariate analysis, predictors of orchiectomy were age <1 year (OR 19.2, 95% CI 6.3–58.9), age 1–9 years (OR 2.7, 95% CI 1.4–5.2), age ≥40 years (OR 6.6, 95% CI 3.1–13.9), and Asian race (OR 2.4, 95% CI 1.0–5.7). Treatment at a mid-volume facility compared with a high-volume facility lowered odds of orchiectomy (OR 0.5, 95% CI 0.3–0.7). While associated with orchiectomy on univariate analysis, factors no longer associated with orchiectomy on multivariate analysis were rural patients, insurance type, and hospital transfer.

Conclusion: This is the first study to track every patient encounter occurring at an inpatient or outpatient facility in order to comprehensively characterize the treatment of testicular torsion. Surprisingly, the majority of cases were treated as an outpatient. Moreover, hospital transfer was not associated with likelihood of orchiectomy. This complete characterization of testicular torsion will aid in future studies in the area, which should now include outpatient settings, and place prior studies into sharper focus.

104) 3:41 PM
The Natural History of Adolescent Varicoceles
Aaron Krill, MD1, Nikhil Waingankar, MD1, Suzanne Sunday, PhD1, Jordan Gitlin, MD1, Steven Friedman, MD2, Lori Dyer, MD3, Paul Zelkovic, MD3, Israel Franco, FACS, FAAP5, Edward F. Reda, MD, FAAP5 and Lane S. Palmer, MD, FAAP5, (1)Pediatric Urology, Cohen Children’s Medical Center of NY, New Hyde Park, NY, (2)Urology, Maimonides Medical Center, Brooklyn, NY, (3)Pediatric Urology, Maria Fareri Children’s Hospital, Valhalla, NY

Purpose: Varicoceles have been linked to ipsilateral testis hypotrophy, and abnormal semen parameters. Some suggest that hypotrophy may result from transient asynchronous growth, and advocate extended follow-up and reserve varicocelectomy for sustained asymmetry. We propose to document the natural history of adolescent varicoceles with grade change, timing, duration and resolution of testis asymmetry as primary endpoints.

Methods: We included adolescents with isolated left varicoceles having ≥2 visits. In surgical patients, only preoperative visits were analyzed. Patients with prior inguinal surgery, cryptorchidism or endocrinologic disorders were excluded. Varicocele grades were assigned by an attending urologist. Testis volume was calculated via sonogram using Lambert's equation or estimated via disc orchidometer; one modality was used per patient. Testis symmetry was calculated using the equation (R-L/R) and defined as ≥20% difference. Statistical analysis was performed using ANOVA, t-test, and Chi square as appropriate.
Results: 479 patients were included with a mean age at diagnosis of 14.2±1.9 yrs. Mean follow-up was 1.7±1.3 yrs. All had ≥2 visits, 25% had 3, 14% had 4 and 5% had 5; visit intervals were approximately 1 year. Initial grade distribution was: 1- 4.6%, 2- 52.6%, 3- 42.7%. Progression occurred in 82% of grade 1 (to grade 2-59%, to grade 3-23%), and in 33% of grade 2. Testicular symmetry at diagnosis was present in 380 patients: 75% remained symmetric, 26% developed temporary asymmetry, 19.5% developed asymmetry at last visit, 1.8% had persistent asymmetry for ≥2 visits, 0.8% had fluctuating asymmetry and were asymmetric at last visit. Among 99 patients with asymmetry at diagnosis, 48.4% resolved, 51.6% were asymmetric at last visit. Among 193 with at least 1 asymmetric episode, 30.5% resolved. Mean duration of asymmetry was 0.99 yrs. Age at asymmetry was 14.1±2 yrs and 14.9±1.9 yrs at resolution. Patients asymmetric at diagnosis were more likely asymmetric at last follow-up than those symmetric at diagnosis (51% vs 21%; p<0.001). Asymmetry associated with grade 3 varicoceles at diagnosis were less likely to resolve (p=0.025). Magnitude of asymmetry was greater in the persistent group versus those that resolved (0.24 vs 0.32, p=0.004). Maximum testis asymmetry that resolved was 43%.

Conclusion: Grade progression occurred in 82% of grade 1, and in 33% of grade 2. 79% presented with symmetric testes, and the majority remained symmetric. Half of the patients that presented with asymmetry remained asymmetric at last followup. Asymmetry occurred at any time in 40.2%, but only 28% were asymmetric at last followup. Grade 3 at diagnosis and asymmetry >32% were predictors of persistent asymmetry. No patient with >43% asymmetry resolved.

Asymmetry Events

![Asymmetry Events Diagram](image-url)
SESSION 22: CALCULI

105) 3:56 PM  
Predators of Urolithiasis in Gastrostomy Tube Fed Children: A Case-Control Study  
Emilie K. Johnson, MD1, Jenifer R. Lightdale, MD, MPH2  
and Caleb P. Nelson, MD, MPH1, (1) Urology, Children’s Hospital Boston, Boston, MA, (2)Gastroenterology/Nutrition, Children’s Hospital Boston, Boston, MA  
Purpose: Due to multiple factors, including immobility and an inability to regulate free water intake, pediatric patients who are fed primarily via gastrostomy tubes (g-tube) may be at increased risk for urolithiasis. However, no studies to date have specifically examined risk factors for urinary stones in this population. The aim of our study was to identify modifiable stone-promoting factors in chronically g-tube fed (GTF) children.  
Methods: We conducted a retrospective case-control study of GTF patients with urolithiasis (cases) matched with GTF children without urolithiasis (controls). Using i2b2 query analysis and hospital EMR data, we identified GTF patients aged 1-21 treated between 2005-2012. Cases were matched with controls 2:1 based on age (+/-1 year) and gender. Demographic, nutritional, medical and pharmacy data were abstracted from the patient record. Bivariate associations between potentially important clinical factors and the presence of stone disease were evaluated using chi-squared testing. Matched logistic regression modeling was then used to determine the adjusted associations between relevant clinical factors and urolithiasis.  
Results: 41 cases and 80 matched controls were included. Mean age was 12.0 +/- 6.5 years, 76% were Caucasian, and 60% were male. Median stone size was 0.6 cm (range 0.2-1.3cm); 18 had bilateral disease. Common diagnoses in GTF children included immobility (74% of cases and 64% of controls were wheelchair bound), GERD (80% of cases, 91% of controls) and seizures (68% of cases, 56% of controls). On bivariate analysis, factors significantly associated with stone formation included: white race (87% of cases, 70% of controls, p=0.045), urinary tract infection (UTI) (24% of cases, 6.3% of controls, p=0.0042), topiramate administration (39% of cases, 14% of controls, p=0.0016), vitamin D use (22% of cases, 8% of controls, p=0.022) malabsorption (56% of cases, 36% of controls, p=0.037) dehydration (44% of cases, 24% of controls), less than 2 year duration with g-tube (32% of cases, 13% of controls, p=0.011), and whether goal free water intake was documented in the patient chart (46% of cases, 21% of controls, p=0.0043).
Mobility status and specific tube feed formulation were not associated with urinary stones. On regression analysis, the following factors remained significant: topiramate administration (OR 6.05 95% CI 1.61-22.76), UTI (OR 7.54, 95% CI 1.57-36.31), and g-tube in place for less than 2 years (OR 8.77, 95% CI 1.27-58.82).

**Conclusion:** Our findings provide a preliminary risk profile for the development of urolithiasis in g-tube fed children, who may disproportionately suffer from dehydration and malabsorption. In particular, we found important risk factors for stone formation to include UTI and topiramate administration.

**The Development of Upper Urinary Tract Stones in Patients with Neural Tube Defects: Impact of Bladder Augmentation**

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**Purpose:** Patients with neurogenic bladder are known to be at increased risk of developing upper urinary tract stones. We hypothesized that patients with lower urinary tract stone disease are at greater risk of developing upper urinary tract stones.

**Methods:** We performed a retrospective review of all patients seen over a 10 year period at our institution with neurogenic bladder due to a neural tube defects or caudal regression. Patients were selected from a de-identified institutional database using 8 separate ICD-9 codes. Inclusion criteria consisted of at least 24 months of urology follow-up, > 5 years of age at last follow-up visit, radiographically confirmed upper urinary tract stones, and confirmed diagnosis of neural tube defect or caudal regression. Univariable analysis was performed by Fisher’s exact test and the Mann-Whitney U test. Multivariable Cox regression analyzed stone risk factors in patients following bladder augmentation. P values < 0.05 were considered significant.

**Results:** 287 patients were included and 49 developed upper urinary tract stones at our institution. The prevalence of upper tract stones was 17% and median age at diagnosis was 19.1 years (range: 3.9 – 47). Table 1 compares characteristics of stone formers and non-stone formers. The presence of bladder augmentation with bowel was significantly higher in stone formers. 28% with a bladder augment developed a stone versus 10% without. Median time to stone formation following bladder augmentation was 83.8 months (range: 23.8 – 159.5). Cox regression in 77 patients with a bladder augment examined 5 factors 1) age at augment surgery, 2) gender, 3) neurologic lesion level, 4) ambulatory status, and 5) presence of lower urinary tract stones prior to, or at the time of upper tract stone diagnosis. The analysis
revealed the presence of lower urinary tract stones as the sole significant factor ($p = 0.02$) associated with upper urinary tract stone formation.

**Conclusion:** Upper urinary tract stones occur frequently in patients with neural tube defects. The placement of bowel into the urinary tract appears to increase this risk significantly. Additionally, the presence of lower urinary tract stones may herald the development of an upper tract stone. Patients undergoing bladder augmentation with bowel segments should be studied prospectively to better understand the natural history of upper urinary tract stone development.

### Table 1: Characteristics of Stone Formers and Non Stone Formers

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Stone Former (n = 49)</th>
<th>Non Stone-Formers (n = 238)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age at Last visit</td>
<td>27.5</td>
<td>16.5</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Mean Followup (mos)</td>
<td>113</td>
<td>101</td>
<td>0.12</td>
</tr>
<tr>
<td>Male</td>
<td>51%</td>
<td>43%</td>
<td>0.43</td>
</tr>
<tr>
<td>Caucasian</td>
<td>95%</td>
<td>80%</td>
<td>0.006</td>
</tr>
<tr>
<td>Bladder Augmentation</td>
<td>59%</td>
<td>25%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>CIC without Bladder Augment</td>
<td>40%</td>
<td>51%</td>
<td>0.48</td>
</tr>
<tr>
<td>Bladder Stones</td>
<td>51%</td>
<td>7%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Lumbar Level Lesion or Lower</td>
<td>75%</td>
<td>82%</td>
<td>0.31</td>
</tr>
<tr>
<td>Ventriculoperitoneal Shunt</td>
<td>83%</td>
<td>78%</td>
<td>0.44</td>
</tr>
<tr>
<td>Wheelchair dependent</td>
<td>85%</td>
<td>52%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

107) 4:08 PM

**Morbidity and Efficacy of Ureteroscopy in Patients with Neurogenic Bladder**

*Matthew Christman, Angela Kalmus and Pasquale Casale, The Children’s Hospital of Philadelphia, Philadelphia, PA*

**Purpose:** The incidence of urolithiasis in patients with neurologic impairment and spinal abnormalities has been estimated at 5%-11%. Stone disease in this cohort often results in increased morbidity in both surgically treated and untreated patients. However, there is a notable lack of information regarding the safety and efficacy of ureteroscopy (URS) in this population. We hypothesized that patients with a neurogenic bladder (NGB) would be at increased risk for complications following URS and that the ability to clear stone burden via URS would be lower, when compared to those without neurologic impairment.

**Methods:** We reviewed a registry of 902 with ICD-9 codes for urolithiasis between 2004 and 2012. Subjects were eligible for inclusion in the study if their complete stone history had been abstracted into the database and if they had URS for stone disease. The cohort was divided into two groups according to NGB status. Statistical analysis of demographic variables and surgical outcomes was performed. Complications were classified according to
the Clavien system. Clearance was defined by CT, renal/bladder ultrasound, or direct ureterorenoscopy. Wilcoxon rank-sum test was used for continuous variables; Fisher’s exact test was used for categorical proportions. Statistical significance was set at $\alpha \leq 0.05$.

**Results:** Complete stone histories were available for 345 patients, 79 with NGB and 266 without. URS was performed 217 times in 146 subjects; 173 procedures in 127 non-NGB subjects (Group1) and 44 procedures in 19 patients with NGB (Group2) were conducted. There were no differences between the groups according to gender (p=1.0), race (p=0.675), or BMI (p=0.519). Infection was the initial indication for stone treatment in 19.5% of Group1 and 70.5% of Group2 (p<0.001). Operative times (median[IQR]) were significantly longer in those with NGB (p=0.0003): Group1, 52 min [33-78] and Group2, 80.5 min [50-110.5]. One death from urosepsis occurred in a patient with NGB. The proportion of complications (Table1) was significantly different (p=0.030), as was the clearance rate (p=0.004). 86.6% of Group1 cleared with URS compared to 63.2% of Group2.

**Table1.**

<table>
<thead>
<tr>
<th></th>
<th>Group1 (non-NGB, n=173)</th>
<th>Group2 (NGB, n=44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Complications</td>
<td>83.2% (144)</td>
<td>75.0% (33)</td>
</tr>
<tr>
<td>Clavien 1</td>
<td>9.8% (17)</td>
<td>2.3% (1)</td>
</tr>
<tr>
<td>Clavien 2</td>
<td>2.9% (5)</td>
<td>9.1% (4)</td>
</tr>
<tr>
<td>Clavien 3</td>
<td>1.7% (3)</td>
<td>4.5% (2)</td>
</tr>
<tr>
<td>Clavien 4</td>
<td>2.3% (4)</td>
<td>6.8% (3)</td>
</tr>
<tr>
<td>Clavien 5</td>
<td>0% (0)</td>
<td>2.3% (1)</td>
</tr>
</tbody>
</table>

**Conclusion:** Patients with NGB have increased morbidity and lower clearance rates following URS for upper tract calculi compared to neurologically unaffected controls. Infection clearly plays a role in stone disease within the NGB cohort. Attention to peri-operative antibiotic coverage is critical in this population and prompt recognition and treatment of systemic infection is necessary to optimize their care.

108) 4:14 PM (poster 55)
**The Effect of Dietary Sodium and Fructose Intake on Urine and Serum Parameters of Stone Formation in a Pediatric Mouse Model**

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**Purpose:** Dietary factors have been shown to influence stone development in the adult population. There is
little known about the contribution of diet to stone development in the pediatric population. Pediatric stone disease has significantly increased over the past 30 years. Concurrently, sodium intake has increased more than 60% and fructose consumption more than 2000% in children on a Western diet and over 30% of all children are overweight or obese. To date, no studies have evaluated dietary intake and how diet may alter urine electrolytes that contribute to stone formation.

**Methods:** A total of 30 BALB/c female mice (age 3 weeks) were randomized to receive 1 of 3 ad lib diets: standard mouse chow (13% fat, 25% protein, 62% carbohydrates kcals), a complex-carbohydrate-based Western diet (35% fat, 17% protein, 48% carbohydrate kcals), or a Western diet in which 95% of the carbohydrate kcals were from fructose plus 3.84g sodium/kg of diet. Body weights were measured twice weekly. Mice remained on study for 30 days, and urine was collected on Days 0 (at randomization), 1, 2, 5, 10, 15, 20, 25, and 30 by applying gentle suprapubic pressure. All samples were pooled into 3 samples per arm (Days 0-2, 5-15, and 20-30) and sent for analysis of creatinine, uric acid, urea nitrogen, calcium, potassium, sodium, magnesium, phosphorus, sulfate, citrate, and oxalate. Upon harvest at Day 30, we collected serum by cardiac puncture as well as bladder and kidneys for subsequent analyses.

**Results:** There were no significant differences in body weights among the 3 groups, although the mice consuming the high-fructose, high-sodium diet trended to be larger on Day 30 (p=0.15). We found no observable differences in stone-forming analytes in the urine of the 3 dietary arms. However, we did find a substantial decrease in urinary magnesium and citrate levels of Western diet groups compared to the mice consuming mouse chow.

**Conclusion:** Results from this study suggest that consumption of Western diets, especially those high in fructose and sodium may lead to decreases in stone-forming inhibitors magnesium and citrate. Although more research is necessary, this decrease in the inhibitors may explain, in part, how diet may play a role in pediatric stone formation.

**CLINICAL RESEARCH POSTERS**

**Poster 1**

**Severe Pelvic Trauma in Prepubertal Children: The Significance of Bladder Neck Injury**

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**Purpose:** Major pelvic trauma is more devastating in prepubertal children than in adults because of their
small bodies and the soft pelvic bony ring. Among other disabilities caused by trauma to the lower urinary tract (LUT), urinary incontinence, secondary to damaged bladder neck (BN), is the most frustrating. We reviewed our experience with such injured children, and discussed management options, and outcome, with and without sphincteric injury.

**Methods:** Retrospective review of our trauma registry for all prepubertal children, with severe LUT injury due to major blunt pelvic trauma between 1993 and 2011 was conducted. This study was approved by the institutional review board.

**Results:** Eighteen patients were identified, and divided into 2 groups. Group 1 consisted of 8 patients (3 males, 5 females, aged 2-10 years, mean 8) who sustained pelvic trauma with severe demolishing injury to the BN. Group 2 included 10 males (aged 5-11 years, mean 8.2) with pelvic trauma without damaged BN. The 10 male urethral injuries in this group included membranous-7, bulbar-2, and combined-1, with average urethral stricture length 2.67 cm, range 1-4. Additional genital injuries included vaginal avulsion-5, and testicular laceration-2. Non-urogenital injuries included pelvic fracture-16, rectal tear-4, rectovesical fistula-2, crush injury to the thigh-2, and lacerated spleen-1. Five patients sustained hemorrhagic shock. Initial management included insertion of suprapubic cystostomy (SPC)-17 (one was converted to vesicostomy), primary urethral realignment-2, pelvic fixation-5, colostomy-4, internal iliac artery embolization-2, splenectomy, above knee amputation, and orchidectomy-1 each. Average time to urological reconstruction in group 1 was 53 months (range 11 to 96), mostly due to prolonged orthopedic rehabilitation, and psychological immaturity, and in group 2, 8.3 months (range 6-18, p<0.05). Prior to reconstruction, all group 1 patients had small-volume high-pressure fibrotic bladders, with vesicoureteral reflux in 6 renoureteral units. None of group 2 patients sustained significant bladder injury. LUT reconstruction in group 1 included bladder augmentation-5, Mitrofanoff urinary diversion-5, ureteroneocystostomy 6 units, BN closure, vaginal reconstruction, and rectovesical fistula repair 2 each, and Malone Continence Enema-1. One female patient, whose urethra was detached from the BN, required temporary catheter drainage only in order to achieve continence, while voiding spontaneously. Two females still await reconstruction. Urinary continence with intermittent catheterization was achieved in all group 1 reconstructed patients during 6-144 month follow-up. All male patients in group 2 underwent anastomotic urethroplasty. Eight (80%) patients were able to void with average Qmax of 15.5 ml/sec (6.5-25.9), with average post-void residual of 6.25 ml (0-30). Urethroplasty failed in two. Five males lost erections permanently.

**Conclusions:** Complex LUT injuries in pre-pubertal children can be successfully repaired, and urinary
continence is achievable, even in severe BN injuries. Musculoskeletal rehabilitation and psychological status are important factors for BN reconstruction timing.

Poster 2

**Dextranomer/Hyaluronic Acid Endoscopic Injection Simulator**

Guy Hidas1, Elspeth M. McDougall2, Antoine E. Khoury, MD, FAAP

(1)Department of Urology, University of California Irvine, Children Hospital Orange County, Orange, CA, (2) Department of Urology, University of California Irvine, Minimally Invasive Surgery Education Center, CA

**Purpose:** Published success rates of dextranomer/hyaluronic acid (Dx/HA) injection for pediatric vesicoureteral reflux (VUR) correction vary widely. Increased surgeon experience has been shown to have an important role in these results, and it is well known that endoscopic injection has a definite learning curve, especially for higher VUR grades. Dx/HA needle injection is a 1 to 2-minute, highly confined, unforgiving implantation of a discrete 1 to 3 submuscally with little room for, adjustment, intraoperative correction or revision. Multiple needle punctures have been shown to decrease the success rate. Nevertheless, to our knowledge no validated simulator has been developed to provide the opportunity to learn and practice those skills that can be transferred to the operating room. We present a porcine bladder simulator model for training and assessment of the surgical skills for the Dx/Ha endoscopic injection technique.

**Methods:** We developed a porcine bladder model placed in a training box. We positioned the porcine bladders with the distal ureters and urethra in 20x20cm polystyrene box and performed cystoscopy as well as Submucosal injection, Subtrigonal injection and Double Hit injection of Dx/HA. Dx/HA syringes and needles were used. In order to simulate Dx/HA consistency we utilized Surgical K-Y lubricant gel as the injecting compound. Following injection the bladders were opened to appreciate the quality of the injection mound and provide the trainee with immediate feedback. Content validity testing of the simulator was performed by four pediatric urologists with over 15 years of experience and 20 mean injection procedure annually. Experts were asked to perform bilateral double HIT injection. After the procedure the experts completed a questionnaire designed to evaluate the realism of each step of the injection procedure on the simulator compared to an actual procedure.

**Results:** Overall the model demonstrated good content validity by all experts (mean questionnaire score 92%). Mean post injection questionnaire scores measured the ability of the simulator to simulate realistically each steps of the actual procedure were 94% for the cystoscopy, 94% for the Ureteral orifice identification, 87% for the ureteral orifice hydrodistention part of the procedure, 94% for
the first and second injection, 100% for the shape of the mound after the injection. 75% for the Viscosity of the material used for simulate injection.

**Conclusion:** Dx/HA Endoscopic Injection Simulator realistically simulate the actual clinical procedure. This simulator may be an effective teaching tool to improve the early learning curve and provide a greater understanding of the components of successful endoscopic VUR correction.

**Poster 3**

**Proctor Environment Facilitates Faculty Training In Pediatric Robotic-Assisted Laparoscopic Pyeloplasty**

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**Purpose:** Our study objective was to evaluate the benefit of the proctor environment on the learning curve associated with robotic-assisted laparoscopic pyeloplasty (RALP) in a pediatric population.

**Methods:** All pediatric RALPs performed at our institution between 2005 and 2011 were included. Procedures were performed by three surgeons: CAP (expert), STC (trainee to expert) and CAH (trainee). Both training surgeons were experienced laparoscopic surgeons. A proctor environment was established necessitating 3-5 proctored cases before a surgeon was able to perform cases on his own. Additional cases were required if proctor or training surgeon felt more cases were needed to establish competency. Variables analyzed included stent placement (antegrade or retrograde), da Vinci® robotic surgical system type (Standard or Si), chief or junior resident assistance, complications, concurrent procedures, and improvement in operating (OR) times. Bilateral and redo surgeries were excluded from OR time analysis which was defined as time in to time out of operating room. Time trend analysis was performed using linear regression.

**Results:** A total of 111 RALPs were performed during the time period. Median age at intervention was 36 months (range 3 mos – 20 yrs). Most patients (87%) underwent retrograde stent placement. The majority of cases (80%) were performed using the da Vinci® Standard surgical system. In 74% (82) of cases, the chief resident assisted with the procedure. A minority (13%) of patients required concurrent procedures. Almost all patients (90%) were discharged within 48 hours. Overall mean operative time was 3:25 hours (SD ± 42 min). As expected, OR time trend analysis showed no significant improvement over time for the expert surgeon, however significant improvement was seen in the trainee to expert surgeon (p < .05). One surgeon’s sample size
(trainee) was limited so no meaningful analysis could be performed.

Conclusion: The transition from laparoscopic pyeloplasty to RALP in a proctor environment results in a negligible learning curve with high success and minimal complications. The dual module da Vinci® Si surgical system expedites this process further with the operative surgeon acting as a true “co-pilot”.

Pediatric Resident Exposure to Urology: More Is Better

Gerald Mingin Jr., MD1, Sarah Hardy, MD2, (1)Surgery/Urology, Vermont Children’s Hospital, Burlington, VT; (2) Pediatrics, Vermont Children’s Hospital, Burlington, VT

Purpose: The majority of patients referred to a pediatric urologist are initially seen by pediatricians. The purpose of the study is to determine the level of exposure of pediatric residents to urology during their residency and to see how these findings compare and contrast with the perceptions of urology program directors.

Materials and Methods: An IRB approved web based survey containing 18 questions was employed. The survey was sent to both chief residents in pediatrics and urology program directors. Seventy one chief residents and 51 urology program directors completed the survey.

Results: When asked about the availability to rotate on the pediatric urology service only 8.1% of pediatric residents stated that this was possible, while 25% of urology program directors responded affirmatively. Fifty one percent of pediatric residents responded that they were involved in the urology clinic anywhere from 1 day to 1 month. This response differs from urology program directors that stated that only 19.6% of pediatric residents were involved in clinics. Sixty six percent of residents said that their main form of urologic teaching was through formal didactics or grand rounds; whereas 37.8% felt that it was through clinical teaching. More concerning 23% of residents rated their satisfaction with
didactics as fair to poor with 25% rating their bedside clinical experience as fair to poor. Sixty percent of pediatric residents wished to see more didactics, and 64% wished improvement in bedside teaching. Likewise, 51% of urology program directors felt that the overall exposure pediatric residents received could be improved. **Conclusion:** Pediatricians as gate keepers account for a large percentage of a pediatric urologist’s referral base. Our findings suggest a disconnect between urologists and pediatric trainees concerning exposure to pediatric urology. More concerning, a significant number of residents felt that their exposure was in adequate and more than 60% were eager for improvement. Interestingly, 51% of urology program directors felt that there was a need for greater involvement. Given these findings it would seem that improvement in both didactic and clinical interaction with our future colleagues will lead to better communication and care for our mutual patients.

Poster 5 (also Moderated Poster, Sunday 3:06 pm)

**Utilizing a Serosal-Trough for Fashioning a Continent Catheterizable Stoma: Technique and Outcomes**

Nima Baradaran, MD1, Andrew A. Stec, MD2, Angela Gupta, MD3, Michael A. Keating, MD, FAAP3 and John P. Gearhart, MD, FAAP1, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2)Urology, Medical University of South Carolina, Charleston, SC, (3)Division of Pediatric Urology, Walt Disney Pavilion at Florida Hospital for Children, Orlando, FL

**Purpose:** To evaluate the efficacy and potential complications of the serosal-trough (ST) technique for the implantation of a continent catheterizable stoma (CCS) during enterocystoplasty in children with bladder exstrophy.

**Methods:** Using an IRB-approved departmental database, children with bladder exstrophy, born after 1990 were selected and patients, who underwent urinary diversion with a CCS created with the ST technique, were identified. Demographic characteristics, as well as the eventual clinical outcomes, were retrospectively reviewed.

**Results:** A total of 135 patients with urinary diversion were identified, of whom 26 (13 males) had CCS implantation using the ST technique. Patients included 14 classic exstrophies, 10 cloacal exstrophies, and 2 epispadias. The appendix and tapered ileum was utilized for creation of CCS in 11 and 15 cases respectively. The median age at creation of CCS was 10.7 years (range: 4.4 – 17.4). At the time of CCS creation, 21 patients underwent initial enterocystoplasty, 4 had repeat augmentations, and 1 had a CCS on a previously augmented bladder. Ileum (average length 18cm) was used in 24/25 augmentations and was selected due to lack of redundant sigmoid in 52% of cases and intraoperative surgeon preference in the remaining. In one case of
Cloacal extrophy, a hindgut remnant was utilized. In 24 (92%) cases, initial CCS resulted in complete continence of the catheterizable channel. After median 2.5 years (range: 0.2 – 7.5) of follow-up all patients are dry via intermittent catheterization. The CCS failed at postoperative months 6 and 21 and required complete revision in two cases. The details of the procedure are illustrated in figures 1 and 2.

**Conclusion:** Utilizing a serosal-trough to provide a strong backing for a catheterizable channel is an excellent option when a channel must be placed in ileum, hindgut, or in an area of an augment where muscular backing is not available. This technique provides a reliably catheterizable tunnel, durable continence mechanism and good success rate when creating a CCS in combination with a urinary diversion.

**Figure 1:**

Two parallel longitudinal incisions only on the serosa are made to expose the underlying mucosa (A). The two incisions are caudally joined forming a U-shaped incision. Tacking sutures help to fan out the serosal layer and define the limits of the trough (B, C).
Figure 2:

The tabularized conduit is placed on the newly created trough (E, F). Tacking sutures are used to wrap the trough, covering the new continent catheterizable stoma with over 5:1 ratio in length to width. Pulling the sutures too hard may cause over compression of the catheterizable stoma and compromise the function of the conduit (G). The catheterizable stoma is attached to the reservoir with an end-to-end anastomosis and then the stoma is matured on the abdominal wall.

Poster 6 (also Moderated Poster, Monday 2:53 pm)

Experience with the Invance AMS Sling for the Treatment of Incontinence in Boys

Gregory Dean, MD, FAAP¹, Mark R. Zaontz, MD, FAAP¹, Antonio Chaviano², Jack Elder, MD³, Israel Franco, FACS, FAAP⁴, Andrew Kirsch⁵, Yegappan Lakshmanan, MD, FAAP⁶, (¹)Urology, Temple University, Voorhees, NJ, (²)Urology, Children’s Memorial Hospital, Chicago, IL, (³)Urology, Henry Ford Health System, Detroit, MI, (⁴)Pediatric Urology, New York Medical College, Valhalla, NY, (⁵)Pediatric Urology, Children’s Hospital of Atlanta, Emory University Medical Center, Atlanta, GA, (⁶)Department of Pediatric Urology, Children’s Hospital of Michigan, Detroit, MI
**Purpose:** The InVance sling was designed to treat incontinence following radical prostatectomy in adult males. We have adapted this procedure to treat incontinence in boys that arises from an incompetent bladder neck. We have used this technique for the past seven years in boys with a history of spina bifida, spinal cord injury as well as bladder exstrophy and describe our results.

**Methods:** Since April of 2005, seventeen boys have been treated for incontinence resulting from an incompetent bladder neck. Their ages at the time of surgical treatment ranged from seven to twenty years. Followup ranged from 24 months to 74 months. All patients underwent preoperative urodynamics demonstrating adequate bladder capacity and compliance. Cystography confirmed the presence of an incompetent bladder neck. The patients underwent the placement of an out-patient perineal bulbar urethral sling (AMS InVance) and then resumed intermittent catheterization either via the urethra or through a mitrofanoff.

**Results:** Of the seventeen boys undergoing this procedure, 65% (11/17) are improved. Of this number 27% (3/11) are dry and the remaining 73% (8/11) are damp with occasional pad use. The remaining 35% (6/17) are failures with 6/17 being completely wet of which 3 required sling removal for infection. Of the improved patients, only one went on to bladder decompensation requiring subsequent augmentation. Of the 11 improved patients 45% (5) required some form of revision, primarily for screw displacement. No patients experienced urethral erosion and no patients had difficulty with catheterization post sling placement.

**Conclusion:** The AMS InVance sling has been employed in our patient population with mixed success. While 65% are improved, only 18% are completely dry. Of those with improvement, a significant number required revision as the result of inadequate anchor fixation. The relatively small screw size (5mm) used in the AMS InVance system may not have sufficient bone stability for the long term compressive demands in these pediatric patients. Other challenges faced by this approach include an 18% infection rate. While the compressive bulbar sling can be effective, modification to the current approach must be made before it can be generally recommended.

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**Poster 7**

**The Use of Interventional Radiology in Re-Establishment of Lost Access to Continent Catheterizable Channels**

Gina M. Lockwood, MD1, David Moe, MD2, Craig Johnson, DO2 and Travis Groth, MD3, (1)Urology, Medical College of Wisconsin, Milwaukee, WI, (2)Pediatric Interventional Radiology, Children’s Hospital of Wisconsin, Milwaukee, WI, (3)Pediatric Urology, Children’s Hospital of Wisconsin, Milwaukee, WI

**Purpose:** To evaluate the efficacy of Interventional
Radiology (IR) procedures in regaining lost access to continent catheterizable channels and in prevention of future surgical revision of the channels in pediatric urology patients.

**Methods:** We performed a retrospective chart review over eight years of children presenting with lost access to a catheterizable channel for urinary or bowel drainage. Rates of successful re-establishment of access in IR and rates of future surgical revision were calculated.

**Results:** Twenty patients, ages one to 21 years, underwent attempts to re-establish lost access, some patients on multiple occasions. IR regained access via a minimally invasive technique with pigtail or foley catheter in 24 of 31 attempts (77%). None of these procedures required general anesthesia, and only four (13%) required conscious sedation. Of the 20 patients, eight (40%) never had to undergo eventual surgical revision to allow return to intermittent catheterization after a successful IR procedure. Eight (40%) did eventually require surgery, whether that entailed revision, endoscopy, or suprapubic tube placement, even after successful IR re-establishment of access. All four patients in whom IR access was unsuccessful required surgery.

**Conclusion:** Image-guided re-establishment of access for continent catheterizable channels in children is a useful and minimally-invasive treatment option to allow for resumption of self-catheterization and to obviate the need for surgical correction. This data is valuable in directing treatment course and in counseling families about potential clinical outcomes.

**Poster 8**

**Image Optimally: A Program to Optimize Pediatric Radiation Safety in Patients with Chronic Congenital Urological Conditions**

*Pramod P. Reddy, MD1, Steven Kraus, MD2, William DeFoor, MD2, John Racadio, MD2, Eugene Minevich, MD2 and Brian Coley, MD2, (1) Division of Pediatric Urology, Cincinnati Children’s Hospital Medical Center, (2) Department of Pediatric Radiology, Cincinnati Children’s Hospital Medical Center, Cincinnati, OH*

**Purpose:** Advances in medicine and multidisciplinary care have resulted in increased life expectancy and improved quality of life for patients with chronic congenital urological conditions (CUC). Current survival into adulthood approaches 80%. These patients are often followed with multiple serial radiographic studies to monitor their health and improve clinical outcomes. We created an inter-disciplinary improvement program to optimize the utilization of diagnostic imaging (DI) for patients with CUC, i.e., patients with Spina Bifida (SB) and Posterior Urethral Valves (PUV). In this study we present the baseline data on cost and dosimetry associated with DI in this patient population during their care in a Pediatric Hospital.

**Methods:** A collaborative study was undertaken to review
DIC practices to determine utilization of DI resources, patient dosimetry, and cost to the healthcare system. IRB approval was obtained. A cohort of patients with CUC treated from birth to age 21 years was identified and DI data abstracted from their medical record. Costs reflect actual average collections, not charges. Radiation estimates were derived from current departmental averages and literature estimates.

**Results:** The number of DI studies performed is presented in the table as mean and range. The cost of birth to adulthood DI testing, approximate radiation exposure in mSv, and the equivalent duration of background radiation is presented.

| Total Diagnostic Imaging studies performed | Mean = 96 (62-130) (Mean Cost - $47,673.88) | Mean = 72 (69-74) (Mean Cost - $34,180.53) |
| Ionizing Radiation DI studies | Mean = 53 (44-62) | Mean = 34 (33-34) |
| Ultrasound and MRI studies | Mean = 43 (18-68) | Mean = 38 (36-40) |
| GU related DI Studies | Mean =55 (16-93) | Mean = 47 (44-50) |
| Non-GU related DI studies | Mean = 42 (37-46) | Mean = 25 (19-30) |
| Radiation Dose Estimate | Mean 66.5 mSv | Mean 43.6 mSv |
| Equivalent Duration of Background Radiation | 20 years and 6 months | 10 years and 1 month |

**Conclusions:** True clinical integration and collaboration in the creation of this 'Image Optimally' program is an example of "disruptive innovation" that will positively impact patients with CUC. The current practice of imaging with radiation doses ‘as low as reasonably achievable’ (ALARA) does not always take into account costs of DI and the needs of patients with chronic health conditions and their long-term cumulative radiation exposures. This baseline data is being prospectively used to construct optimized ‘Best Practice’ diagnosis specific imaging protocols. These will serve to reduce potential patient harm from radiation, while allowing for optimal care with reduced cost to the healthcare system.

Poster 9

**Quality Assessment of Economic Analyses in Pediatric Urology**

Paul J. Kokorowski, MD, MPH, Jonathan C. Routh, MD, MPH and Caleb P. Nelson, MD, MPH, (1)Department of Urology, Children’s Hospital Boston, Boston, MA, (2)Division of Urology, Duke University Medical Center, Durham, NC

**Purpose:** Economic evaluations, such as cost-effectiveness analysis, are increasingly common in the medical literature. Our objective was to describe and evaluate economic analyses in the pediatric urologic literature.

**Methods:** We performed a systematic literature review of the MEDLINE, EMBASE, and Cochrane databases (1990-2011) to identify economic analyses of pediatric urologic topics. Studies were evaluated using published quality metrics. We examined the analysis type, data
sources, perspective, methodology, sensitivity analyses, and the reporting of methods, results, limitations, and conclusions.

Results: We identified 2,945 non-duplicated studies, 60 of which met our inclusion criteria. Economic analyses of pediatric urologic topics increased in number during the study period, from 1 study (2%) in 1990 to 7 (12%) in 2010 (p<0.0001 for trend). The most common types of analyses were cost-effectiveness and cost-minimization (22 each, 37%), typically performed from the payer perspective (26, 43%). Although 44 (73%) correctly identified the analysis type, only 21 (35%) correctly identified the study perspective. Optimal data sources were used in 7 studies (11%). Appropriate inflationary discounting was used in 32% (17/53). Sensitivity analyses were not reported in 58% (31/53). The descriptions of study methods were adequate in 43 (72%); assumptions were adequately reported in 42 studies (70%). Most (37, 62%) adequately discussed their limitations.

Conclusion: Although economic analyses are increasing in the pediatric urologic literature, there is a need for standardization in methods and reporting. Future investigations should attempt to follow standardized reporting guidelines and should pay particular attention to reporting of methods and results, including a comprehensive discussion of limitations.

Poster 10
Prospective Evaluation of Patient Readiness to Transition to Adult Urologic Care
Heidi A. Penn, MD1, Melissa R. Kaufman, MD2, Lisa Trusler1, Douglass B. Clayton, MD1, John C. Thomas, MD1, John C. Pope IV, MD1, Mark C. Adams, MD1, John W. Brock III, MD1 and Stacy T. Tanaka, MD1, (1)Division of Pediatric Urology, Monroe Carell Jr. Children’s Hospital at Vanderbilt, Nashville, TN, (2)Department of Urologic Surgery, Vanderbilt University, Nashville, TN

Title: Prospective Evaluation of Patient Readiness to Transition to Adult Urologic Care

Purpose: Many pediatric urological conditions are chronic in nature and require lifelong urologic surveillance to preserve renal function, promote continence, and maintain sexual/reproductive health. With improved survival rates, more pediatric patients will need transition to adult care, thus creating a unique opportunity to facilitate a smooth and accommodating transition from pediatric to adult healthcare. Our goal was to assess the awareness and readiness of both patients and parents regarding the transition process to help improve the transition process at our institution.

Methods: All children who were older than 14 years of age and seen in our spina bifida clinic were approached and prospectively enrolled. Surveys were distributed to both the patient and his or her parent. Questions focused on awareness of both the need for long-term urologic follow-up and the patient’s desire to learn more about the
process. Sexual and reproductive health was addressed. Finally, fears of both patient and parent regarding transition were also assessed. Survey accrual is ongoing. Fischer's exact test was used to compare between patients and parents and p<.05 was considered significant.

**Results:** A total of 20 surveys were prospectively collected, 9 from patients and 11 from parents. Fourteen of the respondents were females and 6 were males. The mean age for patients completing the survey was 18.7 (14-27). Figures 1-3 show results from both the patients and parents. Interestingly, 33% of patients and 18% of parents said they never wanted to transition (p=.33). Forty-four percent of parents had questions regarding their children's sexual and reproductive health, 40% had talked with their child about sex, and 55% wanted the urologist to discuss these issues with their child. Only 22.2% of patients were comfortable discussing sexual health topics with their urologist. The only significant difference between patient and parent responses was how much he or she thought about the transition process, 22.2% and 82%, respectively (p=0.02).

**Conclusion:** Transitioning to adult urologic care is a necessity for many pediatric urology patients with chronic conditions. While physicians are adapting to and implementing specialized clinics designed to transition patients into adult healthcare, parents are significantly more aware of transitioning than their children. Acknowledging and understanding the concerns of patients and families will help to optimize their transition to adult urologic care.

**Figure 1**

![Image showing survey results](image-url)
Figure 2

Poster 11

Predictive Factors for Stomal Incontinence Following Creation of a Continent Catheterizable Channel

Duong D. Tu, MD, Abhishek Seth, MD, Carlos A. O. Buchalla, Joseph G. Borer, MD, Stuart B. Bauer, MD, Alan B. Retik, MD, and Carlos R. Estrada Jr., MD, Department of Urology, Children’s Hospital Boston, Harvard Medical School, Boston, MA

Purpose: Children with bladder dysfunction from a variety of causes often require intermittent catheterization (IC) to empty. Creation of a continent catheterizable channel (CCC) offers several advantages including increased independence and the ability to catheterize without transfer for wheelchair-dependent children. However, urinary incontinence from the channel can occur and is distressing to patients and families; risk factors for these developments have not been clearly delineated. Our study aims to identify predictive risk factors for stomal incontinence following creation of a CCC.

Methods: We conducted a retrospective review of patients who underwent creation of an appendicovesicostomy or a Monti-Yang CCC at our institution over the past 2 years. Data recorded included demographics, surgical details, continence status, and results of urodynamic testing. Data were analyzed using Fisher’s exact test and a p-value of <0.05 was considered significant.

Results: 52 children (47% female) were included in the study. Mean age was 16 years (range 4-41 yrs). 32 (62%) had an appendicovesicostomy, and 20 (38%) a Monti-Yang channel. Pre-operative diagnosis included: spina bifida (20), extrophy/epispadias (15), cloacal malformation (3), sacral agenesis (2), valve bladder (4), pelvic neurofibromatosis (3), conjoined twin (1), spinal cord injury (3), and Hinman-Allen syndrome (1). 11/52 (21%) patients had stomal incontinence at a mean follow-up of 15 months. Of these, 1 (1/32, 3%) had an
appendicovesicostomy and 10 (10/20, 50%) had a Monti-Yang channel (p=0.0007). Incontinence was noted at a mean 3.8 mos following surgery (range 0-16 mos). In the Monti-Yang cohort, we examined possible predictive factors for incontinence, including age, pre-operative diagnosis, urodynamic parameters, surgical technique and postoperative management. The patients with stomal incontinence were significantly older (mean 21.2 ± 9.0yrs vs. 13.7 ± 5.4yrs, p=0.0375). Pre-operative diagnosis was not a significant predictor of stomal incontinence (p=0.99). Pre-operative urodynamic parameters including bladder capacity (p=0.47), maximum detrusor pressure (p=0.41), or overactivity (p=0.475) were also not significant. Likewise, intraoperative factors such as insertion site of the channel, catheter size over which the bowel segment was tubularized, and whether a concomitant bladder augmentation was performed were non-significant predictors (p=0.99). Postoperative management parameters including frequency of IC (p=0.18) and catheter size (p=0.99) were also not predictive.

**Conclusion:** Patients who undergo creation of an appendicovesicostomy have significantly higher rates of stomal continence compared to those with a Monti-Yang catheterizable channel. The only significant predictor of stomal incontinence was age. No other pre-, intra- or postoperative factors were found to be predictive of stomal incontinence, making risk stratification difficult. Patients and families should be counseled accordingly.

**Poster 12**

**Analysis of Outcomes Using Dextranomer Hyaluronic Acid Copolymer (DHA) Injections for the Treatment of MACE or Mitrofanoff Incontinence As Well As Bladder Neck Incontinence Following Continent Urological Reconstruction Procedures**

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**Purpose:** To analyze the outcomes for those patients who underwent continent urological reconstruction procedures and then subsequently required dextranomer hyaluronic acid copolymer (DHA) injection for mace or mitrofanoff stomal incontinence or urethral incontinence.

**Methods:** We performed a retrospective chart review of children under the age 18 who underwent a continent Urological reconstruction procedure done at our institution from 1990–2010. The patient’s diagnosis, details of procedure, number of months from initial procedure to repeat procedure, age at diagnosis, age at procedure, repeat procedures, age at repeat procedures, complications, outcomes (as defined by continence status), and clinic follow-up findings were collected for analysis. Emphasis was placed on those patients in which DHA injection was used for stomal leakage or urethral
Incontinence was defined as any leakage of stool or urine.

**Results:** Fifty-eight patients underwent a total of 126 reconstruction procedures. Ages ranged from 1.25 to 18 years (mean 9.6). Reconstruction procedures performed included Malone antegrade catheterizable enema (MACE) (37), mitrofanoff (43), bladder augmentation (16), bladder sling (10), bilateral ureteral reimplants (7), unilateral ureteral reimplant (6), bladder neck closure (4), and bladder neck reconstruction (3). DHA injections were performed in thirteen patients secondary to leakage in MACE (10), mitrofanoff (13), and urethra (6). Time from initial operation to first DHA injection ranged from 1-19 months (mean 7.4) Five patients (38%) required more than one injection. Continence was achieved in 8 (80%) of MACEs and 8 (62%) of mitrofanoffs undergoing DHA injections. Average number of injections needed to achieve continence was 2.3. Of the patients who had a bladder sling performed as part of their initial procedure, 5 (50%) required a deflux injection due to urethral incontinence with continence achieved in 3 (60%).

**Conclusion:** The use of DHA injection is a reasonable alternative to open reoperation in those patients experiencing stomal or urethral leakage following a continent urological reconstruction procedure given it is well tolerated, has minimal morbidity, and can be done in the outpatient setting.

**Poster 13**

**Results of Dextranomer Endoscopic Injections for the Treatment of Urinary Incontinence in Patients with Exstrophy Epispadias Complex**


**Purpose:** to evaluate prospectively the efficacy of Dextranomer based implants as a bulking agent for the endoscopic treatment of urinary incontinence in patients with exstrophy epispadias complex.

**Methods:** Since October 1997, 38 children and adolescents have been enrolled in an ongoing study: Female epispadias 7, male epispadias 15 and bladder exstrophy 16. 23 had had a previous bladder neck continence procedure (BNR). Preoperative evaluation consisted in medical history, incontinence charts, urine culture, urinary tract ultrasound and videourodynamics. This evaluation was repeated at six months and one year after treatment and then on a yearly basis, except for videourodynamics performed only when necessary for further management. Patients had one to three treatment sessions. Mean injected volume was 4.6 ml per session. At each evaluation, the patient was classified as cured.
(dryness interval of four hours), significantly improved (minimal incontinence requiring no more than one pad per day; no further treatment required) and treatment failure when no significant improvement was observed. Follow-up ranged from 1 to 14 years (mean 8 years).

**Results:** There were four post treatment complications: perineal abcess (1), encrusted cystitis (1), peritoneal urinoma (1) and urinary retention (1). Female epispadias: treatment failed in 2/2 before BNR and 3/5 after BNR, 2patients were improved. Male epispadias: before BNR, 3/10 patients became dry and 7/10 had no improvement; after BNR: 7/7 patients became dry (6) or significantly improved (1). Bladder extrophy: treatment failed in 5/5 before BNR and 3/11 after BNR; 5/11 became dry and 3/11 significantly improved

**Conclusion:** Endoscopic treatment has a low success rate (18%) as a primary continence procedure in the exstrophy epispadias complex except in selected male epispadias where continence can be achieved with endoscopic treatment alone. However it is associated with a significant cure and improvement rate (74%) after a previous unsuccessfull BNR particulary in exstrophy and male epispadias patients. Female epispadias seems to be the worst indication for endoscopic treatment.

**Poster 14**

**A Comparison of Pediatric and Adolescent Testicular Germ Cell Malignancy**

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**Purpose:** Testicular Germ Cell Tumors (T-GCTs) can occur from infancy to adulthood. However, they are more frequently diagnosed in adolescents and young adults and are the most common solid tumor in males between 15-19yr. Recent investigation has emphasized the unique characteristics of adolescent cancer patients and how they can be caught between pediatric and adult specialists and they generally suffer from worse outcomes than their pediatric counterparts. In terms of testicular cancer, pre-pubertal T-GCTs are typically thought to be more benign than post-pubertal, adolescent T-GCTs. However, there are few studies comparing these groups in terms of oncologic outcomes.

**Methods:** We retrospectively reviewed an institutional database of all available patients with an ICD-9 diagnosis of T-GCT. We organized these patients into pediatric (0-12yr), and adolescent (13-19yr) cohorts. Next, we compared them in terms of demographics, tumor characteristics, disease stage, treatment type, recurrence-free survival (RFS) and overall survival (OS).
Results: We identified 59 such patients (20 pediatric and 39 adolescent) followed-up for a median of 1.8yr (0.01-15.6) after diagnosis. The median age at diagnosis was 1.4yr (0.29-7.5) in the pediatric group and 17.3yr (13.0-19.9) in the adolescent group. We observed that adolescent patients had more mixed non-seminomatous GCTs, while pediatric patients were more likely to harbor pure yolk sac or teratoma. The adolescent patients had significantly more advanced primary tumor stage (p=0.033), clinical nodal stage (p=0.036), and American Joint Committee on Cancer Group Stage at presentation (p=0.006). Statistically fewer adolescent patients were managed with observation, p<0.0001, and more treated with chemotherapy, p<0.0001.

In terms of RFS, there were more recurrences in the adolescents (13, 33.3%) than in the pediatric group (1, 5.0%). The 3yr RFS was 92.3% for the pediatric group and 61.1% for the adolescent group, p=0.016 (Figure 1). 5yr OS was 100% in the pediatric group and 84.8% in the adolescents, p=0.243. Lastly, we retrospectively investigated the potential for a risk-adapted strategy in managing Stage Ia/b disease in this population. We analyzed the impact of lymphovascular invasion (LVI) or higher percentage of Embryonal Carcinoma (EC) in the orchiectomy specimen on either positive nodes at primary RPLND or recurrence after initial observation in 23 such patients. We assigned those with LVI or ≥40% EC as high-risk and observed recurrence in 3 of 6 (50.0%) high-risk patients compared to 1 of 16 (6.2%) without high risk features, Hazard Ratio = 10.03 (95%CI 1.035-97.213), p=0.047.

Conclusion: Our data on Adolescent T-GCTs support the larger movement to establish a distinct focus on adolescent cancer patients. We recommend managing these patients more aggressively than pediatric T-GCT patients. Also, we believe that the use of a risk-adapted strategy, utilizing LVI and the %EC, can be helpful in such patients with Stage Ia/b disease.

Figure 1: Recurrence Free Survival in Pediatric and Adolescent T-GCT Patients
Long-Term Outcomes after Partial Adrenalectomy in Pediatric Patients with Von Hippel-Lindau Syndrome

Dawud O. Lankford, MD1, Nitin Yerram, BS2, Dmitry Volkin, BS2, Israel Franco, MD1 and Peter Pinto, MD2, (1) Urology, New York Medical College, Valhalla, NY, (2) Urologic Oncology, National Institutes of Health, Bethesda, MD

Purpose: Children with von Hippel-Lindau (VHL) syndrome are at an increased risk for developing bilateral pheochromocytomas. In an effort to illustrate our experience with partial adrenalectomy (PA) in this select population, we report the largest series on PA for pediatric VHL patients.

Methods: From 1994 to 2011, a database was reviewed to evaluate 10 pediatric patients with hereditary pheochromocytoma for PA. Surgery was performed if there was clinical evidence of pheochromocytoma and normal adrenocortical tissue was evident on preoperative imaging. Perioperative data were collected and patients were followed for postoperative steroid use and tumor recurrence.

Results: Ten pediatric patients with a diagnosis of VHL underwent 18 successful PAs. The median tumor size was 2.6 cm. Over a median follow up of 7.2 years additional tumors in the ipsilateral adrenal gland were found in two patients. One patient underwent completion adrenalectomy and the other received a salvage PA with ipsilateral resection. One patient required steroid replacement. At last follow up, 7 patients had no evidence of disease recurrence.

Conclusion: At our institution, partial adrenalectomy is the preferred management for pheochromocytoma in the (VHL) pediatric population. This surgical approach allows
for removal of tumor while preserving adrenocortical function and minimizing the side effects of long term steroid replacement on quality of life and development.

**Table 1. Clinical Characteristics and Outcomes**

<table>
<thead>
<tr>
<th>Case No</th>
<th>Age*</th>
<th>Gender</th>
<th>Largest lesion size (cm)</th>
<th>PA Operationsa</th>
<th>Recurrence site/time</th>
<th>Path</th>
<th>Follow up (yrs)</th>
<th>Steroids</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17 M</td>
<td>3.0</td>
<td>lap-RPA</td>
<td>None</td>
<td>Pheo</td>
<td>15.63</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>13 M</td>
<td>2.7</td>
<td>lap-LPA, lap-BPA</td>
<td>None</td>
<td>Pheo</td>
<td>15.77</td>
<td>No†</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>13 M</td>
<td>2.5</td>
<td>open-LPA</td>
<td>None</td>
<td>Pheo</td>
<td>12.74</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>13 M</td>
<td>4.1</td>
<td>lap-LPA, lap-RPA</td>
<td>None</td>
<td>Composite</td>
<td>9.41</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>15 F</td>
<td>1.4</td>
<td>lap-LPA, lap-RPA</td>
<td>None</td>
<td>Pheo</td>
<td>2.56</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6 M</td>
<td>3.5</td>
<td>lap-LPA, lap-RPA</td>
<td>Right/5mos</td>
<td>Composite</td>
<td>4.58</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>17 F</td>
<td>2.0</td>
<td>open-BPA</td>
<td>None</td>
<td>Pheo</td>
<td>**</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>13 M</td>
<td>1.5</td>
<td>lap-RPA</td>
<td>None</td>
<td>Pheo</td>
<td>5.00</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>16 M</td>
<td>6.5</td>
<td>open-RPA, lap-RPA</td>
<td>Right/1yr</td>
<td>Pheo</td>
<td>4.06</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>15 M</td>
<td>5.5</td>
<td>robo-LPA, robo-RPA</td>
<td>None</td>
<td>Pheo</td>
<td>4.42</td>
<td>Yes/2 yrs post-op</td>
<td></td>
</tr>
</tbody>
</table>

* Age at first operation
† Patient began steroids after removal of an ACTH secreting ectopic tumor.
Lap – laparoscopic
Rob – robotic
LPA – left partial adrenalectomy
RPA – right partial adrenalectomy
BPA – bilateral partial adrenalectomy

**Table 2. Operative Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>Total Number (n)</th>
</tr>
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<tbody>
<tr>
<td>Total adrenal units operated on</td>
<td>18</td>
</tr>
<tr>
<td>Open</td>
<td>4</td>
</tr>
<tr>
<td>Lap</td>
<td>12</td>
</tr>
<tr>
<td>Robotic</td>
<td>2</td>
</tr>
<tr>
<td>Median</td>
<td>Range</td>
</tr>
<tr>
<td>Gross tumor size (cm)</td>
<td>2.6</td>
</tr>
<tr>
<td>Operative time (min)</td>
<td>300</td>
</tr>
<tr>
<td>Open</td>
<td>353</td>
</tr>
<tr>
<td>Lap</td>
<td>300</td>
</tr>
<tr>
<td>Robotic</td>
<td>273</td>
</tr>
<tr>
<td>Estimated blood loss</td>
<td>150</td>
</tr>
<tr>
<td>Open</td>
<td>725</td>
</tr>
<tr>
<td>Lap</td>
<td>125</td>
</tr>
<tr>
<td>Robotic</td>
<td>100</td>
</tr>
</tbody>
</table>
Poster 16 (also Moderated Poster, Sunday 9:55 am)

**Sensitivity of Renal Ultrasound for the Detection of Grade 5 Vesicoureteral Reflux**

Robert C. Orth, MD, PhD¹, A. Chantal Caviness, MD, PhD², Alan Schlesinger, MD, FAAP³ and James Crowe, MD¹, (1) Edward B. Singleton Department of Pediatric Radiology, Texas Children’s Hospital, Houston, TX, (2)Section of Emergency Medicine, Department of Pediatrics, Baylor College of Medicine, Houston, TX

**Purpose:** The American Academy of Pediatrics (AAP) recently updated its Clinical Practice Guideline for the diagnosis and treatment of infants and children aged 2-24 months with a first febrile UTI and now recommends these patients undergo renal and bladder ultrasound (RBUS) and subsequently undergo voiding cystourethrography (VCUG) only if abnormalities are found on RBUS. A false-negative rate of up to 40% has been reported for the diagnosis of grade IV vesicoureteral reflux (VUR) by RBUS. Data on the sensitivity of RBUS for detection of the highest grade of VUR, grade V, are lacking. The purpose of this study was to determine the sensitivity of RBUS for grade V VUR.

**Methods:** An institutional electronic medical record was searched to identify all patients diagnosed with grade V VUR by VCUG between January 1, 2010 and December 31, 2011. Studies were included if they were performed on patients ≤ 24 months of age at the time of VCUG and if a RBUS had been performed on the same patient within 30 days of the VCUG. Exclusion criteria were a prior VCUG at our institution or a known history of genitourinary surgery or anomaly. Two pediatric radiologists independently reviewed the VCUG examinations to confirm correct classification of VUR grade using the International Reflux System, and a third pediatric radiologist resolved discrepant readings. Ultrasound images were reviewed by a single pediatric radiologist and designated abnormal if any of the following were present: renal pelvic dilitation >8 mm on transverse images, caliectasis, ureteral dilitation >10 mm, duplicated collecting system, or ureterocele. Sensitivity of RBUS for grade V VCUG was calculated.

**Results:** During the study period, 4970 VCUG examinations were performed, 92 were diagnosed with grade V VUR by VCUIG between January 1, 2010 and December 31, 2011. Studies were included if they were performed on patients ≤ 24 months of age at the time of VCUIG and if a RBUS had been performed on the same patient within 30 days of the VCUIG. Exclusion criteria were a prior VCUIG at our institution or a known history of genitourinary surgery or anomaly. Two pediatric radiologists independently reviewed the VCUIG examinations to confirm correct classification of VUR grade using the International Reflux System, and a third pediatric radiologist resolved discrepant readings. Ultrasound images were reviewed by a single pediatric radiologist and designated abnormal if any of the following were present: renal pelvic dilitation >8 mm on transverse images, caliectasis, ureteral dilitation >10 mm, duplicated collecting system, or ureterocele. Sensitivity of RBUS for grade V VCUIG was calculated.

**Conclusion:** The diagnostic sensitivity of RBUS is high for grade V VUR, supporting the recent AAP Practice Guideline recommendation that infants and children aged 2-24 months with a first febrile UTI forgo VCUIG if their RBUS is normal.
Parental Anxiety and VCUG Education
Lisa L. Lachenmyer, CPNP, Lisa A. Trusler, RN, MSN, Jennifer J. Anderson, CPNP, Douglass B. Clayton, MD, John C. Thomas, MD, John C. Pope IV, MD, Mark C. Adams, MD, John W. Brock III, MD and Stacy T. Tanaka, MD, Division of Pediatric Urology, Monroe Carell Jr. Children's Hospital at Vanderbilt, Nashville, TN

Purpose: Many parents of children undergoing voiding cystourethrogram (VCUG) report anxiety. Existing studies have shown that children respond to their parents' anxiety. Our current practices focus on education immediately prior to and during the VCUG. We hypothesized that parent education in the form of a written brochure 1-2 weeks in advance of the procedure would decrease anticipatory parental anxiety.

Methods: All parents whose children were scheduled for VCUG at least 6 days in advance were eligible for the study. Families were randomized to an experimental or control group. The experimental group was mailed an educational brochure about the VCUG. The control group received our current standard of care (no brochure). Parents were enrolled and consented prospectively. On the day of the VCUG, blinded investigators administered the State-Trait Anxiety Inventory (STAI) to the parent in the Diagnostic Imaging waiting room immediately prior to the procedure. The STAI measures both anxiety about an event and trait anxiety. Scores range from 20-80; higher scores indicate greater anxiety. Parents were also asked what educational sources they used and what could improve their experience. Groups were compared by Mann-Whitney-Wilcoxon test for continuous variables and chi square test for categorical variables. We used univariate linear regression to evaluate factors associated with greater parental anxiety. A p value <0.05 was considered statistically significant.

Results: A total of 105 families were enrolled (47 experimental, 58 control). Mean patient age was 2.2+/−3.2 years. 77 of 105 (73%) were female. Mean parent age was 30+/−7.0 years. Respondents were mothers in 91 of 105 (87%) families. English was the primary language in 99 of 105 (94%). Child Life Services was present for the VCUG in 29 of 105 (28%). Ordering practitioner was Pediatric Urology in 69 of 105 (66%). None of these factors differed significantly between the control and experimental groups. Average event anxiety score was 37.3+/−10.5 and average trait anxiety was 31.6+/−7.8. Neither event (p=0.010) nor trait (p=0.09) anxiety differed between control and experimental groups. Increased event anxiety was associated with younger parent age (p=0.004). No identifiable factors were associated with increased trait anxiety. In the control group, the three top sources of information for the parents were the doctor’s office, friends/family and the internet. In the experimental group, the three top sources of information were the doctor’s office, friends/family and...
the brochure. In response to an open-ended question, 9 control group respondents indicated that further advance education would improve their experience; 4 respondents of the experimental group indicated the brochure improved their experience.

**Conclusion:** In our study, an educational brochure mailed to families prior to VCUG did not decrease parental anxiety. However, the educational brochure can potentially improve patient satisfaction and ensure accurate dissemination of information.

Poster 18

**Not All Low-Grade Reflux Is Benign**

Daniela C. J. Sanchez, Brian M. Rosman, MD, Caio M. Oliveira, Sabrina T. Reis, Lorenzo F. M. Trevisani, Guilherme A. Rossini, Carlos A. O. Buchalla, Gustavo N. C. Inoue and Hiep T. Nguyen, MD, FAAP, Department of Urology, Children's Hospital Boston, Boston, MA

**Purpose:** Low-grade vesicoureteral reflux (VUR grades 1-3) is frequently considered to be a benign condition that will resolve without requiring monitoring or intervention. Despite this widely held belief, there is little evidence to corroborate this claim. The natural history of mild VUR has not been well characterized. The purpose of this study is to examine the clinical outcomes and possible risk factors for poor outcomes in patients with low grade VUR (grade 1-3).

**Methods:** From 2003 through 2006, the medical records of 558 children diagnosed with grade I-III VUR by voiding cystourethrography were retrospectively reviewed. Demographic factors (such as gender, age at presentation, initial presenting symptoms, and co-existing voiding dysfunction) and VUR characteristics (such as grade, laterality duplication) were ascertained. Outcomes were classified as either resolved vs. requiring treatment (either endoscopic injection or ureteral reimplantation). Univariate and multivariate analysis were performed to determine the risk factors for specific outcomes.

**Results:** The mean age at the diagnosis of VUR was 16.9 months and mean follow-up (F/U) period was 31 months. 83.3% of the patients were females. The frequency of spontaneous resolution, the incidence of worsening VUR grade in follow-up, the incidence of breakthrough UTI and the rate of ureteral reimplantation and endoscopic injection are listed in Table 1. We observed that female patients were more likely to require treatment than males (p=0.04). In addition, grade III VUR, the presence of breakthrough UTI, diverticulum and renal scarring were independent risk factors for requiring treatment on multivariate analysis (p<0.0001). Interestingly, initial presentation, the presence of voiding dysfunction, ureteral duplication and bilaterality were not risk factors for requiring treatment.

**Conclusion:** We observed that nearly 40% of all patients with low grade (I-III) VUR did not spontaneously resolve in follow-up. Of those that do not resolve, over
30% required surgery, and nearly 1 in 10 patients had worsening VUR. Breakthrough UTI, diverticulum and renal scarring were risk factors requiring treatment in children with low grade VUR. Thus, not all children with low grade VUR have a benign clinical course, and those with these risk factors should consequently be monitored more carefully as in those with high grade VUR.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Frequency</th>
<th>Spontaneous Resolution</th>
<th>Worsening VUR</th>
<th>Breakthrough UTI</th>
<th>Reimplantation</th>
<th>Endoscopic injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>6.99%</td>
<td>73.5%</td>
<td>9.4%</td>
<td>6.8%</td>
<td>11.8%</td>
<td>5.6%</td>
</tr>
<tr>
<td>II</td>
<td>52.3%</td>
<td>66.5%</td>
<td>8.2%</td>
<td>7.3%</td>
<td>18.1%</td>
<td>6.3%</td>
</tr>
<tr>
<td>III</td>
<td>47.5%</td>
<td>51.5%</td>
<td>12.4%</td>
<td>11.3%</td>
<td>32.4%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Overall</td>
<td>59.4%</td>
<td>10.3%</td>
<td>9.2%</td>
<td>22.48%</td>
<td>5.76%</td>
<td></td>
</tr>
</tbody>
</table>

Poster 19
Objective Measurement of Voiding Function among Vesicoureteral Reflux Patients
Katherine W. Herbst, MSc, John H. Makari, MD, FAAP, Fernando A. Ferrer Jr., MD, FAAP and Christina Kim, MD, Division of Urology, Connecticut Children’s Medical Center, Hartford, CT

Purpose: Dysfunctional Elimination Syndrome (DES) is a prevalent abnormality in patients with vesicoureteral reflux (VUR). Objective measures may not be predictive of disease presence. The purpose of this study was to assess the accuracy of two objective measures, the Dysfunctional Voiding Symptom Score (DVSS) and post-void residual as a percent of estimated bladder capacity (PVR/EBC) when compared to the clinician’s diagnosis of DES.

Methods: In June 2010, we created a prospective registry for anti-VUR surgery patients. Since then, fifty-one patients have been enrolled, forty-six have undergone surgery, and forty-four have had follow up visits. Clinician diagnosis of DES (DxDES) was obtained before surgery and at follow-up visits by two clinicians. Pre-surgical DVSS score was recorded for 43/51 patients, and follow-up DVSS for 36/44 patients. Pre-surgical PVR/EBC was recorded for 42/51 patients, and follow-up PVR/EBC for 38/44 patients. Patients were scored as positive for DES if DVSS score was >6 for females and >9 for males. To determine the precision of DVSS, DxDES was used as the gold standard and positive predictive value (PPV), sensitivity and specificity calculated. A receiver operating characteristic (ROC) curve was used to determine the accuracy of PVR/EBC with DxDES as the gold standard.

Results: The majority of patients had a DxDES before surgery (57%), with only 25% showing DxDES after surgery. Pre-surgical DVSS had a PPV of 75%, a sensitivity of 56%, and a specificity of 69% (Table 1). Post-surgical DVSS had a PPV of 40%, a sensitivity of 36%, and a specificity of 24% (Table 2). ROC curves for both pre-surgical and follow-up PVR/EBC had area under the curve values of 0.456 and 0.464 respectively (Figures 1 & 2).

Conclusions: Although pre-surgical DVSS was somewhat precise in identifying DxDES, sensitivity and specificity were low. Post-surgical DVSS statistics were very inexact.
The PVR/EBC ratio (at any level) was unable to correctly identify a clinician’s diagnosis of DES with any greater frequency than a random guess as determined by ROC curve analysis. Given these results, we theorize that our clinicians rely on a multitude of factors other than DVSS and PVR. We recognize this study is limited by sample size and non-generalizability. Nonetheless, these findings raise questions regarding the value of the DVSS and PVR/EBC as diagnostic tests to assess DES. We believe further investigation of objective measures is warranted.

**Table 1. Pre-surgical Findings**

<table>
<thead>
<tr>
<th>DVSS</th>
<th>DxDES</th>
<th>+</th>
<th>−</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPV</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type I Error</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type II Error</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>+</td>
<td>15</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>−</td>
<td>11</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specificity</td>
<td>0.69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2. Follow-up Findings**

<table>
<thead>
<tr>
<th>DVSS</th>
<th>DxDES</th>
<th>+</th>
<th>−</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PPV</td>
<td>0.40</td>
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<td>Type I Error</td>
<td>6</td>
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</tr>
<tr>
<td></td>
<td>Type II Error</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>+</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>−</td>
<td>19</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specificity</td>
<td>0.24</td>
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</table>

**Figure 1. Pre-surgical ROC Curve for PVR/EBC Using Clinician's Diagnosis as Gold Standard**
Poster 20
“Definitive” Is Not the Word – Rate of Revision in the Surgical Management of Ureteroceles: A Large Single Institutional Study
Seth A. Cohen, MD, Timothy Juwono, Kerrin L. Palazzi, MPH, Oren F. Miller, MD, Nicholas M. Holmes, MD, George W. Kaplan, MD, and George Chiang, MD, Urology, Rady Children’s Hospital, University of California, San Diego, San Diego, CA

Purpose: The surgical management of ureteroceles is extremely variable; some have hypothesized that if these patients were treated with “definitive” staged surgical intervention, this would eliminate the need for further revision surgery. We sought to determine if the rate of revision surgery was truly decreased among patients who have undergone staged surgical management.

Methods: A large retrospective chart review was conducted, identifying all patients having undergone ureterocele surgery at a single institution over the last 41 years. The cohort was divided into four groups based on surgical approach: upper tract approach (UTA), lower tract reconstruction (LTR), simultaneous upper and lower tract approach (STA), and staged upper and lower tract reconstruction (SGTR). Demographics, the presence of pre/post-op VUR, post-op morbidity, and the need for revision surgery were compared using Chi2 test, Fisher’s exact test, Kruskal-Wallis test, Mann-Whitney U test (Bonferroni correction), and logistic regression analyses.

Results: Between 1969 and 2010, 180 patients were identified as having undergone surgical management of ureteroceles, of which 120 had complete demographic data available for analysis. Median age at time of initial surgical intervention was 5.8 months, (inter-quartile range (IQR), 2.6-13.5) and the majority (83.3%) were female. Median follow up was 33.1 months (IQR, 16.5-57.9). Surgical management was as follows: 18 (15%) patients underwent UTA, 47 (39.2%) underwent LTR, 23 (19.2%) underwent STA, and 32 (26.7%)
underwent SGTR. Amongst these groups, the only difference in median age was between the LTR and SGTR groups (6.3 months vs 3.7 months, p=0.012). Otherwise, all the groups were similar in proportion of patients <6 months of age at time of initial surgery (p=0.733), sex (p=0.210), laterality of ureterocele (0.235), and presence of duplex systems (p=0.760). Additional revision surgery was required in: 9 (50%) of UTA, 10 (21.3%) of LTR, 4 (17.4%) of STA, and 3 (9.4%) of SGTR; the only statistically significant difference in required revision surgery was noted in the UTA group versus each of the other groups. The likelihood of requiring revision surgery in comparison to the SGTR group was significantly increased in the UTA group (OR 9.67, CI 2.15-43.56), but not the LTR (OR 2.61, CI 0.66-10.37) or the STA group (OR 2.04, CI 0.41-10.13).

**Conclusion:** There is no definitive surgical repair for the ureterocele complex; all, with exclusion of the UTA group, had similar rates of revision surgery. The widespread variability in current management echoes the lack of one superior approach found in this comprehensive series.

**Poster 21**
**Efficacy and Safety of Alfuzosin in the Reduction of Hydronephrosis In Patients with Neuropathic Bladder and Elevated Detrusor Leak Point Pressures**
**Paul F. Austin, MD, FAAP1, Barbara Wamil, MD2, Israel Franco, MD3, (1)Pediatric Urology, Washington University School of Medicine, Saint Louis, MO, (2)Sanofi Aventis, Bridgewater, NJ, (3)Urology, New York Medical College, Valhalla, NY**

**Purpose:** Hydronephrosis (HN) is considered a surrogate marker for elevated bladder pressures in patients with neuropathic bladder and increases the risk for future renal damage if left unchecked. Previous studies have shown that the detrusor leak point pressures (DLPP) can be lowered in these patients with alpha blocker therapy. We set out to ascertain if Alfuzosin can have a positive effect on the neuropathic bladder in patients with elevated DLPP by causing a significant reduction in the degree of hydronephrosis. Additionally, we evaluated the safety and tolerability of Alfuzosin.

**Methods:** A prospective trial was conducted enrolling patients with neuropathic bladders with a LPP>40 cm H20 and SFU grade 1-3 HN. The primary endpoint of the study was a decrease of at least 1 grade of hydronephrosis on 12-weeks of therapy. The patients were divided into 2 age groups: 2-7 yo (group 1) and 8-16 yo (group 2). The 8-16 yo group was evenly divided into patients receiving liquid (group 2A) and tablet (group 2B) formulations. All patients received a 0.2mg/kg/day dose of Alfuzosin over a 12-week period. Renal ultrasounds were performed at the onset and end of the study. A blinded, central reader reviewed all ultrasonographic studies. A standard protocol reviewing any adverse events was conducted at each follow-up visit.
**Results:** A total of 25 patients (pts) were enrolled into the study (12 pts group 1, 13 pts group 2). There were 9 males and 16 females. Mean age of the patients was 7.9 ±4 yo. One patient in the 2-7 yo age group dropped out.

<table>
<thead>
<tr>
<th>Reduction of HN</th>
<th>Group 1 (%)</th>
<th>Group 2 (%)</th>
<th>Group 2A (%)</th>
<th>Group 2B (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral</td>
<td>2/12 (17)</td>
<td>8/13 (62)</td>
<td>5/6 (83)</td>
<td>3/7 (43)</td>
<td>10/25 (40)</td>
</tr>
<tr>
<td>Left</td>
<td>5/12 (42)</td>
<td>11/13 (85)</td>
<td>6/6 (100)</td>
<td>5/7 (71)</td>
<td>16/25 (64)</td>
</tr>
<tr>
<td>Right</td>
<td>4/12 (33)</td>
<td>10/13 (77)</td>
<td>5/6 (83)</td>
<td>5/7 (71)</td>
<td>14/25 (56)</td>
</tr>
</tbody>
</table>

Twenty pts (80.0%) showed a response in at least one kidney, with 7 pts (58.3%) in group 1 and 13 pts (100.0%) in group 2. Six pts (24.0%) had complete resolution of bilateral HN, with 1 pt (8.3%) in group 1 and 5 pts (38.5%) in group 2. Four pts (16.0%) with unilateral Grade 3 HN at baseline had an improvement to Grade 0. Adverse events included 3 reports of dermatitis/rash, 1 event of tachycardia and 1 of dizziness. There were no serious adverse events.

**Conclusion:** Overall, Alfuzosin reduces hydronephrosis by at least one SFU grade in 80% of patients with unilateral HN and in 40% of patients with bilateral HN. There is good tolerability of Alfuzosin with no serious adverse events during this 12-week study. Long-term treatment studies are needed to determine if greater changes in the grade of HN are achievable with extended treatment.

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**Poster 22 (also Moderated Poster Sunday 1:46 pm)**

**Hydronephrosis In Patients with Spina Bifida – Can It Predict Vesicoureteral Reflux?**

Woojin Kim, Hiroko Suzuki, Yoshiyuki Shiroyanagi and Yuichiro Yamazaki, Urology, Kanagawa Children’s Medical Center, Yokohama, Japan

**Purpose:** Standardized evaluation of patient with spina bifida in our institution included renal ultrasound (US) and video-urodynamic study (VUDS). To our knowledge, there is no report to evaluate the association between hydronephrosis and vesicoureteral reflux (VUR) in patients with spina bifida who catheterize. We assessed the association between hydronephrosis and findings of VUDS in patients with spina bifida.

**Methods:** We retrospectively reviewed the records of spina bifida patients with clean intermittent catheterization from August 2009 to February 2012. The patients who underwent both US and VUDS within three months were included in this study. SFU classification was used to assess hydronephrosis. To evaluate the association between hydronephrosis and VUR, we performed the following investigations. 1) To compare patients with and without hydronephrosis. Analysis included age, gender, Pdet max, bladder trabeculation and the presence or absence of VUR. 2) To compare kidneys with and without
The presence or absence of VUR of each kidney was analyzed. Chi square and student-t test were used for statistical analysis.

**Results:** There were 104 patients (58 girls, 46 boys) who met study inclusion criteria. Median age at US was 8.3 years (range 0 to 23). Underlying diseases included open myelomeningocele in 89, closed myelomeningocele in 2 and conus lipoma in 13. A total of 17 kidneys (14 patients) had hydronephrosis, including Grade I in 13, Grade II in 2, Grade III in 2. A total of 27 kidneys (22 patients) had VUR, including Grade I in 4, Grade II in 1, Grade III in 6, Grade IV in 4, Grade V in 2. Tables showed the results of the comparison between patients (table 1), kidneys (table 2) with and without hydronephrosis. To compare patients with and without hydronephrosis, age and Pdet max was significantly differed. As for the presence or absence of VUR, there was no statistically significant difference in the hydronephrosis and no hydronephrosis groups.

**Conclusion:** Although patients with hydronephrosis had significantly high Pdet max, hydronephrosis could not predict VUR in patients with spina bifida who catheterize.

**Table 1.** Comparison between patients w/ and w/o hydronephrosis

<table>
<thead>
<tr>
<th></th>
<th>Hydronephrosis group</th>
<th>No hydronephrosis group</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>6.1 ± 3.8</td>
<td>8.8 ± 5.6</td>
<td>0.04</td>
</tr>
<tr>
<td>Gender (male/ female)</td>
<td>7/7</td>
<td>39/51</td>
<td>0.86</td>
</tr>
<tr>
<td>Pdet max (cmH₂O)</td>
<td>54.8 ± 24.8</td>
<td>35.0 ± 25.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Bladder trabeculation</td>
<td>6/8</td>
<td>36/53</td>
<td>0.90</td>
</tr>
<tr>
<td>VUR (yes/no)</td>
<td>3/11</td>
<td>19/71</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 2.** Comparison between kidneys w/ and w/o hydronephrosis

<table>
<thead>
<tr>
<th></th>
<th>Hydronephrotic kid</th>
<th>Normal kidney</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VUR (yes/no)</td>
<td>3/14</td>
<td>23/166</td>
<td>0.79</td>
</tr>
</tbody>
</table>

**Poster 23**

**Relative Renal Function Does Improve After Pyeloplasty in Children**

**Ahmed M. Harraz,** Diaa-Eldin Taha, Tamer Helmy, Mohamed Dawaba and Ashrat Tarek Hafez, Urology, Mansoura Urology and Nephrology Center, Mansoura, Egypt

**Purpose:** Previous studies showed controversial relative renal function (RRF) outcome after pyeloplasty in children. However, these studies had a small sample size. We aim at determining the status of RRF after pyeloplasty in children for a relatively larger number of patients in a tertiary referral center.
Methods: After exclusion of patients with solitary kidney or bilateral pyeloplasty, we retrospectively identified 207 patients (18 years) who underwent pyeloplasty between January 2002 and January 2011 and to whom preoperative and postoperative renal scintigraphy (MAG3) available. Preoperative RRF was identified as low (<20%), moderate (20%-40%) and good (>40%). Postoperative RRF was defined as improved or deteriorated if it is 5% more or less than preoperative one, respectively. Preoperative and postoperative RRF were compared. Multivariate logistic regression analysis was performed to detect factors predictive of RRF deterioration.

Results: Over a median followup period of 12 months (range: 6-93), the mean (SD) and median RRF was improved from 35.7% (10) and 37% to 37.9% (10) and 40% after pyeloplasty, respectively (P<0.001). By repeated measure ANOVA, low and moderate RRF preoperatively showed improvement while good RRF showed a decline postoperatively (P<0.001). On multivariate binary logistic regression analysis, preoperative low RRF (Referent is good RRF; OR: 0.2; 95%CI: 0.04-0.9; P=0.048), preoperative moderate RRF (Referent is good RRF; OR: 0.5; 95%CI: 0.2-0.9; P=0.028) and redo pyeloplasty (OR: 3.8; 95%CI: 1-13; P=0.035) were the only significant predictors for RRF deterioration.

Conclusion: RRF does improve after pyeloplasty in children. A lower preoperative RRF is more likely to improve after surgery. These findings are important in patients’ counselling prior to surgery, in addition, aim of the surgery should be directed at improving RRF.

Poster 24
Robotic Assisted Laparoscopic Pyeloplast in Obese and Non-Obese Patients
Bruce W. Lindgren, MD, FAAP, Brenden Frainey, MS and Edward M. Gong, MD, Urology, Children’s Memorial Hospital, Chicago, IL

Purpose: Childhood obesity prevalence has nearly tripled over the last 3 decades. Obesity has been shown to be a negative risk factor for adult surgery. This has not been well studied in the pediatric population. We compare outcomes between pediatric patients undergoing robotic assisted laparoscopic pyeloplasty (RALP) with and without childhood obesity.

Methods: Between October 2009 and January 2012, 108 robotic assisted laparoscopic surgeries were performed at our institution. We retrospectively identified the last 50 consecutive patients who underwent RALP with IRB approval for research analysis. Patients were separated into overweight and normal weight cohorts using 85th percentile of BMI (WHO criteria) as a cut-off for overweight. Surgical and post-surgical outcomes were evaluated. Complications were categorized using the Dindo-Clavien scale.
Results: Of the 50 patients, 37 were considered normal weight (BMI <85%ile for age) and 13 were considered overweight (BMI >= 85%ile for age). The two cohorts were similar in respect to age, sex, follow-up, laterality, and prior renal procedures. Operative time (235 min vs. 245 m, p=0.0995), EBL (7.0 ml vs. 4.6 ml, p=0.098), length of stay (1.2 d vs. 1.2 d, p=0.803, and morphine equivalent narcotic analgesic administration 4.5 vs 3.1 mg, p=0.214) were similar between normal weight and overweight children, respectively. Complication rates were similar in regard to minor (15.6% vs. 30.8%, p=0.411) and major (12.5% vs. 0%, p=0.308) complications between the normal and overweight cohorts, respectively. Finally, there was no difference in sonographic evidence of decreased hydronephrosis (89.3% vs. 90.9%, p=1.000).

Conclusion: Despite the known difficulties with surgery in overweight patients, robotic-assisted laparoscopic pyeloplasty can be performed as safely and effectively in children who are overweight as in normal weight children.

Poster 25

Weight-Based Surgical Approach for Laparoendoscopic Single-Site Total and Partial Nephroureterectomy

Philipp O. Szavay, Tobias Luithle and Joerg Fuchs, Pediatric Surgery an Pediatric Urology, University Children’s Hospital, Tuebingen, Germany

Purpose: Laparoendoscopic single-site surgery (LESS) for pediatric urological pathology has emerged as a viable alternative to standard laparoscopy. However, most single port devices are disposable, resulting in additional operative expense. In addition, availability of these devices is limited for small children. Our aim was to assess operative outcomes with different surgical approaches for LESS total and partial nephroureterectomy in pediatric patients, stratifying by weight.

Methods: Since March 2010 LESS total and partial nephroureterectomy were performed in 14 children. Indications for nephrectomy were non-functioning kidney due to vesico-ureteral reflux (n=6), giant cystic dysplasia (n=3) loss of renal function due to obstruction (n=1) and rudimentary kidney (n=1). Three patients underwent partial nephroureterectomy for non-functioning moieties in duplex systems, including one bilateral case. Children weighing below 10 kg underwent LESS nephroureterectomy through an umbilical incision using two 3 mm trocars and one 5 mm trocar in the so called “Manhattan-technique”. Patients above 10 kg were operated on using a metal multi-use single-site single port, with different diameters for instruments ranging from 3-12.5mm. The “Manhattan-technique” was used in all patients undergoing partial nephroureterectomy. Renal hilus dissection was performed using a variety of techniques, including vascular sealing devices,
Electrocautery and clip-ligation. All ureters were transected after ligation using a PDS-loop. Conventional straight laparoscopic instruments were used in all cases.

**Results:** Mean age at operation was 27 months (0.75-128) and mean weight was 13.6 kg (3.1-67). Median operating time was 122 minutes (50-260). 11 children underwent LESS nephroureterectomy using two 3 mm trocars and one 5 mm trocar, and 3 patients were operated on with the multiuse device. All operations were completed in a standard laparoscopic transperitoneal technique without the use of additional trocars. There were no intra-operative complications. Postoperatively, one child who had undergone partial nephroureterectomy developed renal artery spasm, which resolved without sequelae. Another patient developed a postoperative urinoma at the site of partial nephroureterectomy of the upper pole, which resolved spontaneously within 5 days. Recovery was uneventful in the remaining 12 children.

**Conclusion:** LESS total and partial nephroureterectomy can be safely and efficiently performed in children, irrespective of age and weight. However, different surgical approaches have to be considered, as disposable single-site ports are not available for infants and small children. To decrease operative expenses, conventional multi-use trocars and a multi-use single-site port were used with conventional laparoscopic instruments. Technical problems included gas leakage due to failure of sealing, limitations of the range of movements due to the rigidity of the metal device, and tangling of instruments within the port. Despite the technical limitations, both techniques offer an alternative to contain procedural costs. However they will benefit from future development of instruments and trocars more suitable for small children.

**Poster 26**

**Long-Term Bladder and Renal Outcomes in Boys with Posterior Urethral Valves**

Ruthie R. Su, MD¹, Paul A. Merguerian, MD, FAAP², Josephine Hidalgo-Tamola³, Richard W. Grady², Thomas S. Lendvay¹ and Margaret Shnorhavorian⁴, (1)Urology, Seattle Children’s Hospital, Seattle, WA, (2)Division of Pediatric Urology, Seattle Children’s Hospital, Seattle, WA, (3)Group Health Medical Center, Seattle, WA

**Purpose:** In 1996, a short-term study at our institution showed patients treated with early valve ablation had better bladder outcomes than those treated with urinary diversion. In the same cohort, we examined whether these bladder outcomes endure with long-term follow-up.

**Methods:** This is a retrospective cohort study of patients who underwent valve ablation (PVA, n=19) or urinary diversion (UD, n=6) during the first year of life from 1986 to 1995. Pre-operative renal and bladder characteristics were not significantly different. Clinical bladder outcomes measured were continence at most recent follow-up,
age at toilet training, age at nocturnal control, rate of nocturnal enuresis and febrile UTIs, and resolution of hydronephrosis. Urodynamic data during follow-up were reviewed for patterns of voiding dysfunction classified as hypertonic, hyperreflexic, or myogenic failure. Renal outcomes were defined as end stage renal disease (ESRD) (GFR < 15 mL/min per 1.73 m2). To normalize the comparison groups, a subset analysis of bladder outcomes amongst patients with ESRD was conducted.

**Results:** Long-term follow-up a median of 13 years (range 5-21 years) was available for 81% (25/31) of the original valve cohort of which 74% (14/19) of PVA patients and 100% (6/6) of UD patients had follow-up since 1996. PVA patients had significantly higher rates of continence, underwent toilet training, and gained nocturnal urinary control at an earlier age compared to UD patients (Table 1). At the time of follow-up, 5 of 19 (23%) PVA patients and 6 of 6 (100%) UD patients had developed ESRD (p<0.05). A subset analysis of these patients with ESRD revealed more PVA patients were continent (4/5, 80% versus 2/6, 33% of UD patients) and had resolution of hydronephrosis (5/5, 100% versus 2/6, 33% of UD patients). Nocturnal enuresis and febrile UTIs were less frequent in the PVA group (0/5, 0% and 0/5, 0% versus 3/6, 50% and 2/6, 33% of UD patients, respectively). Urodynamic evaluation was performed for 21 of 25 patients; on follow-up, 3 UD patients and 0 PVA patients demonstrated late myogenic failure.

**Conclusions:** PUV patients treated with early valve ablation before the age of 1 year have clinically durable, improved bladder outcomes compared to patients treated with urinary diversion even if they develop end stage renal disease. Long term follow-up is imperative in this population of patients to monitor for delayed bladder and renal dysfunction.

<table>
<thead>
<tr>
<th></th>
<th>Ablation</th>
<th>Diversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continence*</td>
<td>16/18 (86%)</td>
<td>2/6 (33%)</td>
</tr>
<tr>
<td>Age at toilet training*</td>
<td>5 years</td>
<td>9 years</td>
</tr>
<tr>
<td>Age at nocturnal control*</td>
<td>6 years</td>
<td>12 years</td>
</tr>
<tr>
<td>Nocturnal Enuresis</td>
<td>3/17 (18%)</td>
<td>3/6 (50%)</td>
</tr>
<tr>
<td>Recurrent UTIs*</td>
<td>2/19 (11%)</td>
<td>4/6 (66%)</td>
</tr>
<tr>
<td>Bladder Augmentation</td>
<td>1/19 (5%)</td>
<td>2/6 (33%)</td>
</tr>
</tbody>
</table>

*p<0.05

**Table 1. Summary of bladder function at followup**

**Poster 27**

**Bladder Neck Obstruction in Boys with Valve Bladder Syndrome; Fact or Fiction?**

*Mohamed Youssif, MD, Ibrahim Mokhless, MD, M. Yehia, MD and A. Zahran, MD, Pediatric Urology Section, Urology Department, Alexandria University, Egypt*
Purpose: Valve bladder syndrome (VBS) represents the worst end of posterior urethral valve (PUV) spectrum. The role of bladder neck hypertrophy with subsequent obstruction remains debatable as a possible contributing factor in the pathogenesis of this syndrome. We conducted a prospective randomized study to determine if bladder neck obstruction is implicated in the pathogenesis of valve bladder syndrome or not.

Methods: Twenty boys with valve bladder syndrome were studied. All patients had primary endoscopic valve ablation. Patients were randomized into 2 groups. Group I (study group) including 10 boys where in addition to the standard conservative treatment (suppressive therapy, anticholinergic, CIC and overnight catheter indwelling) had endoscopic injection of a single dose of 100 I.U of Botox into the hypertrophied bladder neck at 3, 6, 9 o’clock position. Group II (control group) including 10 boys where urethroscopy was performed to exclude residual valves in addition to the standard conservative treatment. Preoperative evaluation & follow up were performed at 1, 3, and 6 months by laboratory studies (urine culture and sensitivity, BUN, serum creatinine), ultrasound of the urinary tract, VCUG and urodynamics (pressure flow study).

Results: The mean age of the boys was 17 months. There was no statistical difference in both groups regarding rate of febrile UTI, improvement of hydronephrosis, resolution of VUR, creatinine level at the start or at the end of the study. Urodynamic parameters revealed significant increase in cystometric capacity in group I without statistical difference between both groups (mean capacity increased from 117 cc to 151 cc in the study group and from 113 cc to 179 cc in the control group). The mean voiding pressure reduced significantly in both groups but without statistical difference (from 85.20 ± 21 cmH2O to 70.70 ± 23 cmH2O in the study group and from 76.0 ± 17 cmH2O to 65.40 ± 14 cmH2O in the control group).

Conclusion: Abolishing the presumed obstructing effect of bladder neck by Botox injection does not seem to improve the outcome of valve bladders. This study is another proof that the role of bladder neck obstruction in boys with valve bladder syndrome does not exist and has no functional implication in its pathophysiology. Thus role of bladder neck incision should be cautiously evaluated.

Poster 28 (also Moderated Poster Monday 9:03 am)
Using a National Pediatric Hospital Database to Assess the Practice Pattern of Clitoroplasty from 1992-2011 in the United States
Blake W. Palmer, MD1, Amy B. Wisniewski, PhD1, Kevin Kierl1, Dominic Frimberger, MD1, Bradley P. Kropp, MD1 and Christopher C. Roth, MD2. (1)Pediatric Urology, University of Oklahoma Health Sciences Center, Oklahoma City, OK, (2) Urology, Louisiana State University Health Sciences Center, New Orleans, LA
Purpose: Much debate is had over the optimal time for female genitoplasty for girls with a Disorder of Sex Development (DSD). The 2006 Consensus Statement on management of DSD cautioned on performing clitoral surgery on any girl except the most virilized (Prader III-IV) but cited literature to support that cosmetic surgery in infancy aids in parental distress and improves attachment. To date however little has been reported to understand what the normative practice patterns are for clitoral surgery and whether those patterns have changed over time.

Methods: We searched the Pediatric Health Information Systems hospital database to identify patients who had clitoral surgery between: 1992-2011. We used associated procedure and diagnostic codes to describe the practice pattern of female genital surgery in the United States for the last 2 decades.

Results: The PHIS database query revealed 504 operations on the clitoris. Clitoral procedures were done at less than 1 year of age in 29.2% (147/504) and at less than 3 in 49% (247/504) with only 11.3% (57/504) occurring after the age of 14. In those patients with a specific diagnosis of CAH 60.0% vs. 45.4% of non-CAH girls had surgery at <3 years of age (p=0.005; x²=8.037, df=1). There is trend of decreasing incidence of clitoroplasty that occur at <3 years of age in the cohort when comparing 1992-1996 (62.5%), 1997-2001 (56.1%), 2002-2006 (47.5%), 2007-2011 (40.9%) (p<0.0005; x²=12.88, df=3). There were no regional variations seen in the cohort with the incidence of clitoroplasty surgery at less than the age of 3 with the West (50.0%), Midwest (53.6%), South (47.1%) and Northeast (43.7%) (p=0.140).

Conclusion: Our study demonstrates that the incidence of clitoral surgery at ages less than 3 has been decreasing for the past 2 decades. The PHIS database does not offer the ability to assess why this change is occurring but emphasizes the importance of further study as to the long term impact and psychosocial factors associated with DSD surgery.

Poster 29 (also Moderated Poster Monday 9:07 am)
Psychosocial Adjustment of Children with DSD
Amy Wisniewski1, Stephanie Hullmann, MS2 and Larry L. Mullins, PhD2, (1) Pediatric Urology/Child and Adolescent Psychiatry, University of Oklahoma Health Sciences Center, Oklahoma, OK, (2) Psychology, Oklahoma State University, Stillwater, OK

Purpose: Disorders of sex development, or DSD, are medical conditions in which affected individuals experience discordance between their genetic, gonadal, and/or phenotypic sex (Hughes et al., 2006). Anecdotal reports from parents of children with DSD suggest that these children show increased aggression and behavior problems. They may also be at risk for internalizing disorders, such as depression and anxiety, due to low self-esteem, shame, and inability to fit in with peers. However, very few studies have examined the psychosocial
adjustment of children with DSD empirically. The goal of the current study is to determine if children with DSD are, indeed, at risk of experiencing behavioral, emotional, and social concerns by having their parents complete standardized measures of child psychosocial functioning.

**Methods:** Participants were caregivers (N = 12) of children (50% male sex of rearing) ages 2-18 (M = 7.30, SD = 3.99) with DSD. Diagnoses included Congenital Adrenal Hyperplasia (CAH; 66%), Complete Adrenal Insensitivity Syndrome (CAIS; 16.7%) and 46,XY DSD of unknown cause (16.7%). Most of the children (58.3%) had received genital surgery. With regard to race and ethnicity, the majority of participants self-identified as Caucasian (66.7%), 8.3% self-identified as African American, 16.7% as Native American, and 8.3% as Asian American. Parent participants completed measures of child behavior, including the Behavioral Assessment System for Children Parent Report Scale (BASC-PRS) and Vanderbilt ADHD Diagnostic Parent Rating Scale (VADPRS).

**Results:** Results of the VADPRS were examined for caseness using the clinical cutoff scores defined by the authors (Wolraich et al., 2003). With regard to ADHD clinical cutoff scores, 36.4% of the sample met caseness for ADHD (9.1% inattentive type, 16.6% hyperactive type, 9.1% combined type), and 75% of those children were raised female. The majority of the sample (54.5%) met clinical cutoff criteria for Oppositional Defiant Disorder (ODD). Further, 66.7% of those children were raised female. Independent samples t-tests were conducted to compare children with male and female sex of rearing on externalizing and internalizing problems as well as overall behavior problems and adaptive functioning. There was a trend for children reared female (M = 57.33, SD = 13.49) to exhibit greater externalizing symptoms than children reared male (M = 45.67, SD = 6.98), t (10) = -1.88, p = .089. There was another trend for children reared female (M = 57.83, SD = 13.01) to exhibit more behavior problems than children reared male (M = 45.17, SD = 9.60), t (10) = -1.92, p = .084.

**Conclusion:** This preliminary work suggests that children with DSD may be at risk for exhibiting significant inattentive, hyperactive, and oppositional behaviors. Female children with DSD may be at a particular risk for exhibiting externalizing behaviors and other problem behaviors at greater rates than those who have been raised male.

**Poster 30**

**Virilization and 46, XY Disorders of Sex Development: The Role of Gonadectomy and Genetic Testing**

Eric Z. Massanyi, MD1, Lisa A. Kolp, MD2, John P. Gearhart, MD3 and Claude J. Migeon, MD3, (1)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (2) Obstetrics and Gynecology, Johns Hopkins University School of Medicine, (3)Pediatric Endocrinology, Johns Hopkins University School of Medicine, Baltimore, MD
Purpose: The presentations of 17β-hydroxysteroid dehydrogenase type 3 deficiency, 5β-reductase type 2 deficiency, and complete androgen insensitivity syndrome can be clinically similar. However, individuals with 17β-hydroxysteroid dehydrogenase type 3 and 5β-reductase type 2 deficiencies will undergo pubertal virilization and should undergo gonadectomy prior to the age of maturation if reared in the female gender. The decision of when to perform gonadectomy among individuals with complete androgen insensitivity remains controversial. Proponents of delayed gonadectomy suggest that endogenous estrogen results in natural breast development and improved bone health. Proponents of early gonadectomy suggest that individuals are at increased risk of gonadal malignancy if the testes are left in situ.

Methods: Two sisters were initially diagnosed with complete androgen insensitivity syndrome as young children after testes were discovered during hernia surgery. A decision was made to delay gonadectomy. Virilization occurred in both individuals during puberty, and a diagnosis of 17β-hydroxysteroid dehydrogenase type 3 deficiency was made. Their cases were reviewed and gene sequencing was used to confirm their correct diagnoses.

Results: Confirmatory diagnosis through gene sequencing identified a heterozygous mutation for both a known splicing mutation and a previously unreported amplification mutation of the HSD17B3 gene. Gonadectomy was performed and vaginal dilations were used to achieve results satisfactory for potential sexual intercourse.

Conclusion: Differentiating 46, XY disorders of sex development is difficult. Failure to make the proper diagnosis may result in unwanted virilization. Any individual with a low testosterone:androstenedione ratio after hCG stimulation should undergo confirmatory genetic analysis of the HSD17B3 gene. The authors identified a previously unreported amplification mutation of the HSD17B3 gene. If a diagnosis of 17β-hydroxysteroid dehydrogenase type 3 deficiency is made in a child that is being reared female, gonadectomy is warranted to prevent virilization at the time of puberty. Furthermore, it is essential to obtain confirmatory diagnosis in any individual suspected of having complete androgen insensitivity syndrome before decision is made to postpone gonadectomy.

Poster 31
Impact of Laparoscopy for Diagnosis and Treatment in DSD Patients
Kimihiko Moriya, Takahiko Mitsui, Takeya Kitta, Michiko Nakamura, Yukiko Kanno, Masafumi Kon and Katsuya Nonomura, Urology, Hokkaido University Graduate School of Medicine, Sapporo, Japan

Purpose: Recently laparoscopy has gained wide acceptance in pediatric urology However, reports of
evaluation and management for large numbers of DSD patients are scarce. To clarify the impact of laparoscopy for DSD patients, we have evaluated our experience with diagnostic and therapeutic laparoscopy in DSD patients. Patients and Methods: Since April 1992, 28 laparoscopic surgeries were performed in 23 DSD patients after chromosomal and hormonal analysis. Among them, while 10 were diagnostic laparoscopy including gonadal biopsy in 10 patients, 18 were therapeutic laparoscopy in 17 patients. The final diagnosis was 46XY DSD in 9, mixed gonadal dysgenesis (MGD) in 6, ovotesticular DSD in 4 and Turner syndrome in 4. Surgical procedures and complications were evaluated.

Results: Mean age at laparoscopic surgery was 8.4 years (range: 3.3 months to 21.1 yrs). Diagnostic laparoscopy was indicated in 4 with 46XY DSD, in 3 with MGD and 3 with ovotesticular DSD. In 4 cases with 46XY DSD, laparoscopic gonadal biopsy was undergone in 2 and inspection alone in 2. Bilateral open gonadectomy was performed in 3 who were assigned as female and open hysterectomy with bilateral orchiopexy in 1 who was assigned as male thereafter. Among 3 with MGD, open or laparoscopic gonadal biopsy was undergone in 1 each after laparoscopic inspection in 3. Unilateral or bilateral gonadectomy were subsequently indicated in 2. In 3 cases with ovotesticular DSD, gonadal pathology was diagnosed as testis/ovary in 1, testis/ovotestis in 1 and ovary/ovotestis in 1 form the laparoscopic inspection and gonadal biopsy. However, the final diagnoses were bilateral ovotestis in 2 and ovary/ovotestis in 1. Therapeutic laparoscopy was performed in 5 with 46XY DSD, 4 with MGD, 4 with ovotesticular DSD and 4 with Turner syndrome. Surgical procedures were gonadectomy (bilateral in 1, unilateral in 3, partial in 2), hysterectomy in 2 and sigmoid vaginoplasty in 1 (includes multiple procedure). There was no severe perioperative complication including unexpected open conversion in any diagnostic or therapeutic laparoscopy. In 4 with multiple laparoscopic surgeries, no severe intra-abdominal adhesion which disturbed second or third laparoscopic surgery was observed.

Conclusion: Laparoscopic surgery was safe in various procedures in DSD patients. While diagnostic laparoscopy is helpful to make the therapeutic surgical strategy for most patients with DSD by confirming the anatomy of internal genital organ and gonadal pathology, attention should be paid to diagnose precise gonadal status in ovotesticular DSD despite the efforts of laparoscopic inspection and gonadal biopsy. On the other hand, therapeutic laparoscopic surgeries were valuable procedures to treat DSD patients.
Purpose: Previous research has indicated that children with urinary and/or fecal incontinence are at increased risk for psychosocial difficulties and therefore should be screened for mental health problems. The Pediatric Symptom Checklist (PSC) is a parent-completed measure of psychosocial difficulties in children. The PSC was originally established for use in primary care settings, but has been validated for use in children with chronic illnesses, such as Sickle Cell Disease, Diabetes, and Gastrointestinal disorders. However, the PSC has not yet been validated for use in a population of children with voiding dysfunction and/or enuresis. The objective of the current study was to determine whether the PSC holds its previously-established factor structure in the population of children with voiding dysfunction and/or enuresis, or whether scores for these children should be calculated differently to identify those who are at-risk for psychosocial difficulties.

Methods: A retrospective chart review was conducted of all children between the ages of 4 and 16 who presented to an outpatient pediatric urology clinic for voiding dysfunction and/or enuresis between January and July 2011. Charts that contained a completed PSC were retained for analyses and demographic information was obtained from the clinical intake form.

Results: Three hundred patients (145 M, 155 F) with the mean age of 9.08 years were included in the study. Two confirmatory factor analyses (CFA) using previously published models in populations of children with medical conditions (e.g., Sickle Cell and Diabetes, and Gastrointestinal disorders) were conducted on the 35 items of the PSC (Table 1). The CFAs did not result in a good fit of the data in our population, so an exploratory factor analysis (EFA) was subsequently conducted. The EFA resulted in a three-factor structure (e.g., internalizing, externalizing, and attention problems), with all but five items evidencing substantial factor loadings (Table 2). Notably, the five items that “fell out” of the analyses were all related to school difficulties.

Conclusion: Findings from the current study indicate that the PSC is a valid measure to screen for psychosocial difficulties in children with voiding dysfunction and/or enuresis. It is suggested that a shortened version of the measure (i.e., 31 items) could be used in this
population, although further research is needed to identify a specific cut-off for clinically significant levels of psychosocial problems using the shortened version. The PSC can be easily incorporated into clinical care, as it is a straightforward measure to administer and score. Children who are at-risk for psychosocial difficulties can be identified and referred for mental health follow-up so that these issues, which could contribute to poor adherence to and compliance to treatment recommendations, can be managed in addition to the child’s medical treatment.

Poster 33
Comorbid Conditions among Children with Lower Urinary Tract Dysfunction
Janine L. Oliver, MD, Mary Campigotto, FNP, Douglas E. Coplen, MD, FAAP, Erica J. Traxel, MD and Paul F. Austin, MD, FAAP, Pediatric Urology, Washington University School of Medicine, Saint Louis, MO

Purpose: There is emerging awareness of comorbid characteristics in children with lower urinary tract (LUT) dysfunction. The prevalence of psychiatric comorbidities is known to be high in children with LUT dysfunction and has been shown to be a risk factor for longer duration of LUT symptoms. Obesity has been shown to predict severity of LUT symptoms in adults, and is a growing problem in the pediatric population. To explore the prevalence of these comorbidities, we examined the psychosocial characteristics and body habitus of children with LUT dysfunction.

Methods: We reviewed the electronic medical records, LUT symptom score and psychosocial questionnaires of all new patients with non-neurogenic LUT dysfunction presenting to a single nurse practitioner over a 1-year period. School-aged children from 6-17 years old were selected. Parents completed two questionnaires: (1) a 21-question LUT symptom scoring system comprised of a validated 13-question incontinence symptom scoring system as well as 8 additional questions regarding their child’s elimination pattern, including any history of urinary tract infections and bowel function, and (2) a psychosocial questionnaire comprised of 17 questions regarding known psychological diagnoses, externalizing or internalizing behavior patterns, and stressful life events.

Results: A total of 362 patients were seen in 2011. LUT dysfunction characteristics included 47 (13%) patients with encopresis, 186 (51%) patients with daytime urinary incontinence and 100 (28%) patients with recurrent UTIs. The initial LUT symptom score revealed that the majority of patients had a score less than 50.
The majority (65%) of patients were female (236 females vs. 126 males) and in the 6-9 yo age group (55%). More patients had a low or normal BMI (80%) than an overweight or obese BMI (20%).

<table>
<thead>
<tr>
<th>LUT Sx Score</th>
<th>&lt;50</th>
<th>51-100</th>
<th>101-150</th>
<th>151-200</th>
<th>&gt;200</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (%)</td>
<td>259 (72%)</td>
<td>75 (21%)</td>
<td>22 (6%)</td>
<td>5 (1%)</td>
<td>1 (&lt;1%)</td>
</tr>
</tbody>
</table>

Twenty-three percent of parents reported a psychiatric disorder for their child with the most prevalent being ADHD (9.4%) followed by generalized anxiety disorder (5%). Externalizing behaviors (such as aggressiveness and acting out) were reported in 61 patients (17%) and a significant life stress was reported in 119 patients (33%).

**Conclusions:** Contrary to observations in the adult population, the majority of pediatric patients with LUT dysfunction have a low BMI. In this study sample, most patients were female, early school-aged and often reported daytime urinary incontinence and recurrent UTIs with their LUT dysfunction. ADHD was the most commonly reported psychiatric disorder and history of a stressful life event was more prevalent than ADHD in this cohort of children. Despite multiple comorbidities, most patients initially have a low LUT symptom score. Further studies will determine how these comorbidities affect treatment outcomes.

**Poster 34**

**Sensory Processing Differences and Urinary Incontinence in School Aged Children**

Emily T. Cupelli, DNP, CPNP\(^1\), Lori Escallier, PhD, RN\(^1\), Shaolan Xiang, BA\(^1\), Nora Galambos, PhD\(^1\) and Israel Franco, FACS, FAAP\(^2\), (1)Pediatric Urology, Stony Brook University & Maimonides Medical Center, Brooklyn, NY, (2)Pediatric Urology, New York Medical College, Valhalla, NY

**Purpose:** The purpose of this study is to determine if there is a relationship between sensory processing differences and urinary incontinence in typically developing school aged children. Incontinent children appear more sensitive to touch, less sensitive to wet clothing, startle easily, and often appear withdrawn. These behaviors may result from a dysfunction in any component of sensory processing: registration, integration, motor planning or response. Several studies have shown an abnormality in the acoustic startle of incontinent children, a component of motor planning. A study of sensory processing will produce a comprehensive profile of this population.

**Methods:** The Short Sensory Profile (SSP) was administered to parents of 214 children, age 5-11, with day, night, or combined incontinence in a large, multi-ethnic urban area. Exclusion: developmental delay, ADD/HD, Sensory Processing Dysfunction, vesicoureteral
reflux or acute illness. Total sensory scores and subscores (individual tactile, taste/smell, movement, sensory seeking, auditory filtering, high/low energy, or visual/auditory sensitivity) were obtained. Descriptive statistics, T test analysis, and regression analysis were performed. **Results:** 209 valid responses (100 male, 109 female), mean 7.8 yrs. T test: total sensory scores were significantly lower for incontinence \((p=.007)\). Tactile sensitivity scores were lower for urgency \((p=.039)\). Auditory sensitivity scores were lower for dysfunctional voiding \((p=.041)\), and sensory seeking \((p=.006)\).

**Short Sensory Scale Score Classification by percent for sample**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>Typical Performance</td>
<td>117</td>
<td>56.0</td>
<td>56.0</td>
</tr>
<tr>
<td>Probable Difference</td>
<td></td>
<td>49</td>
<td>23.4</td>
<td>79.4</td>
</tr>
<tr>
<td>Definite Difference</td>
<td></td>
<td>43</td>
<td>20.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>209</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**T Test Summary**

<table>
<thead>
<tr>
<th></th>
<th>Incontinence (all types)</th>
<th>Urge Incontinence</th>
<th>Dysfunctional voiding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sensory score</td>
<td>152.59((p=0.007))</td>
<td>153.25((p=0.039))</td>
<td>153.56((p=0.015))</td>
</tr>
<tr>
<td>Sensory Seeking</td>
<td>not sig.</td>
<td>25.03((p=0.003))</td>
<td>25.37((p=0.006))</td>
</tr>
<tr>
<td>Auditory Sensitivity</td>
<td>not sig.</td>
<td>not sig.</td>
<td>21.23((p=0.041))</td>
</tr>
</tbody>
</table>

**Regression Analysis**

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig</th>
<th>Exp(B)</th>
<th>95% C.I. Low</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.37</td>
<td>0.098</td>
<td>14.386</td>
<td>1</td>
<td>&lt;0.0005</td>
<td>0.69</td>
<td>0.57</td>
<td>0.836</td>
</tr>
<tr>
<td>SSTtactile5(water)</td>
<td>1.712</td>
<td>0.628</td>
<td>7.438</td>
<td>1</td>
<td>0.006</td>
<td>5.542</td>
<td>1.619</td>
<td>18.969</td>
</tr>
<tr>
<td>SSTtactile6 (standing in line)</td>
<td>1.603</td>
<td>0.56</td>
<td>8.203</td>
<td>1</td>
<td>0.004</td>
<td>4.968</td>
<td>1.659</td>
<td>14.879</td>
</tr>
<tr>
<td>Constant</td>
<td>4.812</td>
<td>0.949</td>
<td>25.693</td>
<td>1</td>
<td>&lt;0.0005</td>
<td>122.985</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conclusion:** A significant number of incontinent children showed probable or definite differences in sensory processing. Children with urge incontinence and dysfunctional voiding had higher sensory seeking scores, manifesting as avoidance behavior or hyper-reactive responsivity. A strong association is shown between incontinence, younger age, and tactile sensation. SSP survey can be used to rapidly assess clinically significant behaviors.
The Bladder of Willful Infrequent Voiders: Underactive or Underutilized?

Angela M. Fast, BS, Andrew J. Combs, RPA-C, Jason P. Van Batavia, MD and Kenneth I. Glassberg, MD, FAAP, Division of Pediatric Urology, Department of Urology, Columbia University College of Physicians and Surgeons, Morgan Stanley Children’s Hospital of New York - Presbyterian, New York, NY

Purpose: Detrusor underutilization disorder (DUD) has previously been described as a lower urinary tract (LUT) condition characterized by chronic or episodic willful deferment of voiding. This underutilization results in expanded bladder capacity and can lead to infections from prolonged periods of stasis or urgency +/- incontinence provoked by over-distension. Voiding is otherwise normal and the pelvic floor quiet on uroflow/electromyography (uroflow/EMG). We further characterized DUD patients based on LUT symptoms and uroflow/EMG findings before and after treatment.

Methods: We reviewed our database to identify neurologically and anatomically normal children diagnosed with DUD on uroflow/EMG testing with all tests performed when patient expressed a sense of fullness. Only patients with an initial bladder capacity greater than 1.25 times expected bladder capacity (EBC) were included, with %EBC = [actual bladder capacity]/[EBC]. LUT symptoms, uroflow/EMG and urodynamic study (UDS) findings were analyzed. Patients were treated with timed voiding every 3-4 hours. Treatment outcomes were analyzed in patients with follow-up studies.

Results: Fifty-five children (mean age 10.5 years, range 3.7-20.2; 34 female, 19 male) were diagnosed with DUD. Infrequent voiding (70.9%), UTI history (49.1.9%) and incontinence (49.1%) were the most common LUT symptoms (Table 1). Table 2 reports uroflow/EMG findings. Seven patients also had UDS; none had evidence of detrusor underactivity. Twenty-three patients had follow-up (mean treatment length: 8.4 months), with 3 patients reporting treatment non-compliance. Of the 20 compliant patients, 17 (85%) reported improvement in their LUT symptoms, none had a UTI and bladder capacity decreased 49.7% (p<0.001). Non-compliant patients denied symptomatic improvement and had a 23% further increase in bladder capacity.

Conclusion: DUD patients with their expansive bladder capacities typically present with a history of infrequent voiding, UTIs and incontinence. While willful infrequent voiders are often referred to as having an “underactive bladder,” no patient who underwent UDS showed any evidence of detrusor underactivity and only 1 (1.8%) had a strain/interrupted flow pattern generally believed associated with that condition. With increased bladder utilization, these patients improved symptomatically, stopped wetting, stayed infection free and experienced normalization of bladder capacity, demonstrating the efficacy of therapy and likelihood that “underactive bladder” is an incorrect characterization.
Table 1. LUT symptoms in DUD patients (n=55)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>No. patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrequent voiding</td>
<td>39 (70.9)</td>
</tr>
<tr>
<td>UTI</td>
<td>27 (49.1)</td>
</tr>
<tr>
<td>Febrile UTI</td>
<td>10 (18.2)</td>
</tr>
<tr>
<td>Incontinence</td>
<td>27 (49.1)</td>
</tr>
<tr>
<td>Daytime incontinence</td>
<td>14 (25.5)</td>
</tr>
<tr>
<td>Urgency</td>
<td>23 (41.8)</td>
</tr>
<tr>
<td>Frequency</td>
<td>1 (1.8)</td>
</tr>
<tr>
<td>Bowel dysfunction</td>
<td>6 (10.9)</td>
</tr>
<tr>
<td>Straining</td>
<td>1 (1.8)</td>
</tr>
</tbody>
</table>

Table 2. Uroflow/EMG findings pre- and post- treatment with timed voiding

<table>
<thead>
<tr>
<th>All (n=55)</th>
<th>Pre (n=20)</th>
<th>Post (n=20)</th>
<th>Paired P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Qmax (ml/sec)</td>
<td>32.7</td>
<td>35.3</td>
<td>31.8</td>
</tr>
<tr>
<td>Mean Qave (ml/sec)</td>
<td>21.9</td>
<td>19.5</td>
<td>19.3</td>
</tr>
<tr>
<td>Mean PVR (cc)</td>
<td>19.5</td>
<td>13.9</td>
<td>7.4</td>
</tr>
<tr>
<td>Mean % EBC</td>
<td>1.72</td>
<td>1.72</td>
<td>1.19</td>
</tr>
<tr>
<td>Mean Lag time (sec)</td>
<td>6.9</td>
<td>7.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Strain/interrupted flow pattern</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Poster 36 (also Moderated Poster, Monday 11:44 am)

**Validation of the G.M.S. Hypospadias Score: Correlation with Post-Operative Complications**
Laura S. Merriman, Edwin A. Smith, Hal C. Scherz, Andrew J. Kirsch and James Elmore, Pediatric Urology, Emory University School of Medicine, Atlanta, GA

**Purpose:** The GMS scale was recently developed as a means to qualitatively score the severity of hypospadias. This system assigns numeric values to specific characteristics of the Glans, Meatus, and Shaft (figure). The GMS scale (range 3 to 12) has previously been shown to have excellent inter-rater reliability. Herein we present the short-term surgical outcomes of a group of patients graded pre-operatively using the GMS scoring system.

**Methods:** An ongoing database containing the GMS scores of over 200 consecutive patients undergoing hypospadias repair at our institution was queried. The surgical outcomes of those with at least 6-months follow-up were reviewed to determine if a correlation exists between the GMS score and risk of surgical complication.

**Results:** Seventy-eight patients were identified with at least 6-months clinical follow-up. Overall, complications requiring operative revision occurred in 11 (14.1%) patients including fistula in 7, meatal stenosis in 3, and glans dehiscence in 2. The average G, M, and S scores for these three groups are shown (table). The average GMS
score of patients who had a complication following surgery was 7.6. This differed significantly from the average GMS score of 5.9 for patients who did not have a complication (p=0.017). The complication rate was 27.6% for patients with a GMS score greater than 6 compared to 6.12% for those with a GMS score less than 6.

**Conclusion:** At early follow-up, a high GMS score appears to be associated with an increased risk of surgical complication following hypospadias repair. Ongoing study may enable the identification of specific glans, meatus, or shaft characteristics that correlate to certain types of complications. The GMS scoring system may be useful for parental counseling, hypospadias discussions, and outcomes research. External validation of the scoring system is needed.

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**Figure: GMS Scoring Criteria**

### Glans (G) Score:
1. Glans good size; healthy urethral plate, deeply grooved
2. Glans adequate size; adequate urethral plate, grooved
3. Glans small in size; urethral plate narrow, some fibrosis or flat
4. Glans very small; urethral plate indistinct, very narrow or flat

### Meatus (M) Score:
5. Glanular
6. Coronal sulcus
7. Mid or Distal shaft
8. Proximal shaft, penoscrotal

### Shaft (S) Score:
5. No chordee
6. Mild (<30º) chordee
7. Moderate (30-60º) chordee
8. Severe (>60º) chordee

### Table I. Average G, M, and S scores by complication type

<table>
<thead>
<tr>
<th>Complication</th>
<th>G</th>
<th>M</th>
<th>S</th>
<th>Total GMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fistula (n=7)</td>
<td>2.14</td>
<td>2.43</td>
<td>2.0</td>
<td>6.57</td>
</tr>
<tr>
<td>Meatal Stenosis (n=3)</td>
<td>3.0</td>
<td>3.33</td>
<td>2.67</td>
<td>9.0</td>
</tr>
<tr>
<td>Dehiscence (n=2)</td>
<td>3.5</td>
<td>2.0</td>
<td>3.5</td>
<td>9.0</td>
</tr>
</tbody>
</table>

**Poster 37 (also Moderated Poster, Monday 11:50 am)**

**Objective Criteria for Preoperative Testosterone Use before Proximal Hypospadias Repair: Evidence for Androgen Resistance**

*Candace F. Granberg, MD, Nicol Corbin Bush, MD and Warren T. Snodgrass, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX*

**Purpose:** We previously reported preoperative testosterone (T) injection for subjectively small glans before proximal hypospadias repair in 14/36 (39%) cases [J Pediatr Urol, 2010]. Beginning in 2009, preoperative assessment included glans width measurement, reserving T therapy [2mg/kg for 2-3 injections] for those ≤14mm,
based on our observation that median glans size in normal neonates is 14mm. Post-injection measurement indicated minimal size change in some patients, treated with an escalating scale since 2011. We report both use of preoperative T based on glans width, and prevalence of androgen resistance at commonly used T doses.

**Methods:** Consecutive prepubertal patients with proximal hypospadias had glans width measured preoperatively, with T injection for those ≤14mm, with the goal of enlargement to ≥15mm. Initially T dose was 2mg/kg IM for 2-3 injections with intraoperative repeat measurement. When minimal growth was noted in some cases, the protocol changed in 2011 to initial injection with 2mg/kg with repeat measurement in 3 weeks. Those with glans size ≥15mm had no further T, whereas patients without growth next had 4mg/kg injection with repeat measurement in 3 weeks, progressing as needed to 8mg/kg, 16mg/kg, etc.

**Results:** Of 76 prepubertal patients with proximal hypospadias, mean glans width was 14.9mm (SD 2.9). T injections were given to 36 (47%) with glans width <14mm (mean 11.6, SD 1.6), including 23/50 (46%) with the standard protocol and 13/26 (50%) with the escalating protocol. Of these 13 patients, 6 required a single injection to achieve glans size ≥15mm, while 7 (54%) had no increase in glans width with 1 injection of 2mg/kg, and so had escalation: 3 patients to 4mg/kg, 3 to 8mg/kg and 1 to 16 mg/kg.

**Conclusion:** Glans width provides objective criteria for preoperative testosterone therapy, resulting in treatment in nearly half the patients with proximal hypospadias. Androgen resistance to 2mg/kg, responding to escalating doses, has been found in half those selected for T therapy, or 25% of patients with proximal hypospadias.

**Poster 38**

**Declining Rates of Sickle-Cell-Related Priapism in U.S. Children’s Hospitals, 2003-2011**

Jonathan C. Routh, MD, MPH1, Katherine W. Herbst, MSc2, Sherry S. Ross, MD1 and John Wiener, MD1, (1)Division of Urology, Duke University Medical Center, Durham, NC, (2) Division of Urology, Connecticut Children’s Medical Center, Hartford, CT

**Purpose:** Priapism is a common urologic complication of sickle cell anemia, and is frequently cited as one of the more difficult clinical problems encountered by pediatric urologists. Hydroxyurea is associated with significant reductions in both morbidity and mortality from sickle cell anemia; however, there is significant variability in hydroxyurea usage rates around the country. Our objective was thus to compare rates of priapism in boys and young men with sickle cell anemia at children’s hospitals across the United States.

**Methods:** We retrospectively reviewed all inpatient, emergency room, or short-stay visits captured by the PHIS database for boys and young men (aged <21 years) treated
for a diagnosis of sickle cell disease between 2003 and 2011. We then identified those patients with sickle cell who were admitted with a diagnosis of priapism. Rates of inpatient hydroxyurea use were determined based on pharmacy and billing codes. Logistic regression and generalized estimating equation models were used to control for confounding and to adjust for within-hospital clustering of similar patients.

**Results:** The rate of priapism-related admissions decreased during the study period (1.4% in 2003 vs. 0.6% in 2011, p<0.001), while hydroxyurea use remained stable (16.7% in 2003 vs. 12.0% in 2011, p=0.06) among the 17,810 sickle cell patients in PHIS (125,923 hospital admissions during the study period, mean 13.3 admissions per patient, range 1-178). Of these, 315 patients (1.8%) were diagnosed with priapism on 705 admissions (median 6, range 1-120 admissions per patient), and 2,728 (15.3%) patients received hydroxyurea during 14,382 admissions (median 8, range 1-178 admissions per patient). Rates of both priapism diagnosis (0.2 -1.8%, p<0.001) and hydroxyurea use (0-47.5%, p<0.001) varied significantly between hospitals. After adjusting for clustering of similar patients at each hospital, older patient age (teen vs. infant OR 1.7, 95% CI 4.4-31.4, p=0.02) and more frequent hydroxyurea use (p=0.006) were associated with an increased likelihood of priapism diagnosis. The rate of hydroxyurea use at each hospital was not associated with the likelihood of priapism diagnosis (p=0.39).

**Conclusion:** The rate of priapism has decreased over the last decade at U.S. children’s hospitals. Although inpatient hydroxyurea use varies widely among these hospitals, this clinical variation does not appear to influence the likelihood of patients being treated for priapism. Because PHIS only captures emergency room and inpatient medication use, it is unclear whether outpatient hydroxyurea use has played a role in the decreased rate of sickle-cell-related priapism. After adjusting for clustering of similar patients at each hospital, older patient age (teen vs. infant OR 11.7, 95% CI 4.4-31.4, p=0.02) and more frequent hydroxyurea use (p=0.006) were associated with an increased likelihood of priapism diagnosis. The rate of hydroxyurea use at each hospital was not associated with the likelihood of priapism diagnosis (p=0.39).

**Poster 39**

**Outcomes of Reoperations for Glans Dehiscence in Prepubertal Boys with Hypospadias**

Carlos A. Villanueva, MD, Nicol Corbin Bush, MD and Warren T. Snodgrass, MD, Pediatric Urology, Children’s Medical Center, Dallas, TX

**Purpose:** We recently reported that glans dehiscence (GD), defined as complete separation of the glans wings, occurred in 4% of patients with distal and 15% of proximal TIP hypospadias repairs in prepubertal boys
(Snodgrass et al. J Urol 185:1845). Now we present outcomes for reoperative glansplasty among boys with GD.

**Methods:** Data for all patients undergoing hypospadias surgery was prospectively maintained since 1999, and analyzed for this report. All operations were done by WS, and consecutive prepubertal patients undergoing primary or reoperative glansplasty had the same sutures and suturing techniques, consisting of 1 layer interrupted subepithelial 6-0 polyglactin (3 stitches in most patients), closed independently of the underlying neourethra.

**Results:** Of 618 primary distal and proximal TIP repairs, 34 (5.5%) had GD, of which 29 underwent reoperative glansplasty. Recurrent GD developed in 7/26 (27%, p=0.0001) with follow up ranging from 1.2-106 months. Another 100 patients underwent primary hypospadias repair elsewhere complicated by GD, and reoperative glansplasty resulted in recurrent GD in 11/85 (13%, p=0.017 compared to GD after primary repair). GD rates after reoperative glansplasty were similar for those with distal and proximal hypospadias at the time of primary repair (11/67 distal vs. 7/44 proximal, p=0.841). A total of 11 boys had a 3rd attempt at glansplasty, with recurrent GD in 5/8 (63%) with follow up.

**Conclusion:** Glans dehiscence rates are higher after reoperative glansplasty for GD than after primary repair, occurring in 13-27% of patients undergoing 2nd glansplasty and 63% of patients undergoing a 3rd glansplasty attempt. The etiology of GD remains unknown, with no clear association with suture type or suturing technique. Consequently, we used the same methods for both primary and reoperative glansplasty. From these data, we currently offer reoperation to all patients with GD after their primary hypospadias repair. Boys failing 2 glansplasties are now recommended to postpone additional surgery until reassessment at puberty, when the much larger glans size may decrease risk for recurrent GD.

Poster 40

**Hypospadias: Patient/Parent Perception of Functional and Cosmetic Outcomes**

Angela D. Gupta, MD1, Kristina D. Suson2, Ranjiv Mathews, MD3, (1)Urology, Johns Hopkins Medical Institutions, Baltimore, MD, (2)Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD, (3)Brady Urological Institute, Johns Hopkins University School of Medicine, Baltimore, MD

**Purpose:** Hypospadias is a congenital anomaly of the penis, resulting in a nonorthotopic urethral meatus, chordee, and hooded foreskin. Surgical repair is the standard of care, with a goal of creating a functional penis that allows normal voiding, straight erection and a cosmetically normal appearance. The purpose of this study was to evaluate patient/parent perception of functional and cosmetic outcomes.
Methods: Following IRB approval, patients in the outpatient clinic over a 10 year period with the billing codes of hypospadias, urethrocutaneous fistula, and meatal stenosis were identified. A 7-item questionnaire assessing functional and cosmetic outcomes was sent to each family.

Results: 712 patients were contacted. 139 questionnaires were returned demonstrating a 19.5% response rate. 112 (81%) of the responses were completed on patients who had undergone hypospadias repair. Most respondents indicated functional normal voiding without spraying (73%), splitting (80%) and a good strength of stream (75%). 76% of the patients achieved a satisfactory functional outcome after their first completed repair. 63% were completely satisfied with the final cosmetic outcome, 31.2 % were partly satisfied, and 5.3% were dissatisfied. Given a choice, 24.1 % of parents/patients would consider having another procedure to improve the cosmesis, while 55.3% would not consider further surgery. 84% of respondents would have re - elected to have the hypospadias corrected. 24% of patients underwent at least one additional procedure. Based on the location of the initial urethral meatus – proximal versus distal; normal voiding without spraying was reported in 50%, splitting 75%, and a strong stream 67% of proximal vs 80%, 83% and 78% of distal defects. 62.5% of those with a proximal and 66% of those with a distal defect were pleased with the cosmesis. 92% of the proximal group and 82% of the distal group would have elected to have the procedure again.

The age at reconstruction seemed to impact outcomes with boys >2 years at reconstruction having less favorable outcomes. Spraying of urine and a consistent strong stream was noted in 45% and 63% respectively of those having surgery at >2 years of age as compared to <30% and 75% respectively in those having surgery at < 2 years of age. Conclusion: Surgical repair of hypospadias does provide a good functional and cosmetic outcome, however from the patient/parent’s perspective, the outcomes are not always as perfect as would be suggested by provider’s evaluation of the outcomes. It is important to counsel parents regarding cosmetic and functional outcomes. Providers should be aware that parental and patient perception of outcomes may differ from their own.

Poster 41
Psychological Functioning In Patients Undergoing Multiple Procedures for Hypospadias: A Prospective Pilot Study of Children and Adolescents
Duncan Seawell, PsyD1, Katherine W. Herbst, MSc2, John H. Makari, MD, FAAP2, and Fernando A. Ferrer Jr., MD, FAAP2, (1)Psychology, Connecticut Children’s Medical Center, Hartford, CT, (2)Division of Urology, Connecticut Children’s Medical Center, Hartford, CT

Purpose: Published studies have been inconsistent regarding the correlation between hypospadias and increased risk factors related to psychological functioning.
A recent systematic review of the literature found 13 qualified studies with varying methodologies and inconclusive findings. We sought to obtain prospective pilot data on the psychological adjustment of children who have undergone multiple surgical procedures for treatment of hypospadias. No prior study of hypospadias patients has used the Behavior Assessment System for Children, Second Edition (BASC-2), despite its strong psychometric properties and advantages over previously used instruments. Continuation of the current study would be supported by a significantly higher prevalence of at-risk or clinical range scores among hypospadias patients.

**Methods:** We identified patients receiving care at our institution that have undergone multiple surgical procedures for the treatment of hypospadias (mean 3.8 procedures; SD ±1.4) and invited them and their parents to prospectively complete the BASC-2 under an IRB-approved protocol. Psychological health was defined according to norms from the BASC-2. Scores from parent and self-report sub-scales of anxiety, depression, internalizing behaviors, externalizing behaviors, and overall symptoms of psychological distress were collected. Comparisons were made to general population data for age-matched males as provided by the BASC-2.

**Results:** Four of 12 (33%) participants (mean 10.6 years; range 7-20 years) were rated at or above the at-risk level on the Internalizing Problems composite of the Parent Rating Scale. This finding was significant (p < 0.001) compared to age-matched norms and suggests sufficient psychological distress to warrant monitoring and potential treatment referral.

**Conclusion:** Preliminary data demonstrated greater psychological risk in patients who have undergone multiple procedures for hypospadias than previously suggested. Our findings support continued data collection, as elevated scores on the Internalizing Problems composite represent risk factors for symptoms related to both anxiety and depression. Such symptoms, if regularly screened, could warrant referral for treatment and better mental health outcomes in patients with complex hypospadias. Findings also suggest that the BASC-2, widely used in psychological assessment, but not in medical settings or pediatric research, may be a more appropriate measure of overall behavior for this population.

Poster 42 (also Moderated Poster, Monday 1:36 pm)
**Number of Bladder Exstrophy Closures Is Stable with No Evidence of Regionalization of Care: A HCUP/KID Database Analysis**
Adejoro Oluwakayode¹, Melissa A. St.Aubin, Medical, Student², Katie H. Willihnganz-Lawson, MD³, Jane M. Lewis, MD⁴ and Aseem Shukla, MD⁵, (1)Pediatric Urology, University of Minnesota Amplatz Children’s Hospital, Minneapolis, MN, (2)Pediatric Urology, University of
Purpose: Bladder extrophy repair remains one of the most challenging surgical endeavors in pediatric urology. While the estimates of its incidence vary, it is widely assumed that the overall incidence is decreasing due to termination of pregnancy. The complexity of the surgery is also believed to be leading to referrals of these patients to specific centers where expertise with bladder extrophy is concentrated. We examined a large inpatient database that samples discharges from throughout the United States to interrogate these assumptions.

Methods: We utilized the 2003 to 2009 Health Care Cost and Utilization Project (HCUP) Kids’ Inpatient Database (KID), to examine the total number of hospitalizations under the ICD-9 diagnostic code for bladder extrophy (753.5). We then further refined our search to only include those infants from birth to 6 months of age hospitalized for bladder extrophy repair (ICD 9 procedure code 57.86). The extrophy repairs were stratified by their frequencies by year of hospitalization, race/ethnicity, insurance and income status, geographical region, teaching status of hospital and size of the treating hospital. Statistical inference was made with Chi-square tests.

Results: We identified 932 hospitalizations coded for the diagnosis of bladder extrophy over the study interval. Overall 238 patients (25.5%) were coded for a bladder extrophy repair between birth to 6 months of age over the same period. The frequency of patients undergoing repair remained stable at a mean of 59.5 closures per year (P trend=0.23). Compared to other regions, significantly more extrophy closures were performed in the geographic South (p=0.02), but there was no statistical significance in the distribution of children who had a repair by race, type of insurance and income. More patients had their procedures done in teaching hospitals compared to non-teaching hospitals (92.4 % vs 2.9%; p <.0001).

Conclusion: The frequency of bladder extrophy closures does not appear to be decreasing over the past decade, as the number of closures has remained constant despite a decreasing United States birth rate. The increased number of closures in the southern United States parallels the higher birth rate in that region, and there does not appear to be any trend towards regionalization of care based on perceived expertise. The perception that fewer bladder extrophy cases are being encountered even at major teaching institutions may be due to diffusion of expertise with increasing number of fellowship trained pediatric urologists in various regions, rather than regionalization of care at centers of excellence.
Bladder Neck Reconstruction After Failed Exstrophy Closure: Is It Justified?

Eric Z. Massanyi, MD, Nima Baradaran, MD, Bhavik Shah, MD and John P. Gearhart, MD, Pediatric Urology, Johns Hopkins University School of Medicine, Baltimore, MD

Purpose: Successful primary closure of bladder exstrophy ultimately plays an important role in the status of long-term urinary continence. When applying the techniques of modern staged repair of exstrophy, bladder neck reconstruction results in volitional voiding and dryness in up to 75% of patients after successful primary closure with a good template. Failed closures represent an extremely challenging subset of patients where urinary continence is often achieved at the expense of intermittent urethral catheterization or urinary diversion.

Methods: The authors performed a retrospective review of operative notes and medical records of patients who underwent a bladder neck reconstruction with a history of one or more failed exstrophy closures between 1970-2007. Surgical endpoints measured for each patient included: number of failures, time between surgical procedures, whether or not an osteotomy was performed, bladder capacity at the time of bladder neck reconstruction, need for additional continence procedures, and final continence status. Continence was defined as achieving a dry interval of >3 hours and voiding through the urethra.

Results: We identified 137 patients who underwent a repeat closure following one or more failed closures. Of the 58 patients who underwent bladder neck reconstruction, 24 (41%) were continent. Of the remaining patients, 3 (5%) achieved dryness by intermittent urethral catheterization and 22 (38%) by urinary diversion. An additional 9 (16%) patients were awaiting a definitive continence procedure. The mean bladder capacity at the time of bladder neck reconstruction differed between those who achieved continence (101 cc.) and those who did not (75 cc.) (p = 0.03).

Conclusion: A failed exstrophy closure has significant long-term implications on the fate of urinary continence. The majority of patients who undergo bladder neck reconstruction will require additional procedures to achieve dryness. Bladder capacity has been used to determine which patients are candidates for bladder neck reconstruction after successful primary closure of exstrophy. Our data suggest that bladder capacity may also have predictive value in the success of bladder neck reconstruction after failed exstrophy closure.

When Is An Adolescent “Ready” for Incontinence-Surgery? Patient-Patient Interactions In Child-Related Surgical Decision-Making In Bladder Exstrophy

William G. Reiner, MD1, Blake W. Palmer, MD2, Dominic Frimberger, MD2, Amy B. Wisniewski, PhD2 and Bradley Kropp2. (1) Pediatric Urology/Child and Adolescent Psychiatry,
University of Oklahoma Health Sciences Center, Oklahoma, OK, (2) Pediatric Urology, University of Oklahoma Health Sciences Center, Oklahoma City, OK

**Purpose:** Identify developmentally appropriate tools for involving adolescent patients in their own continence-surgery decision-making.

**Methods:** Patient interactions involving two or more patients with bladder exstrophy were conducted with scripted and unscripted scenarios about the risks and benefits of surgery. All patients and their parents (if appropriate) were consented prior to the interaction. All interactions involved patients with urinary incontinence who rejected surgical correction and patients who had completed surgery with or without attaining full continence. Thirty-four patients were grouped from 2 to 12 per group, initial groups being 1:1 but with gradual increase in group size, with experience. Age ranged from 12 to 26 years. Fourteen were incontinent of urine without surgery, while 20 had prior surgical correction with varying degrees of satisfaction with attained continence. Patient satisfaction with this approach was elicited with a Likert 5-point scale, 1 = very dissatisfied (unhappy or uncomfortable) to 5 = very satisfied (happy) with the interactions. One group was videotaped.

**Results:** Young adolescent patients with exstrophy can be very resistant to the idea of surgery, and parents often succumb to their decisions. After group interaction, however, 13 of the 14 incontinent patients decided to proceed with surgery. Scripted approaches, attempted initially, were nonetheless dominated by unscripted interactions and were abandoned for unscripted but supervised interactions. Satisfaction with the group interactions was scored 4-5 by each patient with no difference by group size.

**Conclusion:** Pediatric urology clinics often seek to identify when a patient with bladder exstrophy is “ready” for continence-surgery. However, valid developmentally appropriate guidelines for such decision-making are unknown. Our study demonstrates that young adolescent patient decision-making about surgery was positively influenced after interacting with fellow adolescent patients who had prior surgery, despite some reservations expressed by some of the former patients. Use of such patient interactions appears to reduce adolescents’ anxiety and reluctance about surgical interventions. Videos of such groups might also be beneficial.

**Poster 45**

**Primary Closure of Bladder Exstrophy without Osteotomies and Intensive Care Unit Is Safe and Cost-Effective**

Massimo Garriboli, Naima Smeulders, Abraham Cherian, Imran Mushtaq and Peter Cuckow, Paediatric Urology, Great Ormond Street Hospital, London, United Kingdom

**Purpose:** To analyse the clinical and cost effectiveness outcome of two different post-operative regimens
following neonatal bladder closure for primary Bladder Exstrophy (BE).

**Methods:** We reviewed our neonatal management of primary bladder exstrophy over the past 5 years, comparing post-operative management on the surgical ward with epidural analgesia to muscle paralysis/ventilation on the intensive care unit (ICU). Clinical outcome measures were: length of stay, postoperative complications and re-do closure. Cost-effectiveness has also been evaluated using hospital financial data. Data are expressed as median (range). Significance was explored by Fisher exact test and unpaired t test.

**Results:** 74 neonates were referred to us between 2007 and 2011 and all underwent closure without osteotomies. 48 babies (65%) were managed on the ward (Group A), 26 transferred to ICU (Group B). The allocation was related to surgeon preference based on tight closure or failed epidural. The two groups were homogeneous for gestational age: 39 weeks (27–41) and age at closure: 3 days (1-152). Re-do closure was required in 2 patients in each group (4.2% and 7.7%, p=0.691). Complications requiring surgical treatment occurred in 4 children in group A and 3 children in group B (8.3% and 11.5%, p=0.609): 1 bladder rupture secondary to a tight urethral opening (group A), 1 prolapse managed by laparoscopic cystopexy (group B) and 5 urethral/meatal stenosis requiring dilatation under general anaesthesia. Epidural-related complications (redness, swelling or positive swab from epidural site) were observed in 6 patients (21%). None required treatment. Sagittal sinus thrombosis was identified on routine brain ultrasound following ICU in 1, without clinical sequelae. Length of stay was significantly shorter for the group cared for on the ward (11 days vs 18 days, p < 0.0001). Costing a representative uncomplicated patient for each group demonstrated a significant difference (£ 13.290 group A vs £ 36.394 group B).

**Conclusion:** Neonatal closure of bladder exstrophy can safely be performed without osteotomies. Routine post-operative management in ICU confers no benefit of outcome and significant longer post-operative stay with major cost implications. Patients managed postoperatively with epidural infusion for analgesia in a urology ward are fed and discharged home earlier.

<table>
<thead>
<tr>
<th></th>
<th>Group A (ward)</th>
<th>Group B (ICU)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Median Length of stay (days)</strong></td>
<td>11 (6 – 30)</td>
<td>18 (12 -41)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td><strong>Complications requiring surgical treatment</strong></td>
<td>4 (8.3%)</td>
<td>3 (11.5%)</td>
<td>0.691</td>
</tr>
<tr>
<td>bladder rupture</td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>bladder prolapse</td>
<td>0</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>urethral/meatal stenosis</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Re-do closure</td>
<td>2 (4.2%)</td>
<td>2 (7.7%)</td>
<td>0.609</td>
</tr>
<tr>
<td><strong>Cost for admission (£)</strong></td>
<td>13.290</td>
<td>36.394</td>
<td>-</td>
</tr>
</tbody>
</table>
Right Sided Varicoceles: Characterization and Reconsideration of Abdominal Imaging

Aaron Krill, MD1, Jordan Gitlin1, Steven Friedman, MD2, Lori Dyer3, Israel Franco, FACS, FAAP3, Paul Zelkovic, MD3, Edward F. Reda, MD, FAAP3 and Lane S. Palmer, MD, FAAP1, (1)Pediatric Urology, Cohen Children’s Medical Center of NY, New Hyde Park, NY, (2)Urology, Maimonides Medical Center, Brooklyn, NY, (3)Pediatric Urology, Maria Fareri Children’s Hospital, Valhalla, NY

Purpose: New onset bilateral or right-sided varicoceles are commonly symptomatic in adults and have been associated with retroperitoneal malignancy and less commonly, to anatomic malformations such as situs inversus. In adolescents, varicoceles are usually an incidental finding and little has been written about the presence of right sided varicoceles. Convention dictates that abdominal imaging be performed to rule out malignancy. We reviewed our varicocele database to characterize this subpopulation of adolescent varicoceles and to assess the utility of abdominal imaging.

Methods: The outpatient records were reviewed of all varicocele patients (ICD-9 456.4) seen from 2007-2011 with clinically palpable isolated right or bilateral varicoceles at diagnosis. Exclusion criteria were: incomplete information at diagnosis, age > 20 years, and subclinical varicoceles. Imaging studies (abdominal-pelvic CT or ultrasound) were reviewed for the presence of intraabdominal masses or renal vein thrombus. Testis volume was calculated by sonographic measurements using Lambert’s equation, or estimated by Prader orchidometer. Testis symmetry was represented as percent contribution to total testis volume.

Results: Among 1973 varicocele patients seen during the study period, 37 (1.9%) patients with bilateral varicoceles and 8 (0.4%) patients with isolated right sided varicoceles were identified. All varicoceles were asymptomatic and reduced when supine. Mean age at presentation was similar for both groups: 14.7 ± 1.7 yrs (bilateral) vs. 14.9 ± 2.7 yrs (right). Mean follow-up was also similar: 1.2 ± 1.3 years (bilateral) vs. 0.96 ± 1.9 months (right). Varicocele grade in isolated right sided patients was evenly divided between grades 1 (50%) and 2 (50%). Varicocele grade among bilateral cases was always more severe on the left side with the majority presenting as R2L3 (38%), R1L2 (19%), R1L3 (19%), and R1L1, R2L2 and R3L3 (8% each). Only 1 patient (bilateral case) demonstrated significant testicular asymmetry; the left testis contributed <40%, but increased to 49% at last follow-up. Abdominal and pelvic imaging was performed in 17 cases (12 bilateral and 5 right sided). There were no abnormal findings on any of the15 ultrasounds or 2 non-contrast CT scans to suggest retroperitoneal mass, vascular malformation or situs inversus.

Conclusion: Right sided varicoceles, whether isolated or bilateral, are unusual, incidentally found, low grade, and
not associated with significant hypotrophy. The etiology is idiopathic as associated intra-abdominal or pelvic masses or anatomic anomalies were not detected by imaging. If a screening imaging study is considered, abdominal and pelvic ultrasound is adequate to rule out the possibility of malignancy without exposing the patient to unnecessary radiation.

Poster 47
Is It Necessary to Identify and Ligate Distal Collateral Veins During Varicocelectomy to Decrease Varicocele Recurrence?
Angela M. Fast, BS, Jason P. Van Batavia, MD, Shannon N. Nees, BS and Kenneth I. Glassberg, MD, FAAP, Division of Pediatric Urology, Department of Urology, Columbia University College of Physicians and Surgeons, Morgan Stanley Children’s Hospital of New York - Presbyterian, New York, NY

Purpose: Numerous authors have suggested that distal collateral veins, such as the external spermatic, cremasteric, gubernacular, deferential and scrotal accessory veins, should be identified and ligated to decrease the recurrence rate following varicocelectomy. Recently, some centers have even advocated obtaining Doppler ultrasound to identify collaterals prior to surgery and adjusting the surgical approach based on these findings. In the Palomo and laparoscopic varicocelectomy approaches, exposure is proximal to the internal ring and these aforementioned collaterals are not accessible in the operative field and thus not identified or ligated. We sought to determine our varicocelectomy results when these collateral veins were not taken into account at the initial surgery and report our observations for those requiring redo varicocelectomy.

Methods: We retrospectively reviewed our adolescent varicocele database to identify patients who had undergone varicocelectomy and were <21 years of age at the time of surgery. Only patients who had undergone a Palomo or laparoscopic approach were included to ensure that no surgical manipulation occurred to the collaterals in the inguinal canal or scrotum. Recurrence was defined as a persistent or recurrent grade 2 or 3 varicocele with a retrograde flow velocity of ≥10 cm/sec.

Results: Between 1997 and 2012, 513 varicocelectomies (81 Palomo, 432 laparoscopic) were performed in 419 patients (mean age: 15.4 years, range 9.2-21.0; mean follow-up: 34.3 months, median: 29.8 months). Overall, 323 of 418 patients (77.3%) had a unilateral left varicocelectomy and 95 of 419 patients (22.6%) had a bilateral repair. There were 25 recurrences (4.9%), all on the left, that required redo varicocelectomy. Six patients (24%) did not develop a recurrence until two or more years following surgery. Of the 25, 21 patients underwent redo varicocelectomy, 2 are scheduled for redo varicocelectomy and 2 went to an outside physician for their redo varicocelectomy. Of the redo varicocelectomies, all patients were noted to have dilated veins in the
spermatic vessels proximal to their junction with the vas deferens with continuation of these veins into the spermatic cord. In one redo, a dilated deferential vein was ligated. There were no recurrences in the 21 redo varicocelectomies performed.

**Conclusion:** Given that this series had an essentially 100% success rate when redo surgeries were included without ligating distal collateral veins in all but one case, it appears that the significance of collaterals below the internal ring as an etiology to recurrence and necessity of Doppler ultrasound to identify collaterals pre-varicocelectomy for planning surgical approach is debatable. Given the high success in both initial and redo varicocelectomies in this series, distal collateral veins may play a much smaller role in varicocele formation and recurrence than previously thought.

Poster 48

**The Relationship between BMI and Varicoceles in Children**

Aaron Krill, MD¹, Suzanne Sunday, PhD¹, Jordan Gitlin, MD¹, Jaime Freyle, MD², Steven Friedman, MD² and Lane S. Palmer, MD, FAAP¹, (1)Pediatric Urology, Cohen Children’s Medical Center of NY, New Hyde Park, NY, (2)Urology, Maimonides Medical Center, Brooklyn, NY

**Purpose:** Among adult men with varicoceles, several studies demonstrate lower BMI compared to controls and a negative correlation between BMI and grade. Only one study evaluated the physical characteristics of children with varicoceles, reporting them to be taller and heavier with normal BMI percentiles; however, patients were not stratified by grade. The purpose of our study was to evaluate whether a decreasing BMI percentile was associated with an increase in varicocele grade and testis hypotrophy.

**Methods:** We reviewed records of all patients seen for varicoceles from 2007-2011. The following data were collected at first visit for patients <20 years old with left-sided varicoceles: varicocele grade, sonographic measurements, and height and weight. Exclusion criteria were: prior inguinal surgery, cryptorchidism, or endocrine disorders. Testis volume was determined by Lambert’s formula. Testis asymmetry was calculated via \( \frac{\text{larger} - \text{smaller}}{\text{larger}} \). Age-based BMI percentiles from CDC growth curves were analyzed in relation to grade, Tanner stage and testis asymmetry (≥ 20% versus < 20%). ANOVA, Chi square/Fischer exact test and Pearson correlations were used where appropriate.

**Results:** 575 boys with a mean age of 14.8 ± 2.2 were included. Grade distribution was: 1-68 (11.8%), 2- 291 (50.6%) and 3-216 (37.6%). BMI percentiles for decreased significantly with increasing grade (see table). More boys with grade 3 varicoceles were underweight versus boys with grades 1 and 2. 33.8% of grade 1 patients were overweight, versus 18% and 11% of grades 2 and 3 (p<0.0001). Testis asymmetry was related to
grade: 31% of grade 3 and 20.6% of grades 1 and 18.6% of grade 2 (p=0.004). There was no correlation between BMI and testis symmetry overall. Tanner stage 3 showed an association between declining BMI percentile and increasing asymmetry (r=-0.35, p=0.0027).

**Conclusion:** Mean BMI percentiles for each group were within “normal healthy weight”, but children with grade 3 varicoceles were more likely to be underweight, less likely to be overweight, and more likely to have testis asymmetry than grades 1 and 2. Only at Tanner stage 3 was declining BMI percentile linked to testis asymmetry. Observations in adults linking varicocele severity and body type are applicable to adolescents with grades 2 and 3 being leaner than those with grade 1.

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>14.8 +/- 2.15</td>
<td>14.86 +/- 2.42</td>
<td>14.75 +/- 2.23</td>
<td>14.86 +/- 1.97</td>
</tr>
<tr>
<td>&gt;20% Testis asymmetry</td>
<td>135(23.5%)</td>
<td>14(20.5%)</td>
<td>54(18.5%)</td>
<td>67(31%)*</td>
</tr>
<tr>
<td>BMI</td>
<td>20.78 +/- 3.7</td>
<td>22.57 +/- 5.1</td>
<td>20.93 +/- 3.5</td>
<td>20.01 +/- 3.21</td>
</tr>
<tr>
<td>BMI percentile</td>
<td>54.2 +/- 28.3</td>
<td>65.2 +/- 27.63</td>
<td>56.78 +/- 27.11</td>
<td>47.35 +/- 28.53</td>
</tr>
<tr>
<td>% Underweight (&lt;5th%)</td>
<td>21(3.6%)</td>
<td>1(1.5%)</td>
<td>6(2%)</td>
<td>14(6.5%)</td>
</tr>
<tr>
<td>% Normal weight (5th-85th%)</td>
<td>454(78.9%)</td>
<td>44(64.7%)</td>
<td>232(79.7%)</td>
<td>178(82.4%)</td>
</tr>
<tr>
<td>% Overweight (≥85th%)</td>
<td>100(17.3%)</td>
<td>23(33.8%)</td>
<td>53(18.2%)</td>
<td>24(11.1%)</td>
</tr>
</tbody>
</table>

**Poster 49**

**Surgical Management for the Palpable Undescended Testicle: Scrotal or Inguinal Approach?**

Sanjeev Panda, MD\(^1\), Lira Chowdhury\(^2\), Stephen Almond\(^3\), Mohammad Emran\(^1\), Haroon Patel\(^5\), Leon Smith-Harrison\(^3\) and Juan C. Prieto, MD\(^2\), (1) Pediatrics, Texas A&M University. Driscoll Children’s Hospital, Corpus Christi, TX, (2) Urology, Driscoll Children’s Hospital, Corpus Christi, TX, (3) Surgery, Driscoll Children’s Hospital, Corpus Christi, TX.
**Purpose:** Inguinal orchiopexy (IO) is the predominant surgical modality for the palpable undescended testicle (PUT), despite the introduction of scrotal orchiopexy (SO) in 1989 (Bianchi A). The purpose of this study is to compare a series of consecutive patients who underwent SO with an age matched control group who underwent IO for primary PUT.

**Methods:** From 2009 to 2011, 346 patients underwent SO or IO for PUT in our institution according to surgeon’s criteria. All the primary SO (n=90) performed by one pediatric urologist (JCP) were age matched to a control group of primary IO (n=157) performed by three pediatric surgeons (SA, ME, HP) and two pediatric urologists (LSH and JCP). Patients with incomplete data, ancillary procedures or lack of follow up were excluded from analysis. SO was performed through a transverse incision in the mid hemiscrotum and the dissection of the hernia sac was completed without disruption of the tunica vaginalis. IO was performed by opening the inguinal canal and completing a high ligation and division of the processus vaginalis. Results were analyzed by number of testicles treated, laterality, age at surgery, preoperative and postoperative testicular location and size, complications, and success rate (defined as mid or low scrotal testicular position and absence of postoperative hypotrophy or atrophy). Fisher’s exact test was used for statistical analysis.

**Results:** A total of 236 patients with primary PUT underwent orchiopexy at our institution between 2009 and 2011. The table below summarizes the findings.

<table>
<thead>
<tr>
<th></th>
<th>GROUP A (SO)</th>
<th>GROUP B (IO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF PATIENTS</td>
<td>89</td>
<td>146</td>
</tr>
<tr>
<td>NUMBER OF PEXIES</td>
<td>90</td>
<td>157</td>
</tr>
<tr>
<td>RIGHT SIDED</td>
<td>44</td>
<td>74</td>
</tr>
<tr>
<td>LEFT SIDED</td>
<td>46</td>
<td>83</td>
</tr>
<tr>
<td>PREOP location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scrotal/retractile</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>High scrotum</td>
<td>41</td>
<td>10</td>
</tr>
<tr>
<td>inguinal</td>
<td>19</td>
<td>145</td>
</tr>
<tr>
<td>Mean Operative Time (min)</td>
<td>23.4</td>
<td>42.5</td>
</tr>
<tr>
<td>Postop atrophy/hypo trophy</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Postop position (high scrotum)</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Success rate</td>
<td>98.8%</td>
<td>90.4%</td>
</tr>
</tbody>
</table>

All cases of postoperative testicular hypotrophy or ascent occurred in preoperative inguinal testes. The difference in postoperative hypotrophy was statistically significant between the two groups (p= 0.02) while the difference in postoperative testicular ascent was not statistically significant.
significant between the two approaches ($p = 0.14$). Two other complications were documented in group A: suture dehiscence ($n=1$) and bleeding ($n=1$), and 14 other complications were documented in group B: surgical site infection ($n=5$), bleeding ($n=1$), and prolonged pain/swelling ($n=8$). The higher complication rate in group B needs to be interpreted with caution since this group included a larger sample with more preoperative inguinal testicles. Median follow up was 6.7 months.

**Conclusion:** The success rate for the management of primary palpable undescended testicle remains high with SO and IO. The SO offers significant advantages such as avoiding injury to intra-abdominal organs, lower complication rate, shorter surgical times, less postoperative pain with faster recovery, and a cosmetically appealing incision concealed in the scrotum.

**Poster 50**

**Does the Degree of Preoperative Testicular Asymmetry or Length of Postoperative Follow-up Influence Testicular Catch-up Growth Results?**

Angela M. Fast, BS, Jason P. Van Batavia, MD, Shannon N. Nees, BS and Kenneth I. Glassberg, MD, FAAP, Division of Pediatric Urology, Department of Urology, Columbia University College of Physicians and Surgeons, Morgan Stanley Children's Hospital of New York - Presbyterian, New York, NY

**Purpose:** While previous studies have reported that post-varicocelectomy catch-up growth is not related to age, Tanner stage, grade or ligation of lymphatics at the time of varicocelectomy, we are unaware of any reports that describe whether the degree of pre-varicocelectomy asymmetry or length of post-varicocelectomy follow-up are related to the incidence of catch-up growth following varicocelectomy. We sought to answer these questions.

**Methods:** Using our adolescent varicocele database, we identified patients who had undergone a varicocelectomy and had both pre- and postoperative ultrasound testicular volume measurements. Using the following testicular asymmetry formula: \(\left[\text{right (cc)} - \text{left (cc)}\right] / \text{right (cc)} \times 100\%\), catch-up growth was defined as achieving <10% asymmetry postoperatively. Initial asymmetry was defined as $\geq 10\%$ difference in testicular size with the left smaller than the right. Only patients who had undergone laparoscopic or Palamo varicocelectomy and had preoperative testicular asymmetry were included. Kaplan-Meier analysis was used to evaluate the incidence of catch-up growth over time along with its relationship to the degree of preoperative asymmetry (10 to 19.9%, 20 to 34.9% and 35% or greater testicular asymmetry) in patients who had either a unilateral or bilateral varicocelectomy.

**Results:** Overall, 304 patients (mean age 15.4 years; range 6.5-20.6; mean follow-up 36.3 months, range 6.0-128.9) met inclusion criteria; 252 of 304 patients (82.9%) achieved catch-up growth. Mean preoperative testicular asymmetry was 28%, with 88 patients (28.9%) having 10 to 19.9% asymmetry, 133 (43.8%) having...
20 to 34.9% asymmetry, and 83 (27.3%) having 35% or greater asymmetry. Kaplan-Meier analysis of overall catch-up growth is illustrated in Figure 1 with time point predictions in Table 1. Catch-up growth was achieved in 34.5% by 12 months, 59.9% by 24 months and 75.3% in 48 months. There were no differences in catch-up growth rate regardless of the degree of preoperative testicular asymmetry (Figure 2). Varicocele repairs were left sided in 236 patients (77.7%) and bilateral in 68 patients (22.3%). There was no significant difference in incidence or interval to catch-up growth between those who underwent unilateral versus bilateral repair (p=0.39).

**Conclusion:** The incidence of catch-up growth following varicocelectomy increases with time with many patients demonstrating catch-up growth more than two years after surgery. Catch-up growth was not influenced by the degree of preoperative asymmetry or whether the repair was unilateral or bilateral. If a patient has significant testicular asymmetry 2.76 years (95% CI: 2.47-3.31 years) following surgery, there is little chance that catch-up growth will occur thereafter.

**Table 1.** Kaplan-Meier time point predictions of expected postoperative catch-up growth

<table>
<thead>
<tr>
<th>Percentage expected to achieve catch-up growth*</th>
<th>Time (years)</th>
<th>95% Confidence Interval (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>0.82</td>
<td>(0.76, 0.92)</td>
</tr>
<tr>
<td>50%</td>
<td>1.31</td>
<td>(1.19, 1.47)</td>
</tr>
<tr>
<td>75%</td>
<td>2.76</td>
<td>(2.47, 3.31)</td>
</tr>
</tbody>
</table>

*Based on all patients with preoperative testicular asymmetry undergoing varicocelectomy regardless of outcome.

![Figure 1. Kaplan-Meier curve for overall catch-up growth](image-url)
Purpose: Urolithiasis in children has a significant risk of recurrence and thus warrants a complete stone clearance. Many children have residual fragments (RF) in the kidney or ureter after ESWL or PCNL. Fragments 5 mm or less have high probability to pass spontaneously. The term clinically insignificant residual fragments (CIRF) have been established for these stones. However, this term is still controversial, as persisting fragments might be important risk factors for stone growth and recurrence. We evaluated the fate of small residual stone fragments (RF) identified up to 3 months following ESWL or PCNL in children.

Methods: Our study subjects included 40 children (42 renal units) with RF 5 mm or less 3 months following treatment using PCNL or ESWL for kidney stones. Median patient age was 6 years. Average initial stone burden was 18 mm. Mean follow-up was 28 months. Follow-up examinations consisted of radiographic studies, renal ultrasonography and urine culture. Outcomes such as spontaneous passage, growth of RF, symptomatic episodes or calculi recurrence were recorded.

Results: Of the 42 renal units with RF 5 mm or less, 29 units (69%) pass stone spontaneously, 8 units (19%) had an adverse clinical outcome (symptoms or RF growth) and 5 units (12%) were asymptomatic and had non-growing RF.

Conclusion: Most small RF in children passes spontaneously without adverse clinical outcome. A low incidence of stone growth has been found among children with RF. Based upon this observation, it is
acceptable to use the term “clinically insignificant residual fragments” since most RF pass spontaneously. However, one fifth of the patients developed growth of RF or calculi recurrence, it is obvious that close follow-up is required as RF may act as a nidus for further stone formation.

Poster 52
Recurrence Free Survival Following the First Episode of Upper-Tract Calculi in a Pediatric Cohort
Matthew Christman, Gregory E. Tasian, Angela Kalmus and Pasquale Casale, The Children’s Hospital of Philadelphia, Philadelphia, PA
Purpose: Few data are available regarding stone recurrence free survival in a pediatric cohort. We aimed to determine the recurrence free survival following the first episode of upper-tract calculi. We hypothesized that a model of demographic and stone factors could be developed to predict recurrence in subjects treated at a children’s hospital.
Methods: A database of 902 patients with ICD-9 codes consistent with urolithiasis from 2004–2012 was reviewed. Subjects with a confirmed diagnosis of upper-tract urolithiasis and whose entire stone history had been abstracted were eligible. Patients were excluded if clearance of their first stone episode was not confirmed by CT scan or renal/bladder ultrasound. Information pertaining to demographics and individual stone episodes was analyzed. Patients were censored at their last follow-up visit to our institution. Kaplan-Meier survival estimates were generated. Potential predictors of recurrence analyzed via a Cox proportional hazards model included: age at initial presentation, gender, race, BMI, family history of stones, history of neurogenic bladder and/or bladder augmentation, and stone composition. Factors that trended towards significance ($\alpha<0.10$) on univariate analysis were used to construct a multivariate model of recurrence.
Results: Radiologic clearance of the first episode was verified in 218 subjects, of whom 22% (48/218) presented with a recurrent stone. Median [IQR] age was 11.9 years [6.9, 15.5]. The cohort underwent 288.4 person-years of observation. Median upper-tract stone recurrence free survival was 4.4 (3.0, 5.7) years (Fig1). 14.9% recurred by the end of the first year. Age at the initial presentation, gender, history of bladder augmentation, and a history of calcium oxalate stone/s predicted recurrence on univariate analysis; the remaining variables were not statistically significant predictors. On multivariate analysis, no factor was a significant predictor of recurrence (Table1).
Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate Analysis</th>
<th>Multivariate Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hazard Ratio (HR)</td>
<td>p-value</td>
</tr>
<tr>
<td>Age at Initial Episode</td>
<td>1.04 (1.01, 1.08)</td>
<td>0.020</td>
</tr>
<tr>
<td>Gender (Female:Male)</td>
<td>2.12 (1.14, 3.97)</td>
<td>0.018</td>
</tr>
<tr>
<td>Race (Relative to Caucasians)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>0.67 (0.21, 2.17)</td>
<td>0.500</td>
</tr>
<tr>
<td>Asian</td>
<td>0 (0, ...)</td>
<td>1.000</td>
</tr>
<tr>
<td>Family History of Stones</td>
<td>0.89 (0.45, 1.74)</td>
<td>0.727</td>
</tr>
<tr>
<td>Neurogenic Bladder</td>
<td>1.47 (0.71, 3.05)</td>
<td>0.299</td>
</tr>
<tr>
<td>Augmented Bladder</td>
<td>3.06 (1.08, 8.69)</td>
<td>0.036</td>
</tr>
<tr>
<td>BMI</td>
<td>1.02 (0.97, 1.07)</td>
<td>0.486</td>
</tr>
<tr>
<td>Calcium oxalate</td>
<td>0.44 (0.21, 0.93)</td>
<td>0.033</td>
</tr>
<tr>
<td>Calcium phosphate</td>
<td>1.09 (0.48, 2.45)</td>
<td>0.840</td>
</tr>
<tr>
<td>Struvite</td>
<td>1.70 (0.64, 4.49)</td>
<td>0.286</td>
</tr>
<tr>
<td>Uric Acid</td>
<td>0.79 (0.17, 3.67)</td>
<td>0.763</td>
</tr>
</tbody>
</table>

**Conclusion:** Over half of pediatric patients with upper-tract urolithiasis may recur within 5 years. Patients with a neurogenic bladder do not appear to be at increased risk of upper-tract stone recurrences. Furthermore, stone composition cannot be used to predict recurrence. We suspect that metabolic factors play the larger role in determining recurrence free survival.
Antibiotic Prophylaxis (AP) for Infants with Antenatal Hydronephrosis (AHN): The Risk of Urinary Tract Infection (UTI) Changes According to Degree of Dilation, Gender and Circumcision Status

Luis H. Braga, MD, PhD1, Victor H. Figueroa2, Rodrigo LP Romão, Clinical, Fellow1, Forough Farrokhyar, PhD1, Martin A. Koyle, MD2, Joao L. Pippi Salle2 and Armando J. Lorenzo2, (1)Department of Surgery/Urology, McMaster University, Hamilton, ON, Canada, (2)Division of Urology, The Hospital for Sick Children, Toronto, ON, Canada, (3) Division of Urology, Department of Surgery, The Hospital for Sick Children, Toronto

Purpose: According to a recent systematic review (SR) that evaluated the role of AP as a preventive measure against UTIs in infants with AHN, AP use was shown to reduce the rate of UTIs in patients with grade III-IV hydronephrosis. Unfortunately, due to limitations in the available SR data, the effect of gender and circumcision status could not be properly evaluated. Herein we sought to analyze a single-center experience to further explore the impact of these unmeasured variables in this population.

Methods: A comprehensive AHN database including all neonates scheduled to undergo a voiding cystogram (VCUG) between 2005 and 2012 was reviewed. Patients in whom VCUG was not properly completed (n=126) were excluded. The primary outcome was development of a febrile UTI (fUTI). Five a priori defined risk factors were explored: ANH grade [low (I-II) vs. high (III-IV)], AP use, presence of VUR, gender, and circumcision status. These were subjected to univariate and multivariable regression, with log-rank and stratified analyses conducted to corroborate findings, while adjusting for differences in follow-up time.

Results: Data on 1040 patients (72% males) with a mean follow-up of 27.7 months were available for review. VUR was detected in 241 (23%) and was bilateral in 149 (14%). AP was prescribed for 463/1040 (44.5%), including 193/241 (80%) of patients with VUR and 270/799 (34%) of those without. Neonatal circumcision was carried out in 140/749 (19%) of males. A total of 221 patients presented with a fUTI. Of the explored risk factors, female gender and uncircumcised boys (HR circumcised males vs. uncircumcised males and all females = -1.04, 95%CI=-1.9to-0.4; p=0.006), and lack of AP (HR no use vs. use =1.4, 95%CI=1.1to1.7; p=0.001) were associated with a higher rate of fUTIs. However, the protective effects of circumcision and AP were more evident in high-grade hydronephrosis (figure), with protection conferred to uncircumcised males and females on AP, and circumcised males regardless of AP. On multivariable regression analysis, use of AP (p<0.01), grade III-IV AHN (p<0.01), presence of reflux (p<0.01) and gender (p=0.03) all remained statistically significant.

Conclusion: Our findings support the role of hydronephrosis grade as a risk factor for fUTIs in children.
with ANH. AP appears to selectively decrease the risk of infections in females and uncircumcised males with high grade hydronephrosis. Circumcised males are at low risk for fUTIs irrespective of other risk factors. These findings provide evidence for selective use of AP and highlight the need for properly powered prospective randomized studies.

Figure: Wrap plication of a megaureter around the normal-sized ureter in the management of complete duplex system reimplantation.

Purpose: A duplex collecting system (DCS) is a common congenital renal tract abnormality associated with different clinical problems. We describe our experience with ureteral reimplantations of a complete DCS where one megaureter, needing recalibration, and one normal sized ureter coexist. The recalibration of the megaureter has been done by a wrap plication around the normal sized ureter.

Methods: Operative logs and case notes were reviewed of consecutive children with a complete DCS treated with a wrap plication of the megaureter around the normal sized ureter and reimplantation between 1997 and 2010. Postoperative reoperation rates, vesicoureteral reflux (VUR) rates and obstruction rates were assessed. To assess severity of surgical complications, the Clavien-Dindo classification system was used.

Figure 1: Wrap plication of a megaureter around the normal-sized ureter in duplex collecting systems, with sufficient spatulation in the normal-sized ureter.
Results: 25 Children underwent a wrap plication and ureter reimplantation. Nineteen were completely successful (76%). Six out of 25 children (24%) needed a reoperation. Three children (12%) had persistent VUR, two children (8%) underwent endoscopic correction and one (4%) a re-reimplantation of the duplex system. Three children (12%) had postoperative obstruction and two (8%) underwent endoscopic incision of the ureteral orifice. Another child (4%) developed a nonfunctioning lower moiety of the kidney and therefore underwent a heminephrectomy. The severity of surgical complications is shown in table 1.

Table 1 Reoperation rates after wrap plication and reimplantation of the duplex system.

<table>
<thead>
<tr>
<th>Reoperation/N</th>
<th>Clavien-Dindo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6/25</td>
</tr>
<tr>
<td>EC persistent high-grade VUR lower pole ureter</td>
<td>2</td>
</tr>
<tr>
<td>Endoscopic incision ureteric orifices DCS</td>
<td>2</td>
</tr>
<tr>
<td>Re-reimplantation of the DCS</td>
<td>1</td>
</tr>
<tr>
<td>Heminephrectomy of non-functioning lower moiety kidney</td>
<td>1</td>
</tr>
</tbody>
</table>

EC: endoscopic correction, VUR: vesicoureteral reflux, DCS: duplex collecting system

Conclusion: Wrap plication of a megaureter around the normal-sized ureter before reimplantation seems to be a relatively safe method in the surgical management of children with a complete duplex collecting system of the kidney. Sufficient spatulation of the lower pole ureter seems to be crucial.
The Effect of Dietary Sodium and Fructose Intake on Urine and Serum Parameters of Stone Formation in a Pediatric Mouse Model

Elizabeth M. Masko, Michael E. Lipkin, MD, Michael R. Abern, Emma H. Allott, Alexis R. Gaines, Jonathan C. Routh, MD, MPH, John Wiener, MD, Glenn M. Preminger and Sherry S. Ross. (1) Division of Urology, Department of Surgery, Duke University, Durham, NC. (2) Division of Urology, Duke University Medical Center, Durham, NC. (3) Division of Urologic Surgery, Duke University Medical Center, Durham, NC.

Purpose: Dietary factors have been shown to influence stone development in the adult population. There is little known about the contribution of diet to stone development in the pediatric population. Pediatric stone disease has significantly increased over the past 30 years. Concurrently, sodium intake has increased more than 60% and fructose consumption more than 2000% in children on a Western diet and over 30% of all children are overweight or obese. To date, no studies have evaluated dietary intake and how diet may alter urine electrolytes that contribute to stone formation.

Methods: A total of 30 BALB/c female mice (age 3 weeks) were randomized to receive 1 of 3 ad lib diets: standard mouse chow (13% fat, 25% protein, 62% carbohydrates kcals), a complex-carbohydrate-based Western diet (35% fat, 17% protein, 48% carbohydrate kcals), or a Western diet in which 95% of the carbohydrate kcals were from fructose plus 3.84g sodium/kg of diet. Body weights were measured twice weekly. Mice remained on study for 30 days, and urine was collected on Days 0 (at randomization), 1, 2, 5, 10, 15, 20, 25, and 30 by applying gentle suprapubic pressure. All samples were pooled into 3 samples per arm (Days 0-2, 5-15, and 20-30) and sent for analysis of creatinine, uric acid, urea nitrogen, calcium, potassium, sodium, magnesium, phosphorus, sulfate, citrate, and oxalate. Upon harvest at Day 30, we collected serum by cardiac puncture as well as bladder and kidneys for subsequent analyses.

Results: There were no significant differences in body weights among the 3 groups, although the mice consuming the high-fructose, high-sodium diet trended to be larger on Day 30 (p=0.15). We found no observable differences in stone-forming analytes in the urine of the 3 dietary arms. However, we did find a substantial decrease in urinary magnesium and citrate levels of Western diet groups compared to the mice consuming mouse chow.

Conclusion: Results from this study suggest that consumption of Western diets, especially those high in fructose and sodium may lead to decreases in stone-forming inhibitors magnesium and citrate. Although more research is necessary, this decrease in the inhibitors may explain, in part, how diet may play a role in pediatric stone formation.
Poster 56 (also Moderated Poster, Monday 9:11 am)

Transcriptome Analysis of the Fetal Gubernaculum Following DHT Exposure Identifies Common Androgen and Insulin-Like 3 Targets

Julia Spencer Barthold, Alan Robbins, Yanping Wang, Jack Pike, Erin McDowell, Kamin Johnson and Suzanne M. McCahan, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE

Purpose: Androgen receptors (ARs) within the developing gubernaculum are essential for testicular descent. In order to better define the target pathways involved in AR signaling, we analyzed gene expression in response to in vitro androgenic stimulation of the fetal rat gubernaculum.

Methods: Microdissected pairs of GD17 rat gubernacular bulbs were cultured on a Millicell CM membrane in Dulbecco modified Eagle medium/Ham, 2% charcoal stripped fetal bovine serum, 1× insulin-transferrin-selenium-X supplement and 1× antibiotic-antimycotic. Cultures were maintained in basal medium for 24 hrs and for an additional 6 or 24 hours in basal or dihydrotestosterone-(DHT, 1, 10 or 30 nM) supplemented medium prior to harvesting. RNA was extracted, labeled and hybridized to Affymetrix microarrays (5-6 replicates/group). Differential expression was determined by the LIMMA linear model approach with a false discovery rate of 5% using the limma package in Bioconductor. Analysis for overrepresented functional categories was performed with DAVID. Genes of interest were analyzed in independent samples using TaqMan gene expression assays and data analyzed using ANOVA after log transformation.

Results: DHT was associated with differential expression of 0 and 2533 probesets after 6 and 24 hours’ exposure, respectively; 55% were also regulated by INSL3 as noted in our previous experiments. Functional analysis of 1336 probesets upregulated by DHT (1098 DAVID IDs) showed overrepresentation of extracellular matrix (ECM) and basement membrane; of 34 ECM genes, 8 were collagens. For 1197 downregulated probesets (900 DAVID IDs), WNT signaling; biological processes related to cellular transport, RNA processing and transcription; nucleus and organelle (cellular components) and beta-catenin, SMAD and ion binding (molecular functions) were overrepresented. Using qRT-PCR we confirmed upregulation of Has2 and Adh1 (known AR-regulated genes) and neuromuscular developmental genes including Crlf1, Chrdl2 (both similarly upregulated by INSL3), Slit3 and Syne2. Transcripts confirmed as downregulated by DHT include Wnt4 (upregulated by INSL3), Ar, Myh7, Bmp4, Cxcl12 and Tgfb2. We were unable to validate a significant response of Npy or Sfrp2 transcript levels to DHT.

Conclusions: We identified WNT and BMP signaling as common targets in the DHT- and INSL3-regulated transcriptome of the fetal gubernaculum, and confirmed differential expression of transcripts known to be
androgen responsive in other contexts. These observations support other data suggesting synergy between INSL3-RXFP2 and AR signaling in the gubernaculum. We expected that 6-hr exposure to DHT would identify direct transcriptional AR targets, but none were observed. This absence of effect may indicate incomplete penetration of the intact organ in vitro after limited exposure, technical variation and/or a possible role for rapid, non-genomic AR signaling in the fetal gubernaculum.

Poster 57

A Susceptibility Locus for Cryptorchidism In the ORL Rat Is Associated with Altered Levels of Muscle- and Hormone Receptor-Specific Transcripts In Fetal Gubernaculum and Cremaster

Julia Spencer Barthold, Yanping Wang, Alan Robbins, Joan Pugarelli and Robert E. Akins, A.I. duPont Hospital for Children/Nemours Biomedical Research, Wilmington, DE

Purpose: Altered muscle-specific development in the gubernaculum and/or cremaster is a feature common to human and animal models of cryptorchidism. To better define the developmental mechanisms of cryptorchidism, we studied the time course and differential expression of hormone receptor and muscle-specific transcripts in the ORL rat.

Methods: In prior genetic linkage analysis, we identified Syne2-Esr2 as a candidate modifier locus, homozygous in ORL and heterozygous in outbred Long-Evans (LE) rats, associated with cryptorchidism susceptibility. Therefore, we generated genotype-specific timed pregnancies and compared 3 groups: LE-chr6LE, LE-chr6ORL and ORL. Fetal gubernacula were harvested at gestational days (GD)17, 19 and 21 and cremaster muscle at postnatal day (P)3 and 30. Total RNA purification, cDNA generation, Taqman-based RT-PCR, and data analysis using the delta-delta threshold cycle method were performed. Transcript levels of genes encoding androgen receptor (Ar), estrogen receptors alpha (Esr1) and beta (Esr2), relaxin/insulin-like family peptide receptor 2 (Rxfp2), embryonic (Myh3), slow- (Myh7) and fast-IIB (Myh4) myosins; myogenin (Myog), desmin (Des), nesprin-2 (Syne2) and the AR coactivator ARA70 (Ncoa4, located in a second ORL linkage peak) were normalized to Gapdh levels with rat embryonic total RNA as calibrator. Data were log-transformed and analyzed with ANOVA and UNIANOVA using IBM SPSS v. 19.

Results: In LE-chr6LE samples, expression of all 4 hormone receptors, Syne2 and Ncoa4 decreased perinatally; Esr2 expression was low prenatally and undetectable postnatally. As expected, the early muscle differentiation marker Myog peaked at GD21 during active gubernacular muscle development and Des, Myh3 and Myh7 levels were highest in postnatal cremaster muscle. Fast twitch Myh4 was not detected until P30 and levels were significantly lower in ORL as compared to both LE-chr6LE and LE-chr6ORL cremaster. In contrast,
Rxfp2, Syne2 and Myh3 transcripts were overexpressed or failed to decrease in ORL fetuses in late gestation, just prior to gubernacular migration. In both ORL and LE-chr6ORL gubernacula, we observed altered trends in Syne2 expression, reduced Esr2 and Ar levels at GD17 and an earlier peak of Myh7 expression compared to LE-chr6LE. However, other LE-chr6ORL prenatal expression patterns were unique with markedly higher Ncoa4 levels, an earlier rise in Myog and Des and earlier decrease in Rxfp2, Esr2 and Esr1 levels as compared to LE-chr6LE and ORL.

Conclusion: Allele-specific expression of Syne2 and Esr2 transcripts in ORL and LE-chr6ORL fetuses supports a role for this locus in developmental gubernacular signaling and cryptorchidism. However, the LE-chr6ORL pattern of hormone- and muscle-associated gene expression is otherwise unique, most notably in marked upregulation of the AR coactivator Ncoa4, which is located within another ORL cryptorchidism susceptibility locus. These data support our hypothesis that multiple genomic loci involved in AR signaling contribute to dysfunctional and/or insufficient gubernacular development and cryptorchidism in the ORL rat.

Poster 58

FTY720 Inhibits Tumor Growth and Enhances the Tumor-Suppressive Effect of Topotecan in Neuroblastoma by Interference with Sphingosine Kinase 2

Mei-Hong Li, PhD1, Timothy Hla, Ph.D2, Fernando A. Ferrer Jr., MD, FAAP3, (1)Center for Vascular Biology, University of Connecticut Health Center, Farmington, CT, (2)Center for Vascular Biology, Department of Pathology and Laboratory Medicine, Weill Medical College of Cornell University, New York, NY, (3)Division of Urology, Connecticut Children’s Medical Center, Hartford, CT

Purpose: Neuroblastoma (NB) is the most common extra-cranial solid tumor in childhood. Despite improvements in outcome for those with low-risk NB, the outcome for children with high-risk NB is still poor, underscoring the need for novel therapeutic strategies. FTY720, an immunomodulating drug approved for cancers with promising preclinical activities. Its effect in NB has not been explored. FTY720’s ability to occupy sphingosine kinase 2 (SphK2), which is uniquely and predominantly expressed in NB and in-part responsible for the production of pro-survival factor sphingosine-1-phosphate (S1P), suggests a potential beneficial effect of FTY720 in NB. Herein we describe our preclinical experience with FTY720 as a single agent and combination strategies in NB.

Methods: Methylthiazolyldiphenyl-tetrazolium bromide (MTT) assay was performed to assess the effect of FTY720 on cell viability. A NB xenograft model was employed to assess the efficacy of FTY720 on tumor growth. The liquid
chromatography/tandem mass spectrometry (LC/MS/MS) method was conducted to measure sphingosine and S1P levels. Quantitative real-time PCR and western blot analysis were employed to determine changes of mRNA and protein expressions, respectively.

**Results:** FTY720, but not FTY720-P (inactive at engaging SphK2), strongly induced cell death in NB cells. FTY720 inhibited the growth of NB xenografts and enhanced the tumor-suppressive effect of topotecan both in vitro and in vivo. Interestingly, FTY720 significantly inhibited SphK2 mRNA and protein expressions in NB cells. Consistently, pro-apoptotic sphingosine levels were dramatically increased while pro-survival S1P levels were significantly decreased in NB cells and NB xenografts after treatment with FTY720. Further studies revealed that FTY720-induced cell death was caspase-independent and involved the dephosphorylation of Akt and BAD at Ser136 as well as the subsequent release of cytochrome c.

**Conclusion:** Our data demonstrate for the first time that FTY720 has a potent preclinical anti-cancer activity in NB. Its unique death signaling by interference with SphK2 acts cooperatively with that of topotecan suggesting that FTY720 may become a promising new anti-cancer drug for NB treatment.

Poster 59

**Correlations between Auditory Measures and Gender in DSD**

Amy B. Wisniewski, PhD1, Shelagh Edmundson2, Blas Espinosa, PhD2, Ed Pasanen3, Craig Champlin4 and Dennis McFadden4, (1)Pediatric Urology, University of Oklahoma Health Sciences Center, Oklahoma City, OK, (2) Communication Sciences & Disorders, University of Oklahoma Health Sciences Center, Oklahoma City, OK, (3) Psychology, University of Texas at Austin, Austin, TX, (4) Communication Sciences & Disorders, University of Texas, Austin, TX

**Purpose:** Disorders of sex development, or DSD, are a group of congenital conditions in which affected individuals experience discordance between their genetic, gonadal, and/or phenotypic sex (Hughes et al., 2006). Depending on the type of DSD, up to 25% of people reject their female sex of rearing, perhaps as a result of androgen exposure to the central nervous system. Otoacoustic emissions (OAEs) and auditory evoked potentials (AEPs) are measures of the cochlea and auditory cortex, respectively that are sensitive to prenatal androgen exposure. The purpose of this study was to determine if patterns of OAEs and AEPs correlate with gender development in people with DSD.

**Methods:** 25 participants included male (n=7) and female (n=8) controls, women with complete androgen insensitivity syndrome (CAIS, n=5)) and women with congenital adrenal hyperplasia due to 21-hydroxylase deficiency (CAH, n=5). All participants completed standardized measures of gender role and identity, OAEs and AEPs.
Results: Preliminary analyses reveal that control men and women report masculine and feminine gender, respectively. Women with CAIS report more feminine behavior and women with CAH report gender behavior that is more male-typical than the other women (Figure 1). Similar to the gender data, men exhibited masculine patterns of OAEs and women exhibited feminine patterns while women with CAIS were more female-typical and those with CAH were more male-typical (Figure 2).

Conclusions: This preliminary work suggests that sexually dimorphic measures of the auditory system, believed to be sensitive to prenatal androgen exposure, correlate with gender development in people with DSD. Thus, these measures may be useful for assessing central nervous hormone exposure in people with DSD for the purpose of predicting gender development.
Evaluation of an Acellular Bi-Layer Silk Scaffold for Porcine Bladder Tissue Regeneration

duong d. tu, md1, eun seok gil, phd2, abhishek seth, md1, pablo gomez iii, md1, yeungoo chung, md1, rosalyn m. adam, phd1, david l. kaplan, phd2, carlos r. estrada, md1 and joshua r. mauney, phd1, (1)department of urology, children's hospital boston, harvard medical school, boston, ma, (2)biomedical engineering, tufts university, medford, ma

purpose: currently, autologous gastrointestinal segments are utilized as the primary option for bladder reconstructive procedures despite their inherent morbidity and significant complication rate. biomaterials derived from bombyx mori silk fibroin represent attractive alternatives for bladder tissue engineering given their mechanical robustness, processing plasticity, and biodegradability. our previous results have shown that silk scaffolds were capable of supporting tissue regeneration and voiding function in a murine model of bladder augmentation. in this study, we hypothesized that acellular silk matrices would effectively mediate tissue regeneration in a large animal model of bladder augmentation.

methods: scaffolds (6x6cm2) were generated from aqueous solutions of 6% silk fibroin by a previously reported solvent casting/sodium chloride-leaching process. scanning electron microscopy (sem) and tensile testing were performed to ascertain structural and mechanical properties of scaffolds prior to implantation. matrices were anastomosed to the bladder dome of non-diseased yorkshire pigs (n=2) either through open or robot-assisted augmentation cystoplasty and maintained for 3 months. cystometric analysis was used to determine bladder capacity both pre-operatively and 3 months post-op. following euthanasia, histological (h&e and masson’s trichrome) and immunohistochemical (ihc) analyses of smooth muscle contractile protein expression (α-actin and sm22α) and urothelial-associated markers (cytokeratins and uroplakins) were assessed at the periphery and center of the original implantation site as well as a nonsurgical control region.

results: sem characterization of silk matrices demonstrated the formation of a bi-layer structure consisting of an internal porous network (pore size ~300µm) buttressed on one side by a thin layer of amorphous silk (~50µm thick) which resulted in surface pore occlusion. tensile testing of silk scaffolds revealed an average ultimate tensile strength of 430kpa, tensile modulus of 70kpa, and elongation to failure of 28%. following 1 week of initial catheterization, animals were capable of voluntary voiding throughout the entire implantation period. cystometric analyses of augmented bladders at 3 months post-op revealed substantial increases (>2-fold) in organ capacity in comparison to pre-operative values and weight-matched unoperated
controls. Histological and IHC evaluations of both the periphery and central regions of the regenerated tissues demonstrated robust smooth muscle bundle formation displaying α-actin and SM22α expression as well as the presence of a multi-layered urothelium exhibiting both prominent uroplakin and cytokeratin positivity similar to control regions. In addition, substantial degradation of the silk matrix was noted with only discrete scaffold remnants present within the interior of the implantation site with no areas of fibrosis or stone formation observed. 

**Conclusion:** Acellular bi-layer silk scaffolds represent an effective biomaterial system for mediating bladder tissue regeneration and functional outcomes in a large animal model and may offer advantages over conventional gastrointestinal segments and previously described cellularized biomaterials for augmentation cystoplasty.

Poster 61

**Altered Anoctamin-1 (ANO 1) Tyrosine Phosphorylation in Congenital Ureteropelvic Junction Obstruction**

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**Purpose:** Ureteropelvic junction (UPJ) obstruction is the most common cause of congenital hydronephrosis in children. The pathophysiology of UPJ obstruction and the exact mechanism of pelviureteral peristalsis are poorly understood. Coordinated contractions of smooth muscle cells (SMCs) produce the motor patterns for transmission of peristaltic waves across the UPJ. ANO1, a Ca²⁺ activated chloride channel, has been shown to play a key role in muscle wall contractions in the gastrointestinal tract. Expression of ANO1 has also recently been described in SMCs of the murine renal pelvis and in the urethra of mice, rats and sheep. Furthermore, phosphorylation has been shown to inhibit Ca²⁺ activated chloride channels in SMCs. We designed this study to investigate the hypothesis that ANO1 is expressed in SMCs of the human UPJ and that ANO1 tyrosine phosphorylation is altered in UPJ obstruction.

**Methods:** Fresh frozen specimens of ureteropelvic junction obstruction (n=10) and control specimens from patients who underwent Wilms’ tumor nephrectomy (n=5) were prepared. Western blot was performed to evaluate ANO1 expression and tyrosine phosphorylation patterns. In addition analysis of ANO1 and α-smooth muscle actin using confocal-immunofluorescence-double staining technique and 3D reconstruction was carried out.

**Results:** Western blot revealed markedly increased tyrosine phosphorylation in UPJ obstruction compared to controls (Fig. 1). Western blotting showed decreased ANO1 expression in UPJ obstruction compared to
controls (Fig 2). ANO1 immunoreactivity was decreased in SMCs of UPJ obstruction compared to controls (Fig. 3). **Conclusion:** We provide evidence, for the first time, of the presence of ANO1 expression in the human UPJ. Altered ANO 1 tyrosine phosphorylation observed in UPJ obstruction may inhibit Ca2+ activated chloride channels in SMCs leading to failure of transmission of peristaltic waves in ureteropelvic junction obstruction.

Poster 62

**Renal Progenitors on Extracellular Matrix as A Potential Tool for Kidney Regeneration**

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**Purpose:** Congenital abnormalities of the kidney and urinary tract (CAKUT) still remains a significant contributing factor for chronic kidney disease and end organ failure. Current treatments are directed towards slowing progression before dialysis and/or transplantation become necessary. The scarcity of allografts, cost, and side effects have prompted efforts at investigating new tools for kidney regeneration. Tissue engineering that combines a natural or biodegradable scaffold with cells and growth factors could be a new approach to discover an alternative tool for replacing significantly impaired or non-functional kidney tissue. Our laboratory has previously reported that human amniotic fluid (AF) presents a new source of renal progenitor cells.

**Methods:** A subpopulation of renal progenitor cells expressing CD24 and OB-cadherin were isolated from AF. Using a detergent-enzymatic method we produced mouse decellularized whole kidney extracellular matrix.
Mouse kidney ECM was seeded with renal progenitor cells, implanted into the kidney of nude mice, and harvested at one month to look for structure and phenotypic expression.

Results: One month after surgery, implanted ECM in situ showed invasion of vessels (angiogenesis) and renal tubular-like structures. In addition to seeded scaffolds configuring into 3D renal structures, cells positive for markers associated with several essential renal cell types, such as mesangial, podocytes and tubular cells were detected.

Conclusion: These results suggest that renal progenitor cells from AF seeded into renal ECM could represent a unique investigational approach for kidney regeneration that may be used to augment or replace damaged or compromised kidney tissue from either congenital or chronic disease.

Poster 63
IL-18 Induces Pro-Fibrotic Renal Tubular Cell Injury via STAT3 Activation
Futoshi Matsui, MD, Audrey Rhee, MD, Karen L. Hile, Hongji Zhang, MD and Kirstan K. Meldrum, MD, Urology, Indiana University School of Medicine, Indianapolis, IN

Purpose: Interleukin-18 (IL-18) is an important mediator of obstruction-induced renal fibrosis and renal tubular epithelial cell (TEC) injury, independent of tumor necrosis factor-α and transforming growth factor-β1 activity. IL-18 has previously been demonstrated to stimulate cytokine gene expression via NFκB activation; however, the absence of an effect on TNF-α activity suggests that IL-18 may mediate obstructive renal injury via an alternative signaling mechanism. Signal transducer and activator of transcription 3 (STAT3) has previously been shown to mediate renal fibrotic injury. We therefore hypothesized that IL-18 mediates pro-fibrotic renal tubular cell injury via STAT3 activation.

Methods: Male C57BL6 wild-type (WT) mice and C57BL6 mice transgenic for human IL-18-binding protein (inhibitor of IL-18 activity; IL-18BPTg) were subjected to unilateral ureteral obstruction (UUO) or sham operation. Renal cortical tissue samples were harvested 1 week after operation, and analyzed for active STAT3 (p-STAT3) expression (western blot) and suppressor of cytokine signaling 3 (SOCS3; negative regulator of STAT3) expression (western blot, real time PCR). In a separate arm, renal tubular cells (HK2) were directly stimulated with IL-18 (100ng/ml) for 3 days in the presence or absence of the STAT3 inhibitor, S3I-201 (50µM). Cell lysates were then analyzed for pSTAT3 expression (western blot), SOCS 3 and collagen 3a mRNA expression (real time PCR), and α-SMA expression (marker of EMT; western blot). Cell supernatants were analyzed for total collagen content (ELISA).

Results: A significant increase in p-STAT3 (2.08±0.2 vs. sham = 0.02±0.01, p<0.0005) and SOCS3 expression (1.67±0.09 vs. sham = 0.8±0.2; p<0.005; SOCS3 mRNA=...
in response to UUO. IL-18 neutralization, on the other hand, significantly reduced obstruction-induced p-STAT3 (IL-18BPTg=0.69±0.2; p<0.005 vs. WT) and SOCS3 (IL-18BPTg=0.05±0.02; p<0.05 vs. WT; SOCS3 mRNA = 0.5±0.03; p<0.0001 vs. WT) expression. In vitro results similarly demonstrate that direct IL-18 stimulation increased p-STAT3 (0.94±0.04 vs. control = 0.45±0.2; p<0.05), SOCS3 (0.81±0.06 vs. control = 0.26±0.02; p<0.005), α-SMA (2.2±0.3 vs. control = 0.2±0.05; p<0.005), and collagen 3a (0.84±0.06 vs. control = 0.1±0.01; p<0.001) expression, as well as total collagen production (52±2.4 vs. control = 20±2.4µg/ml; p<0.001). Administration of S3I-201 inhibited IL-18-induced p-STAT3 (S3I-201+IL-18 = 0.48±0.03 vs. IL-18, p<0.001) activation, and suppressed SOCS3 (S3I-201+IL-18 = 0.29±0.04 vs. IL-18, p<0.001), α-SMA (S3I-201+IL-18 = 0.48±0.04 vs. IL-18, p<0.01), and collagen 3a (S3I-201+IL-18 = 0.40±0.03 vs. IL-18, p<0.001) expression, as well as total collagen production (S3I-201+IL-18 = 25±3.8µg/ml vs. IL-18, p<0.001).

Conclusion: IL-18 stimulates STAT3 activation and SOCS3 expression during renal obstruction and in renal tubular cells in vitro. These results demonstrate that inhibition of STAT3 in vitro prevents IL-18-induced pro-fibrotic cellular changes and collagen production in TECs, and implicate STAT3 in IL-18-mediated renal tubular cell injury.

Poster 64

Sexual Differentiation from Day 0 to 10 in the Male and Female Mouse: A Detailed Morphometric Description
Bruce J. Schlomer, MD, Max Ferretti, Esequiel Rodriguez Jr., MD, Gerald Cunha and Laurence S. Baskin, Urology, University of California San Francisco, San Francisco, CA

Purpose: The external genitalia of mice at birth are profoundly undifferentiated with sexual differentiation continuing after birth. The time period of sexual differentiation with the most dramatic changes in morphology is day 0 to 10. Morphologic differences during this time of sexual differentiation in male and female mice have not been adequately described quantitatively. To study potential genetic and environmental causes of genital abnormalities in mice, accurate and detailed morphometric measurements and morphological descriptions of this period are needed.

Methods: The external genitalia of male and female wild type CD-1 mice were serially sectioned transversely at 7mm for histologic staining. Age groups of 0-1, 2-3, 4-5, and 10 day mice were included. Anatomical three-dimensional reconstructions (3DR) were created using the serial sections with the BioVis3D software to visually compare male and female differences. Differences in morphometric measurements of homologous structures in the distal penis and clitoris were quantified in each age group.

Results: The morphologic appearance of the distal penis and clitoris are very similar at 0-1 day but undergo
dramatic changes by 10 days (Figure 1). These changes in both sexes are partly characterized by the development of paired extensions of erectile structures and a paired extension of the urogenital mating protuberance (Table 1). The differences between male and female homologous morphometric measurements become more pronounced from 0 to 10 days (Table 1).

**Conclusion:** Dramatic changes in mouse external genitalia morphology occur from day 0 to 10. Male and female external morphology are strikingly similar visually and quantitatively at 0-1 day but are dramatically different at 10 days. We have described these changes using novel, accurate, and relevant morphometric measurements and 3DR. These differences are due in part to differential development of paired extensions of erectile structures and the mating protuberance. These measurements and morphologic descriptions will help future study on potential causes of external genital abnormalities.

**Table 1:** Male and Female morphometric measurements by age categories.

<table>
<thead>
<tr>
<th>Morphometric measurement (μm)</th>
<th>Sex</th>
<th>Day 0-1 (10 M, 11 F)</th>
<th>Day 2-3 (13 M, 14 F)</th>
<th>Day 4-5 (9 M, 10 F)</th>
<th>Day 10 (8 M, 8 F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Bifid distal extension of UMP1</td>
<td>M</td>
<td>3.5 (6.2) A</td>
<td>$26.4 \pm 13.2 B$</td>
<td>$29.6 \pm 13.1 B$</td>
<td>$72.0 (35.4) C$</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>1.0 (2.5) A</td>
<td>$2.0 \pm 3.7 A$</td>
<td>$10.3 (8.6) B$</td>
<td>$64.8 (19.5) C$</td>
</tr>
<tr>
<td>b) Lateral erectile column extension1</td>
<td>M</td>
<td>$2.8 (4.2) A</td>
<td>$31.8 (24.0) B</td>
<td>$52.1 (20.0) B</td>
<td>$169.8 (55.8) C$</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>$0 (0) A</td>
<td>$1 (2.5) A</td>
<td>$14.4 (8.6) B</td>
<td>$32.4 (11.7) C$</td>
</tr>
<tr>
<td>c) Ventral erectile column extension1</td>
<td>M</td>
<td>$17.2 (8.6) A</td>
<td>$52.5 (33.0) B</td>
<td>$103.4 (18.2) C</td>
<td>$172.4 (22.0) D</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>$0 (0) A</td>
<td>$2.3 (3.3) A</td>
<td>$14.4 (9.2) B</td>
<td>$311.7 (29.1) C</td>
</tr>
<tr>
<td>d) UMP tip to ventral column 1</td>
<td>M</td>
<td>207.2 (34.0) A</td>
<td>$237.7 (50.8) A</td>
<td>$252.0 (23.2) A</td>
<td>$378.9 (113.8) B</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>204.3 (29.0) A</td>
<td>$200.8 (24.3) A</td>
<td>$207.2 (37.8) A</td>
<td>$683 (23.2) B</td>
</tr>
<tr>
<td>e) UMP tip to lateral column 1</td>
<td>M</td>
<td>$126.4 (23.0) A</td>
<td>$168.8 (31.2) AB</td>
<td>$194.4 (30.9) B</td>
<td>$250.7 (53.2) C</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>$86.9 (15.7) A</td>
<td>$91.5 (16.6) AB</td>
<td>$112.7 (44.7) B</td>
<td>$150.9 (32.2) C</td>
</tr>
<tr>
<td>f) UMP tip to urethra</td>
<td>M</td>
<td>$256.2 (47.8) A</td>
<td>$305.7 (49.4) AB</td>
<td>$370.2 (24.6) B</td>
<td>$575.6 (123.9) C</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>$325.2 (53.9) A</td>
<td>$298.5 (30.6) A</td>
<td>$305.9 (51.2) A</td>
<td>$178.3 (51.2) B</td>
</tr>
<tr>
<td>g) UMP tip to penile or clitoris body</td>
<td>M</td>
<td>361.9 (48.7) A</td>
<td>$439.3 (30.6) B</td>
<td>$312.6 (44.7) B</td>
<td>$791.0 (144.9) C</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>325.2 (58.9) AB</td>
<td>$298.5 (30.6) B</td>
<td>$305.9 (51.2) A</td>
<td>$380.6 (52.2) A</td>
</tr>
<tr>
<td>h) UMP tip to ventral foreskin fusion2</td>
<td>M</td>
<td>$319.7 (60.9) A</td>
<td>$-6.4 (71.4) B</td>
<td>$-92.6 (68.5) C</td>
<td>$-361.5 (166.5) D</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>$337.9 (82.1) A</td>
<td>$333.0 (79.5) A</td>
<td>$288.4 (90.2) A</td>
<td>$175 (64.4) B</td>
</tr>
</tbody>
</table>

Data presented as mean (standard deviation)

Abbreviations: CCG = corpus cavernosum glandis, UMP = urogenital mating protuberance

A-D Different superscripts within rows indicate a significant difference between age groups in that sex using analysis of variance test with Bonferroni correction (p<0.05)

1Paired structures used 2 measurements per animal.

2A negative number implied ventral foreskin fusion is distal to tip of mating protuberance

§Statistically significant difference between male and female for that measurement and age category by 2-sided t-test

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The Physiological Micturition of the Fetuses 19-40 Weeks of Gestation. Normal Urodynamic Parameters
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Purpose: to represent the lower urinary tract urodynamic parameters of the fetuses between 19 and 40 weeks of gestation under the physiological circumstances.

Methods: "Prenatal ultrasound cystometry with natural filling" - the method for dynamic control of fetal lower urinary tract. During serial ultrasound measurements of fetal bladder volume we registered bladder cycling in graphical format where the bladder volume is plotted against the observation time.

Urodynamic characteristics: maximal bladder volume, bladder cycling, residual volume of the bladder reflected the capacity, reservation and micturition function of the bladder. Fetal urine production was calculated using the increase volume bladder during the observation time.

56 prenatal ultrasound fetal urodynamic investigations were performed during normal pregnancy of the fetus in 19-40 weeks of gestation. No complication of the pregnancies, normal antenatal period, normal neonatal parameters and postnatal period.

Results: Normal urodynamic parameters of the fetuses between 19 and 40 weeks of gestation are represented in the table.
### Urodynamic parameters

<table>
<thead>
<tr>
<th></th>
<th>18 – 22 weeks (n = 18)</th>
<th>23 – 26 weeks (n = 15)</th>
<th>27 – 30 weeks (n = 11)</th>
<th>31 – 33 weeks (n = 12)</th>
<th>34 – 36 weeks (n = 19)</th>
<th>37 – 40 weeks (n = 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V max bladder volume (ml)</strong></td>
<td>$M = 0.88$ $\delta = 0.27$ $m = \pm 0.07$</td>
<td>$M = 2.55$ $\delta = 1.34$ $m = \pm 0.4$</td>
<td>$M = 6.07$ $\delta = 3.09$ $m = \pm 0.97$</td>
<td>$M = 12.28$ $\delta = 5.4$ $m = \pm 1.58$</td>
<td>$M = 21.7$ $\delta = 4.9$ $m = \pm 0.1$</td>
<td>$M = 27.03$ $\delta = 4.26$ $m = \pm 1.4$</td>
</tr>
<tr>
<td><strong>T (min) micturition cycling</strong></td>
<td>$M = 16.92$ $\delta = 3.94$ $m = \pm 1.09$</td>
<td>$M = 25.7$ $\delta = 5.59$ $m = \pm 2.3$</td>
<td>$M = 30.3$ $\delta = 5.3$ $m = \pm 1.6$</td>
<td>$M = 33.5$ $\delta = 5.3$ $m = \pm 1.9$</td>
<td>$M = 37.5$ $\delta = 5.3$ $m = \pm 1.4$</td>
<td>$M = 42.42$ $\delta = 9.82$ $m = \pm 3.71$</td>
</tr>
<tr>
<td><strong>% (residual urine)</strong></td>
<td>$M = 8.14$ $\delta = 3.6$ $m = \pm 1.01$</td>
<td>$M = 9.93$ $\delta = 4.13$ $m = \pm 1.14$</td>
<td>$M = 9.63$ $\delta = 3.34$ $m = \pm 1.03$</td>
<td>$M = 9.93$ $\delta = 7.7$ $m = \pm 3.2$</td>
<td>$M = 15.15$ $\delta = 8.79$ $m = \pm 2.58$</td>
<td>$M = 17.57$ $\delta = 7.02$ $m = \pm 2.02$</td>
</tr>
<tr>
<td><strong>diuresis ml/kg/h</strong></td>
<td>$M = 9.93$ $\delta = 4.13$ $m = \pm 1.14$</td>
<td>$M = 17.57$ $\delta = 7.02$ $m = \pm 2.02$</td>
<td>$M = 15.15$ $\delta = 8.79$ $m = \pm 2.58$</td>
<td>$M = 17.57$ $\delta = 7.02$ $m = \pm 2.02$</td>
<td>$M = 15.15$ $\delta = 8.79$ $m = \pm 2.58$</td>
<td>$M = 12.95$ $\delta = 4.34$ $m = \pm 1.64$</td>
</tr>
</tbody>
</table>

The gradual increase of capacity, bladder cycling, hourly urine production correlates with gestational age and fetal weight during normal pregnancy. One-step voiding complete emptying of the bladder at 19-23 weeks of gestational is replaced by two-three-steps of voiding incomplete emptying of the bladder (residual urine ≤ 15%) at 36-40 weeks. We had 10 occasions to measure one-step voiding urine flow: 37 weeks fetus urine flow - 1.8 ml/sec. The hourly urine production reflected physiological polyuria. The parameter of the 38-weeks fetus is 17 ml/hour/kg is 4-3 more than newborn baby. **Conclusion:** The normal lower urinary tract hydrodynamic parameters base further investigations in the fields of antenatal urology.