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Thoracic Scientific Session
GI & HPB Scientific Session
ARM & Robotics Scientific Session
Urology Scientific Session
Four 75-min sessions of the content that were to be presented at the Vienna Meeting. Content/abstracts presented in these sessions is listed below. Recordings could be viewed at https://www.ipeg.org/6398-2/ *(you must be logged in as IPEG member to view the content)*

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Thoracic Scientific Session

Friday, September 11, 2020

Moderators/Panelists: Drs. Bethany Slater, Miguel Guelfand, Samir Pandya, Carolina Millan, Ben Padilla, Katherine Barsness

(S01) OXYGENATION AND VENTILATION INDICES WITH MILD PULMONARY HYPERTENTION PARAMETERS IN SELECTING THORACOSCOPIC REPAIR FOR CONGENITAL DIAPHRAGMATIC HERNIA

Mohamed Arafa, MD; Mohamed Aod, MD; Mohamed Shehata, MD; Mohamed Khairalaa, MD; Mohamed Elsawaf, MD; Shirif Shehata, MD; Tanta University

Background: Thoracoscopic repair of congenital diaphragmatic hernia (CDH) have been reported in many series of neonates and infants in the last two decades with proven safety and feasibility of the technique.Selection criteria for CDH thoracoscopic repair were based on author's personal experience.

Purpose: We aim to settle selection criteria to help in selecting CDH cases for thoracoscopic repair in limited resources countries.

Methods: Between Jan 2014 to June 2019, 54 patients with posterolateral CDH were admitted and were repaired thoracoscopically in the neonatal period .

Results: Primary repair was done in 47 cases, with 7 cases were converted to open laparotomy. The mean Peak inspiratory pressure (PIP) was 20.84 ± 2.35 (17-24 CmH2o). The mean positive end expiratory pressure (PEEP) was 5.80 ± 0.82 (4-7 CmH2o). The mean respiratory rate (R.R) was 37.60 ± 9.29 (27-50 Cycle/min). The mean ventilation index was 483.75± 110.01 (325-730). The rangeof oxygenation index was 4 -20.Eight cases died, all of them had P.H. (42 - 45 mmHg).On the other hand all cases (46 cases) that did not have P.H. survived. From our series, we found that there is a relation of V.I. and OI with mortality where all cases that died have high V.I. between 595 to 620 and OI more than 12.

Conclusion: Thoracoscopic repair for Bochdalek CDH is feasible and safe. Even in countries with limited infra-structure, It could be done safely with good selection of neonates. These selection data from our results for neonates with CDH with ventilation index below 550, oxygenation index below 10 and pulmonary hypertension below 40 mm.Hg can be used as parameters for excellent outcome following thoracoscopic CDH repair. These results and parameters need to be validated on a wider scale by larger series of patients.

(S02) THORACOSCOPY VS THORACOTOMY IN THE REPAIR OF ESOPHAGEAL ATRESIA WITH DISTAL TRACHEO-ESOPHAGEAL FISTULA

Ahmad Elhattab[1]; Pauline Clermidi[2]; Liza Ali[3]; Veronique Rousseau[2]; Daphné Michelet[3]; Caroline Farnoux[3]; Sylvie Beaudoin[2]; Sabine Sarnacki[2]; Arnaud Bonnard[3]; Naziha Khen-Dunlop[2]; [1]Mansoura University Children's Hospital, Hôpital Universitaire Necker-Enfants Malades; [2]Hôpital Universitaire Necker-Enfants Malades; [3]Hôpital universitaire Robert-Debré

AIM OF THE STUDY: Thoracoscopic repair of esophageal atresia is gaining popularity among pediatric surgeons all over the world but it is a highly technically demanding procedure. The aim of our study is to compare the surgical results and the early outcome between the thoracoscopic and the open (thoracotomy) approach for esophageal atresia repair.

METHODS: This is a retrospective bi-centric study, reviewing all the patients operated for esophageal atresia with distal tracheo-esophageal fistula. To have a homogenous population, only patients who underwent primary anastomosis were included. From 2008 to 2018, 128 patients were included. Comparison was made between the open and the thoracoscopic approaches regarding the patients' demographic data, operative time, postoperative ventilation time, length of hospital stay, postoperative complications, outcome and 1-year-follow up. Data were compared using non-parametric Mann Whitney u test, p value < 0.05 was considered significant.

RESULTS: Among the 128 patients, 41 were operated thoracoscopically (group A) and 87 were operated by the open approach (group B). Mean gestational age was 38 ± 2.36 weeks in group A and 36 ± 3.62 weeks in group B (p=0.0008) with a mean birth weight of 2787 ± 653 grams and 2354 ± 700 grams, in groups A and B respectively (p=0.003). The rate of associated congenital anomalies was comparable (p=0.29), but cardiac anomalies were higher in thoracotomy group (p= 0.01). Mortality rates during the neonatal or follow up period were 4.1% and 9.2% in groups A and B respectively (p=0.49).

In group A, 96% were operated within the first 72 hours of life. In group B, 78% underwent surgical intervention within the first 72 hours of life (p=0.38). The mean operative time was 119 ± 29 minutes in group A and 105± 23 minutes in group B (p=0.0002). No peri-operative surgical complications occurred in both groups.

The mean post-operative ventilation time and the mean length of stay were significantly shorter in the thoracoscopic group (p=0.002 and p=0.001 respectively).

The rate of post-operative complications was comparable in the both group (p=0.25). The incidence of anastomotic leak was 8.9% in group A vs 17.7% in group B (p=0.18). Anastomotic Stenosis occurred in 28.9% of group A and in 27.9% of group B (p=0.9). A mean of three sessions of endoscopic dilatation was needed for patients in group A during the 1st year of life compared to 2 sessions in group B (p= 0.16). During the 1st year of life, 13.3% patients in group A and 10.1% patients in group B required antireflux surgery for significant reflux (p=0.59).

CONCLUSION: Our results showed that there was a significant difference between patients in the two groups regarding the body weight, prematurity and associated cardiac malformations. However, the thoracoscopic repair resulted in uneventful post-operative outcome and short hospital stay. The results of the esophageal reconstruction are comparable to the ones of the open procedure, with the expected long-term benefits of the minimally invasive approach on the prevention of chest deformities.

(S03) SINGLE INSTITUTION REVIEW AND MANAGEMENT OF PHRENIC NERVE-DIAPHRAGM PACEMAKER FAILURES FOLLOWING THORACOSCOPIC PLACEMENT FOR CONGENITAL CENTRAL HYPOVENTILATION SYNDROME

Anthony C Chin, MD, MS, MBA[1]; Susan M Slattery, MD, MS[2]; Rashmi Kabre, MD[1]; Heather Ballard, MD[3]; Taher Valika, MD[4]; Tracey Stewart, RRT[2]; Ilya Khaytin, MD, PhD[2]; Sifrance Tran, MD[5]; Marybeth Browne, MD[6]; Debra E Weese-Mayer, MD[2]; [1]Ann & Robert H. Lurie Children's Hospital of Chicago, Division of Pediatric Surgery; [2]Ann & Robert H. Lurie Children's Hospital of Chicago, Division of Autonomic Medicine; [3]Ann & Robert H. Lurie Children's Hospital of Chicago, Department of Anesthesia; [4]Ann & Robert H. Lurie Children's Hospital of Chicago, Division of Otolaryngology; [5]University of Texas Medical Branch, Division of Pediatric Surgery; [6]Lehigh Valley Reilly Children's Hospital, Division of Pediatric Surgical Specialties

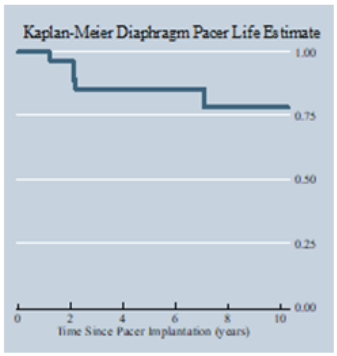
Background: Thoracoscopic placement of bilateral phrenic nerve-diaphragmatic pacer systems as an alternative means of artificial ventilation in tracheotomized pediatric patients with Congenital Central Hypoventilation Syndrome (CCHS) is now considered the standard approach to implantation. Ventilator-dependent patients benefit from such pacers as it allows negative pressure respiration and freedom from a mechanical ventilator during wakefulness. There has been no study to determine the failure rate and longitudinal management of implanted 3-part pacer components (electrode, connecting wire, receiver) in the era of thoracoscopic implantation in children.

Methods: A single institution identification of all thoracoscopically implanted phrenic nerve-diaphragm pacemaker systems (Avery Biomedical Devices, Commack, New York) in children with CCHS was performed. A subset of patients who presented with the inability to successfully pace following implantation was identified. Patient demographics, presentation of failure, radiographic imaging, age of component replaced, operative findings, component replaced, and revision results were collected. Student t-tests, Kaplan-Meier survival curves, and logistic regression were used for analyses.

Results: Fourteen patients (28 initial pacemaker insertions) were identified who met study requirements. During our study period, 5 of 14 patients presented with inability to pace due to shoulder pain or absent contraction of a diaphragm for a 17.9% overall failure rate for implanted systems (n=5/28). Mean age at implantation for children without failure was 6.6±5.0 yrs (n=9) vs. those requiring replacement of 6.1±4.9 yrs (n=5, *p-value*=0.9). Mean age of the pacer system without failure was 6.3±2.5 yrs (n=23) where the failed cohort pacer system mean age was 2.9±2.3 yrs (n=5; Figure 1, *p-value*=0.01). Adjusted for age of patient at pacemaker implantation (*p*=0.43), pacer failure was associated with pacer component age (OR 0.53 (95% CI 0.29, 0.95), *p*=0.03). Four patients had primary non-function of their pacemaker and one presented with pain that prohibited pacemaker use. Two patients had broken pacing wires identified on radiographic imaging. Six procedures were performed on these 5 patients. Two patients had replacement of their receiver and another 2 patients of their connecting wire. One patient required 2 procedures with an initial receiver change, followed by a complete replacement of the pacemaker system and scar release. All patients resumed pacing successful pacing without need for thoracotomy.

Conclusion: Patients undergoing diaphragmatic pacemaker insertion for CCHS may present with inability to adequately pace their diaphragms following insertion. Component failure is the leading cause of non-pacing. Radiographic imaging may localize the source of failure with discontinuity of the pacing wire. Receiver failure is another source of failure and isolated replacement may lead to successful pacing. Failure rate in this series is estimated at 17.9% of inserted systems without a statistical difference of failure given age of patient when implanted. Age of system has statistically higher likelihood for failure, with the older systems 47% less likely to fail with each additional year after placement. The modular pacer system allows component replacement without need for risky dissection intra-thoracically or around the phrenic nerve. Component replacement and successful diaphragm pacing may be safely accomplished with a minimally-invasive technique.

Figure 1. Kaplan-Meier Survival Curve for Diaphragmatic Pacemaker Failure



(S04) TO FREEZE OR NOT TO FREEZE: THE PECTUS SURGEON'S QUESTION.

Jorge Martinez; Luzia Toselli; Gaston Bellia-Munzon; Maxroxia Vallee; Maximiliano Nazar Peirano; Daniela Sanjurjo; Carolina Millan; Horacio Bignon; Fernando Rabinovich; Soledad Valverde; Santiago Calello; Patricio Cieri; Silvana Prodan; Ruth Kaller; Ignacio Diaz Saubidet; Enrique Buela; Marcelo Martinez-Ferro; Fundacion Hospitalaria Mother and Child Medical Center

Introduction: Recent studies have demonstrated rapid hospital discharge and low requirements of pain control medications after bilateral intercostal nerve cryoablation for minimally invasive repair of pectus excavatum (MIRPE). However, since few surgical groups have assumed this strategy, we aim to report our experience after 44 cases with this technique in order to show its potential.

Methods: We performed a prospective registry of all patients submitted to intraoperative cryoanalgesia during MIRPE in our institution since September 2018. All patients with pectus excavatum operated during this period were included.

Technique: Selective orotracheal intubation was performed. A cryosurgery system was used to cool a probe to -70 ºC. Then, under thoracoscopic control, the probe was directly applied to the intercostal nerve for 2 minutes. This was done

bilaterally along five intercostal spaces, from the 3rd to the 7th space with special care to avoid freezing adjacent tissues. Postoperative pain control was assessed with a Visual Analogue Scale (VAS).

Results: Forty-four patients were included. Ninety-three percent were males, the mean age at surgery was 15.8±3.2 years and the mean weight was 56.2±10.0 kg. The mean Haller Index was 5.6±2.3, the mean Correction Index was 41.2±11.5% and 16.7±10.5% had sternal rotation, 61% to the right and 32% to the left. Sixty-five percent had heart displacement, all to the left. Sixty-one percent of the patients received 3 bars and 39% received 2.

The mean duration of cryoanalgesia was 38.1±14.7 minutes. None received epidural anesthesia. There were no intraoperative complications. The mean length of stay was 1.6±0.9 days postoperative. Analysis of the median VAS in postoperative days 1, 2, 7 and 21 were 2, 4, 2, 1 and 0.

Conclusions: Cryoanalgesia during MIRPE allowed a rapid hospital discharge with very good pain control in all cases. Cryoanalgesia has become our first choice of treatment for pain control in the thoracoscopic correction of pectus excavatum.

(S05) THORACOSCOPIC REPAIR OF LONG GAP ESOPHAGEAL ATRESIA. WHEN SHOULD WE TRY? WHEN CAN WE SUCCEED?

Marcin Rasiewicz, MD; Katarzyna Swiatek, MD; Sylwester Gerus, MD; Krystian Toczewski, MD; Dariusz Patkowski, Prof; Department of Pediatric Surgery and Urology Wroclaw Medical University

Introduction: Esophageal atresia (EA) occurs in 1/2500 to 1/400 live births. According to the available literature patients diagnosed with long gap esophageal atresia (LGEA) comprise about 10% of this population. Treatment of this group of patients remains one of the greatest challenges in paediatric surgery. Due to the continuous development of minimally invasive surgical techniques, we can restore the native esophagus via the thoracoscopic approach.

The aim of the study was to analyze available video records of thoracoscopic repair of LGEA performed by one of the authors (D.P). We focused on anatomical factors that may impact on the final success defined as thoracoscopic anastomosis.

Materials and methods: We performed a retrospective review of video and medical records of 25 patients diagnosed with LGEA in five centers in Poland from June 2010 to August 2019. All recorded thoracoscopies were meticulously analyzed to assess the anatomy of the right hemithorax and determine the localization of esophageal ends and the gap between them in relation to vertebral bodies. Patients were divided according to the type of atresia and outcome (group 1 - success, group 2 - failure). Gross classification was used to define the type of atresia. Mann Whitney U test and Fisher exact test were used for statistical analysis.

Results: All patients except one underwent staged thoracoscopic repair with internal traction technique to elongate the esophageal ends.

Among 25 patients 15 were diagnosed with “pure” type A atresia and 10 were classified as type B. In 20 (11 type B and 9 type A) patients we succeeded with thoracoscopic anastomosis. Four out of five patients who failed thoracoscopic treatment had type A atresia. The success rate was similar in both types 73% type A vs 90% in type B. Every video record was suitable for accurate assessment of thoracoscopic anatomy. We found no significant difference in esophageal end localization and the gap between types A and B. There was a significant difference between lower end position and gap between failure and success group ($P<0,02$ and $p<0,01$ respectively). We achieved primary anastomosis in every patient with a lower end located above Th9. In the failure group, each patient’s gap was longer than 7 vertebral bodies. Median time from birth to anastomosis was 49 days. Median time from the first surgery to anastomosis was 28 days.

Conclusions: Assessing the anatomy of esophageal atresia is feasible with thoracoscopy and can be a basis for a further tailor-made treatment plan. Lower end position, as well as relative gap length, seem to be good predictors of final outcome. The thoracoscopic approach enables to repair the esophagus in a short period of time. Thoracoscopy can be performed in every case of LGEA, at least as a diagnostic procedure in the first stage. Further studies on a larger group of patients are necessary to define a group of patients feasible for successful thoracoscopic treatment.

(S06) BACTERIAL AIRWAY MICROBIOME, VOLATILE ORGANIC COMPOUNDS AND EXERCISE PERFORMANCE OF PATIENTS AFTER SURGICAL REPAIR OF CONGENITAL DIAPHRAGMATIC HERNIA

Christoph Castellani, MD[1]; Georg Singer, MD[1]; Gert Warncke, MD[1]; Lukas Schabl[1]; Elena Friehs[1]; Wolfram Miekisch, MD[2]; Ingeborg Klymiuk, PhD[3]; Ernst Eber, MD[4]; Holger Till, MD[1]; [1]Department of Paediatric and Adolescent Surgery, Medical University of Graz, Graz, Austria; [2]Department of Anesthesiology and Intensive Care Medicine, Rostock Medical Breath Research Analytics and Technologies (ROMBAT), Rostock University Medical Centre, Rostock, Germany; [3]Core Facility Molecular Biology, Center for Medical Research, Medical University of Graz, Graz, Austria; [4]Department of Paediatric and Adolescent Medicine, Medical University of Graz, Graz, Austria

Introduction: Even after surgical repair many patients with congenital diaphragmatic hernia (CDH) suffer from lifelong pulmonary sequelae. Recurrent respiratory infections and reduced physical performance capacity have been reported. Over many years the peripheral respiratory tract was assumed sterile. However, recent microbiological advancements demonstrated that the lung harbors a diverse array of microbes, whose dynamic composition is influenced by host and environmental factors. Volatile organic compounds (VOCs) can be detected in exhaled breath samples and allow reflections on bacterial and human host metabolism. In CDH patients airway microbiome, VOC profile, lung function and performance capacity in CDH patients have never been compared healthy age and sex-matched controls.

Patients and Methods: After ethical approval all patients treated for CDH at our department (age 6-18 years at follow-up) were invited to participate in this study. A total of 9 patients (median age 11 years) could be recruited. Lung function testing was performed as nitrogen multiple breath washout body plethysmography. The physical performance was evaluated by exhausting bicycle spiroergometry. Airway microbiome was determined from deep induced sputum by 16S rRNA gene sequencing. VOCs were sampled by needle trap microextraction in the end-expiratory phase and measured by GC-MS.

Results: There was no difference in size, body weight and BMI between the two groups. CDH patients showed significantly reduced Tiffenau Index (p=0.028). Body plethysmography revealed significantly increased residual volume/total lung capacity (RV/TLC; p=0.008) and significantly decreased mean expiratory flow (MEF25-75%; p=0.036). Additionally, there was a trend towards higher RV and Scond in the CDH group. Spiroergometry showed no statistically significant differences between the groups. Microbiome analysis revealed no statistically significant differences for alpha-diversity and beta-diversity. CDH patients exhibited significantly lower relative abundances of Pasteurellales (p=0.038) and Pasteurellaceae (p=0.038) compared to healthy controls. Exhaled VOC profile showed significantly higher levels of Cyclohexane (p=0.004) and significantly lower levels of Acetone (p=0.002) and 2-Methylbutane (p=0.038) in CDH patients.

Conclusion: This is the first study to report on airway microbiome and VOC profile in CDH. Alterations of the microbiome were minor and the clinical consequence of reduced Pasteurellaceae remains unclear at present. Elevations of Cyclohexane observed in our CDH group have also been reported in cases of lung cancer and pneumonia. The majority of our CDH patients showed signs of an obstructive pulmonary disease. CDH patients had no signs for impaired physical performance capacity adding further data to controversial reports in the literature in this regard. Future larger scale multi-center studies will be required to confirm these first results.

(S07) LONG-TERM OUTCOME AFTER MINIMAL-INVASIVE REPAIR OF CONGENITAL DIAPHRAGMATIC HERNIA CAN BE IMPROVED BY TECHNICAL ADJUSTMENTS

Katrin B Zahn, MD[1]; Thomas Schaible, Prof[2]; Lucas M Wessel, Prof[1]; [1]UMM Mannheim, Dept. of Pediatric Surgery; [2]UMM Mannheim, Dept. of Neonatology

Purpose: In literature higher recurrence-rates have been reported for minimally invasive surgery (MIS) compared to open surgery (OS) already during the first hospital-stay. Also, higher recurrence-rates have been reported after MIS-patch-implantation and therefore the longterm-efficacy has been questioned. The purpose of this study was to critically review all patients operated within 10 years to draw conclusions how to improve long-term-efficacy.

Methods: Follow-up-data was collected prospectively within a structured follow-up program and regular radiologic imaging was performed to screen recurrence. Results of patients with a minimal follow-up of two years are presented. Fisher's exact test was used for analysis.

Results: Between 2008 and 2017 355 patients were operated by OS, 101 by MIS and 29 converted from MIS to OS. After exclusion of patients, who deceased, received ECMO-therapy or were lost to follow-up, 95 MIS-patients were compared to 173 nonECMO OS-patients. Patch-rate was 25% in MIS and 81% in OS ($p<0.000001$). In MIS recurrence-rate was 15.5% after primary and 12.5% after patch-repair ($p=1.0$). In OS it was 3.1% after primary and 7.1% after patch-repair ($p=0.7$). Nevertheless the difference in recurrence-rate for primary and patch repair between MIS and OS was not significant (primary repair: $p=0.1$; patch-repair: $p=0.4$). Due to the high recurrence-rate in MIS a few technical adjustments were made since 2014. Comparing 58 MIS-patients before to 37 MIS-patients after these changes, recurrence-rate dropped from 20.7% to 5.4% ($p=0.07$). We observed only one in-hospital recurrence. In MIS most recurrences developed within the first year of life and all were symptomatic (67%). Older children showed no or unspecific symptoms and were diagnosed on follow-up-visits. One child deceased due to unrecognized recurrence with bowel gangrene and lethal septicaemia. No small bowel obstruction due to adhesions was observed after MIS, one patient developed a partial volvulus requiring surgery.

Conclusion: Careful patient-selection is essential for favourable long-term outcome in MIS-repair of congenital diaphragmatic hernia. Hernial sacs should be resected. It is crucial to reduce tension on the diaphragm and preferable to implant a patch in patients with missing lateral diaphragmatic rim. It is essential to promote scarring of the diaphragm in primary repair and adhesions between prosthetic material and diaphragm to prevent recurrence, because patients do not develop intestinal adhesions. Thus small recurrences bear the risk of intestinal incarceration, bowel gangrene and lethal septicaemia. Long-term follow-up with regular radiologic imaging and detailed parent-counseling is therefore mandatory. With rising experience and meticulous technique recurrence-rates similar to those in open surgery seem to be achievable. Yet longterm follow-up until adulthood has to be awaited for final judgement on efficacy.

(S08) HAVE YOU EVER HEARD ABOUT ARCHAEA? PROBABLY NOT! SO WHAT ARE THESE MICROBES DOING IN THE DEEPER AIRWAYS OF CHILDREN FOLLOWING ESOPHAGEAL ATRESIA REPAIR?

Georg Singer, MD[1]; Christoph Arneitz, MD[1]; Christoph Castellani, MD[1]; Marcus Blohs, MSc[2]; Christine Moissl-Eichinger, PhD[2]; Holger Till, MD[1]; [1]Department of Paediatric and Adolescent Surgery, Medical University of Graz, Graz, Austria; [2]Diagnostic and Research Center for Molecular BioMedicine, Medical University of Graz, Graz, Austria

Introduction: Archaea, formerly termed archaebacteria, constitute a separate domain of single cell organisms that are biologically different to bacteria. One of their unique features is methanogenesis. Until now there are no known pathogens in the domain of archaea. While archaea have been known to inhabitate the gastrointestinal tract for several decades, their occurrence in the pulmonary tract especially in children remains unknown. For the first time ever the archaeome was assessed in patients following esophageal atresia (EA) repair and compared to a healthy age- and sex-matched control group.

Methods: Patients (>12years) following correction of EA were invited for a long-term follow-up examination. Deep induced sputum samples were collected. Samples were subjected to DNA extraction, archaea-specific amplicon generation (16S rRNA gene) and next generation sequencing (Illumina Miseq; Pausan et al., 2019). Raw reads were

bioinformatically processed (Qiime2), and results were compared to an age- and sex-matched control group consisting of healthy patients recruited from the families of the medical staff.

Results: 19 patients (9 female, 10 male) following EA with a mean age of 24.7 years (range 14-40) could be recruited. The control group consisted of 19 healthy patients (9 female, 10 male). While archaea could be found in 6 out of 19 EA patients (32%), archaeal signatures were present in only one out of 19 control patients (5%). In the EA patient the signatures belonged to Methanobrevibacter, a group of Euryarcheota, in five patients and a mixture of Methanobrevibacter and Candidatus Nitrosotenuis (a genus of Thaumarchaeota, potentially aerobic ammonia-oxidizing archaeon) in one patient. In the control patient Candidatus Nitrosotenuis was found.

Conclusion: This is the first study to reveal archaea in the airway microbiome of almost a third of the patients following correction of EA. Our findings and their clinical implication have to be further examined in larger scale multi-centric studies.

(S09) THE USE OF INDOCYANINE-GREEN FLUORESCENCE IMAGING FOR PERFUSION ASSESSMENT OF COMPLEX PEDIATRIC ESOPHAGEAL ANASTOMOS

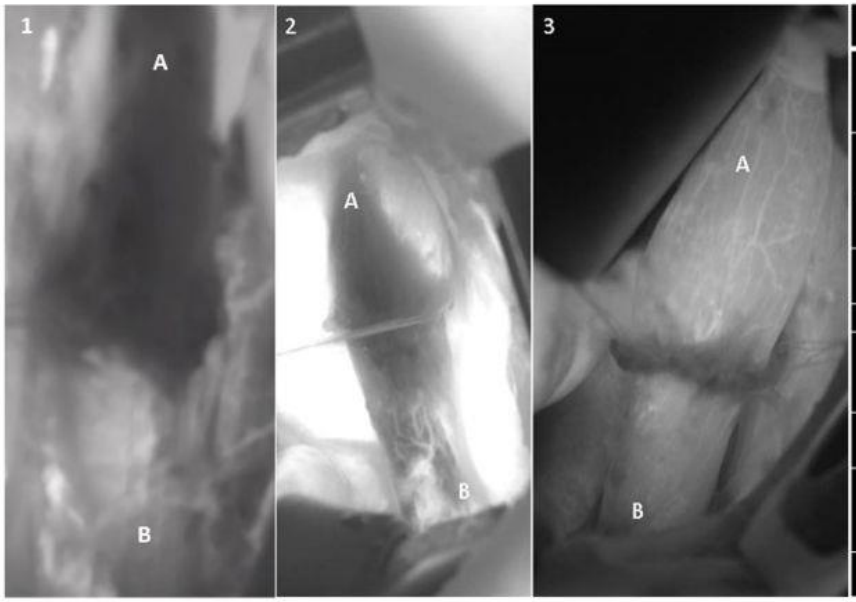
Ali Kamran; Thomas E Hamilton; Peter Ngo; Michael Manfredi; Jessica Yasuda; S Clark; Russell W Jennings; Benjamin Zendejas; Boston Children's Hospital

Background: Blood flow is critical for healing of esophageal anastomoses. We sought to evaluate the use of indocyanine-green (ICG) fluorescence imaging to assess the perfusion of esophageal anastomoses in children.

Methods: We reviewed children who underwent a complex esophageal anastomosis at our institution and had an ICG perfusion assessment of their anastomosis. We evaluated changes in intra-operative decision making directly attributed to ICG perfusion assessments. From the video recordings of each assessment, we defined perfusion features to develop a scoring system. Anastomotic perfusion scores were compared between patients with favorable and poor anastomotic outcomes. Poor anastomotic outcome was defined as a clinically significant leak, need for ≥6 dilations in first year post-anastomosis, need for advanced endoscopic therapy (i.e. stenting, endoscopic-vacuum assisted therapy [e-vac]) or stricture resection.

Results: In a one-year period, 43 children (53% female), median age of 13 months (IQR: 5-31 months), with history of esophageal atresia (EA; n=40, 40% type A or B), caustic esophageal injury (n=1), esophageal peptic stricture (n=1), or acquired trachea-esophageal fistula (n=1), underwent 45 complex esophageal anastomoses. Procedures included primary (n=6) or delayed anastomosis after traction (Foker; n=15), stricture resection (n=10) or plasty (n=2), jejunal interposition (n=7) or primary repair of esophageal leak (n=1) or trachea-esophageal fistula (n=2). We encountered five instances of changes in intraoperative plan that were directly attributed to ICG assessments which ranged from imbrication or reinforcement of a poorly perfused area, to converting from a stricture resection to a jejunal interposition. Thirty-four (76%) videos were suitable for anastomotic perfusion scoring. Perfusion features identified included: strength and speed of perfusion signal uptake, extent of hypoperfusion, symmetry between each side of the anastomosis, and the width of the anastomotic ischemic penumbra (Figure). Median anastomotic perfusion score was 15, (range 8-20, possible scores 3-20). With a median follow up of 4 months (IQR: 2-10 months) 9 (20%) patients experienced poor anastomotic outcomes (6 leaks, 4 with ≥6 dilations, 4 stents, 4 e-vac, 4 stricture resections; patients often fell into more than one category). Anastomotic perfusion scores were significantly lower in patients who experienced a poor anastomotic outcome versus those who did not (mean ±SD; 11.9±3 vs. 15.6±2.4, p=0.009). Greater anastomotic perfusion scores were significantly correlated with lesser risk for poor anastomotic outcome (r=0.29, p=0.001); similarly, greater perfusion scores were associated with fewer number of endoscopic dilations in the first year post-anastomosis (p=0.02). Patients with an anastomotic perfusion score of >12 had a 70% decrease in risk (relative risk 0.3, p=0.02) of a poor anastomotic outcome.

Conclusions: The use of indocyanine-green fluorescence imaging is useful to assess the perfusion of complex pediatric esophageal anastomoses. This technology provides real-time information that can help identify anastomotic areas of hypoperfusion which can be addressed intraoperatively to decrease the risk of anastomotic complications. Furthermore, our novel anastomotic perfusion scoring system helps identify anastomoses at risk for poor outcome. Future validation efforts of this scoring system in other settings and types of anastomoses are needed to corroborate these findings.



4	Upper (10)	Lower (10)
Strength of Perfusion	Robust	Robust
	Int. (-1)	Int. (-1)
	Weak (-2)	Weak (-2)
Hypoperfusion	None	None
	Scattered (-1)	Scattered (-1)
	Segmental (-2)	Segmental (-2)
	Global (-3)	Global (-3)
Speed of Perfusion	Fast	Fast
	Slow (-1)	Slow (-1)
Seg. Score	**Possible 4-10**	**Possible 4-10**
Symmetry	Symmetric [+/+]	
	Asymmetric [+/-] (-1)	
	Symmetric [-/-] (-2)	
See posterior wall?	Yes	
	No (-1)	
Width of anastomotic ischemia	None	
	1-2mm (-1)	
	>2mm (-2)	
Total Score	**Possible Range 3-20**	

Figure (Panels 1, 2, 3, 4): Examples of different ICG perfusion assessments. Panel 1= patient with history of caustic esophageal stricture undergoing a stricture resection with primary anastomosis with resulting global hypoperfusion of upper esophageal segment (A), perfusion score of 10. Panel 2= Patient with a history of long gap esophageal atresia (LGEA) with anastomosis after Foker procedure with a segmental hypoperfusion area of the upper esophageal segment (A) and scattered hypoperfusion of the lower segment (B), perfusion score of 8. Panel 3= Patient with a history of LGEA after Foker procedure with excellent perfusion throughout, perfusion score of 19. Panel 4= Perfusion assessment scoring system, each segment starts with a max score of 10 and as signals of hypoperfusion are identified these detract negative points to generate an upper and lower esophageal segment score, these segments are then compared with regards to their degree of symmetry to generate a total anastomotic perfusion score (range 3 to 20).

GI & HPB Scientific Session

Monday, September 14, 2020

Moderators/Panelists: Drs. David Van der Zee, Maximiliano Maricic, Bradley Segura, Satoshi Ieiri, Hanna Alemayehu, Matthew Clifton

(S10) ARE POSTERIOR CRURAL STITCHES NECESSARY DURING LAPAROSCOPIC FUNDOPLICATION?

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INTRODUCTION: Previous research has shown that minimal esophageal mobilization during laparoscopic pediatric fundoplication decreases the rate of wrap transmigration, while the placement of esophageal-crural sutures does not offer any advantages in preventing wrap migration. Our aim was to determine the need for posterior crural sutures during laparoscopic fundoplication.

METHODS: This was a retrospective review of patients >1 month old who underwent a primary laparoscopic fundoplication from 2010-2019. Demographic, surgical, and outcome data were recorded. Primary outcome was transmigration of the fundoplication wrap. Analysis was performed using STATA® (StataCorp, College Station, TX); p-value < 0.05 was statistically significant.

RESULTS: There were 181 patients included. The median age was 7.2 months (IQR 3.7, 17.0) with 59% being male patients. 61 (34%) patients received posterior crural stitches and 120 (66%) did not receive stitches according to staff preference. The stitch group had a median of 1 (IQR 1, 1) posterior crural stitches placed. Pre-operative symptoms included poor oral intake resulting in failure to thrive (n=83, 46%), retching (n=48, 27%), and acute life-threatening events (n=37, 20%). The most common imaging study obtained was an upper gastrointestinal study (n=113, 62%). Comparisons between the stitch group and no-stitch group are shown in Table 1. There was no difference in the incidence of wrap migration, the number of patients requiring a workup for recurrent symptoms or reoperation between the two groups (Table 1). A significantly higher percentage of patients in the no-stitch group underwent concurrent procedures; when controlled for this, there was no difference in the median operative time between the two groups (p=0.18).

CONCLUSION: Similar to esophageal-crural sutures, placement of posterior crural sutures does not prevent wrap migration and may not be necessary for prevention of wrap herniation in pediatric laparoscopic fundoplication.

Table 1: Intra-operative and long-term comparisons between patients with vs those without posterior crural stitches.

: Intra-operative and long-term comparisons between patients with versus thoses without posterior crural s

	Stitches (n=61)	**ral Stitches (n=120)**	
Age at Surgery (months)	, 16.0)	, 17.4)	
s Abdominal Surgery			
tomy Tube Placed During Operation			
Follow-up (months)	.6, 56.4)	.7, 50.6)	
for Recurrent Symptoms			
ansmigration			
ation within 1 Year			

(S11) ESOPHAGEAL FOREIGN BODY MANAGEMENT IN CHILDREN: CAN IT WAIT?

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Introduction: Pediatric foreign body ingestion remains a common reason for emergency room (ER) visits. Both pediatric surgeons and pediatric gastroenterologists share the load of these cases. With different specialties involved, a wide variety of urgency is seen. It is well accepted that button batteries are a surgical emergency, requiring immediate removal. However, timing of removal for other foreign bodies remains controversial. We hypothesize that there is no difference in complication rate or successful removal of esophageal foreign bodies that wait until the following day for removal.

Methods: A retrospective chart review for cases involving esophageal foreign bodies from November 2015 to November 2019 was performed. Outpatient procedures and patients ingesting a button battery were excluded. Patients were divided into two groups based on arrival to ER, daytime (05:00-16:59) and nighttime (17:00-04:59). All patients had imaging confirming a foreign body in the esophagus. Demographic data included age, gender, procedure, and performing physician. Additional data included time of presentation, time of procedure, presenting symptoms, location of the foreign body, and lastly complications within 30 days. Statistical analysis was performed.

Results: After excluding button batteries, a total of 273 children underwent a procedure for esophageal foreign body removal during this four-year time frame. Two-thirds of the children presented in the nighttime group. A significant difference was identified in the median time from ER to the operating room when comparing daytime (194.8 minutes; IQR: 108.5-347) versus nighttime groups (643 minutes; IQR: 471.5-745) ($p<0.001$). Nine children had a complication or readmission within 30 days of their procedure with no significant difference between the groups ($p=0.94$). In addition, 25 patients had migration of their foreign body into the stomach from presentation time to procedure time, also with no significant difference between the two groups ($p=0.98$). Of note, 100% of foreign bodies were removed successfully.

Conclusion: We have found that waiting until the following morning had minimal impact on complications or success rate when removing esophageal foreign bodies. Many institutions lack in-house operating room personnel and require mobilization of an anesthesia and operating room team for nighttime emergencies. By waiting until morning, resources and staff remain available for more pressing emergencies.

(S12) LAPAROSCOPIC-ASSISTED LONGITUDINAL INCISION AND TRANSVERSE ANASTOMOSIS FOR TREATMENT OF CONGENITAL LOWER ESOPHAGEAL STENOSIS CAUSED BY TRACHEOBRONCHIAL REMNANTS: EXPERIENCE FROM A SINGLE-CENTER

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Purpose: To review the treatment of lower congenital esophageal stenosis caused by tracheobronchial remnants (TBR) and introduce an effective method of cartilage resection under endoscopy.

Methods: From January 2016 to December 2019, 13 patients of TBR underwent the surgery in our department of pediatric surgery. Patients admitted before 2018 received resection of cartilage with esophageal stenotic segment and end-to-end anastomosis through open surgery. After 2018 we ameliorated the procedure to longitudinal incision with partial resection of cartilage in anterior wall of esophagus and transverse suture through laparoscopy or thoracoscopy, to protect the vagus nerve and to avoid pyloroplasty. We reviewed the treatment of these patients and analyzed the advantages of the new procedure.

Main Results: 13 patients received surgery at an average age of 19.8±10.1 months (range 6.5 to 45.5, M=15.5). 9 cases were congenital esophageal atresia accompanied with stenosis in the distal part of esophagus and 4 cases were congenital lower esophageal stenosis with tracheobronchial remnants simply.

5 patients received resection of stenotic segment and end-to-end anastomosis of esophagus and pyloroplasty from laparotomy. Anastomotic leakage occurred in two cases and cured by drainage and conservative treatments. Two cases

presented anastomotic stricture postoperatively and had been improved obviously by one time balloon dilation. The administration of parenteral nutrition (PN) was 9.0±1.4 days (M=9) and the hospitalization was 36.6±5.2 days (M=35). The use of proton-pump inhibitor lasted for 2 to 8 weeks (M=2) postoperatively.

8 cases received longitudinal incision with partial resection of cartilage and transverse suture. Seven cases were under laparoscopy and one was under thoracoscopy since the stenosis with cartilage located in lower middle part of the esophagus. Compared to end-to-end anastomosis, no leakage occurred in these patients. Anastomotic stricture were found in 6 cases postoperatively and improved obviously after 1 to 5 times (M=2) of dilations. The administration of PN was decreased to 7.6±4.7 days (M=7, p=0.456) and the time of hospitalization dropped to 18.6±6.9 days (M=21, p<0.001). The use of proton-pump inhibitor last for 2 to 24 weeks (M=12) postoperatively.

13 patients have been followed up for 0.5-45 months (M=13) after the surgery. 12 patients were fed by normal diets now, showing good physical and mental development without gastroesophageal reflux. One case (2 weeks after the surgery) was fed by soft diet now.

Conclusions: Longitudinal incision and transverse anastomosis of the anterior wall of the esophagus with partial resection of cartilage is an effective method to treat the TBR patients and minimal invasive surgery is a good option.

(S13) TRANSANAL PROCTECTOMY: A SERIES OF 7 PEDIATRIC PATIENTS

Michael D Traynor, MD; D D Potter, MD; Mayo Clinic

Background: Minimally invasive (MIS) approaches have consistently shown advantages for surgical intervention in inflammatory bowel disease. Recently, transanal approaches to rectal surgery have gained acceptance in adult patients for total mesorectal excision and completion proctectomy. The use of transanal approaches may have particular advantages for pediatric surgery where a small pelvic working space and single-incision mechanics can make operations such as proctectomy difficult. We report short-term outcomes of transanal completion proctectomy (taCP) during single-incision surgery for inflammatory bowel disease.

Methods: All patients (age≤19) underwent taCP from January 1, 2018 to December 31, 2019. Prior total abdominal colectomy (TAC) was performed using a single-incision technique. At operation, patients underwent single-incision laparoscopy with taCP. The sigmoid colon and upper rectum were dissected laparoscopically using LigaSure through the ileostomy site. A transanal mucosectomy was then performed beginning 1 cm proximal to the dentate line and transitioned to full-thickness resection after 4-5 cm. A glove port was then placed transanally and the rectum was removed using LigaSure under endoscopic visualization. Patient demographics, pre- and peri-operative details, and post-operative complications were abstracted.

Results: Seven patients (n=6, 86% female) with a median age of 18 years [Range: 13-19] were included in this initial series. All patients had a prior TAC with end-ileostomy with taCP occurring a median of 6 [Range: 3-89] months after TAC. Six of 7 (86%) had a diagnosis of ulcerative colitis (UC) while 1 patient (14%) had Crohn's colitis. For patients with UC, taCP was part of an ileal pouch-anal anastomosis with the majority (n=4, 67%) proceeding as a modified-two stage (TAC followed by IPAA without diversion) and the remaining (n=2, 33%) a three-stage approach. A single-incision laparoscopy through the prior ileostomy site was used in all IPAA patients. Median operative time was 226 [Range: 150-264] minutes with no conversions to more invasive technique. Median hospital length of stay (LOS) was 5 [Range: 2-8] days.

In-hospital complications occurred in two patients (29%) who had watery diarrhea that prolonged LOS but did not result in problems post-discharge. One patient (14%) was readmitted for bowel obstruction that resolved with placement of red rubber catheter at the ileostomy site.

Of the 4 patients with a functioning ileal pouch, 1 patient reported 6-10 bowel movements per day, while 3 others reported ≤5 bowel movements per day. Half (n=2) of patients reported 1-2 nocturnal bowel movements. No patients reported soiling or leakage, though one patient had a single episode of incontinence.

Conclusion: Minimally invasive transabdominal completion proctectomy can be challenging in pediatric patients. In this pilot series, transanal proctectomy was effective and safe. Future work should compare traditional MIS completion proctectomy to taCP for applications in pediatric inflammatory bowel disease.

(S14) FROZEN SECTION DOUGHNUTS OBTAINED WITH A 5MM STAPLING DEVICE IMPROVES OUTCOMES IN LAPAROSOPCI ENDORECTAL PULL THROUGHS FOR HIRSCHPRUNG'S DISEASE

John M Hallett[1]; Timothy Bradnock[2]; Gregor Walker[2]; [1]The University of Edinburgh; [2]The Royal Hospital for Children, Glasgow

A primary pull-through for Hirschsprung's disease (HD) requires confirmation of normal ganglionic bowel by intra-operative biopsies. Despite this, abnormally ganglionated bowel is not fully resected (so called "transition zone pull-throughs") in 15-19% of patients reported in the literature. We hypothesise that this may result from insufficient biopsies sent for intra-operative diagnosis.

A new biopsy protocol has been developed in our institution for patients undergoing a laparoscopic-assisted endorectal pull-through for HD. Laparoscopic seromuscular biopsies are taken as per standard practice and are reported intra-operatively to identify the most distal site of ganglionated bowel. A 5mm laparoscopic stapling device is used to divide the bowel at the proposed proximal resection margin and 2cm distally. This "doughnut" of bowel was then sent for frozen section and four quadrant sampling was undertaken to clarify ganglion cells and neural hypertrophy. If there was any doubt in the normality of these biopsies a second, more proximal doughnut was taken. The divided end is sutured to the distal bowel with 2 different coloured sutures to ensure the bowel is not twisted during delivery through the anus.

Between 2015 and 2020, 21 patients underwent a primary laparoscopic endorectal pull-through for HD using the doughnut biopsy protocol. 16 patients were male. Mean patient age at the time of surgery was 3 months (range 1 – 6 months) and the mean weight at the time of surgery was 6.5kg (range 4.1 - 8.54kg)

There was one case of stapler malfunction (5%), where a 10mm endo-GIA stapling device was introduced after the stapler jammed. No patient suffered from spillage of enteric content, intra-operative bleeding or injury to visceral or vascular structures. In all 21 cases, initial laparoscopic biopsies were reported showing normal ganglionated bowel, In two cases (10%) the laparoscopic doughnut influenced the resection margin. In both cases the segments of the doughnuts were aganglionic and a second doughnut (more proximal) was sent.. No patients had transition zone resections on final histology (mean clear margin 45.55 mm, range 11-72 mm).

Median follow up is 24 months (range 2-53 months). No patients had ongoing symptoms of HD caused by a transition zone pull through. One patient (with Down Syndrome) had issues with colonic distension and has had a colostomy despite a ganglionic pullthrough (confirmed by subsequent normal biopsies).

In conclusion intra-operative frozen sections taken from doughnuts of bowel retrieved using 5mm laparoscopic stapling devices is safe, has resulted in a 0% rate of transition zone pull throughs whilst reducing the potential of spillage of enteric contents. We would recommend this protocol for all patients undergoing primary endorectal pull throughs.

(S15) RE-SUTURING WITHOUT ENTEROSTOMY FOR THE TREATMENT OF ANASTOMOTIC DEHISCENCE OR LEAKAGE AFTER LAPAROSCOPIC SOAVE PROCEDURE IN HIRSCHSPRUNG DISEASE

Shuiqing Chi; Shao-tao Tang; Jialing Guo; Wuhan Union Hospital

Background: In the era of minimally invasive surgery, people have higher requirements for beauty. With the maturity of technology, postoperative complications gradually decrease, but it is still inevitable. Complications managed by surgery will affect the patient's cosmetic appearance. Anastomotic dehiscence or leakage is one of the complications of Hirschsprung's diseases (HD) postoperatively, which may lead to abdominal cavity infection, pelvic antrum formation. At present, the most common management is enterostomy. This study aimed to explore the safety and feasibility of re-

suturing without enterostomy treating anastomotic dehiscence or leakage after laparoscopic Soave procedure in Hirschsprung's disease.

Methods: From March 2014 to July 2019, 503 patients underwent laparoscopic Soave procedure in our center, 12 of them had anastomotic dehiscence or leakage. Moreover, there were another four referral anastomotic leakage patients from other hospitals. All medical records of 16 patients who had anastomotic dehiscence or leakage were reviewed, including abdominal symptoms, the occurrence time, and the causes of anastomotic dehiscence or leakage. Twelve patients underwent re-suturing without enterostomy. we cleared the posterior rectal abscesses, irrigated the abdominal cavity by laparoscopic visualization, and released the abdominal adhesions, then sutured the anastomosis with 4-0 Vicryl. We preserved a presacral drainage tube for 5-7days. Two patients who had severed peritonitis received re-suturing with an ileostomy. Another two patients who had severe peritonitis and anastomotic ischemia only received colostomy.

Results: The average age of anastomotic dehiscence or leakage patients was 31.5 months, significantly older than patients without leakage (13.8 months). Among the 16 patients, 14 of them were recto-sigmoid type, and the other 2 were long segment type. All of them had laparoscopic-assisted Soave procedure as their first operation. Five leakages were at the 3-6 o'clock position and the other seven at 6-9 o'clock position. The average re-suturing time was 6.4 ± 2.8 days (2-13d), and all 12 patients received good prognoses. The mean follow-up time was 35.6 ± 20.6 months (5-69m). All 12 patients have a mean defecation frequency 2-3 times/day, without soiling. In group re-suturing with an ileostomy, postoperative fever lasting time and hospital stay time were shorter.

Conclusion: Early re-suturing of anastomotic dehiscence or leakage after laparoscopic Soave procedure of Hirschsprung's disease without enterostomy could be a safe, effective and pleasing treatment.

(S16) SEQUENTIAL TRACK & INTESTINAL GATHERING "STRING TECHNIQUE"

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Introduction: Consecutive laparoscopic biopsies require some technical skills. In order to simplify the complexity and operative time of this procedure we present a new technique to perform multiple intestinal biopsy: The STRING Technique. Its development and refinement was carried out in an inanimate model and then applied in patients with Hirschsprung and Visceral Myopathy diagnosis.

Methods: Inanimate model: a video surgery trainer (MTBox1®) connected to a Video Endoscopy Camera System Tower. Instruments: 1) 4 mm 30 degrees scope; 2) 3 mm instrument 3) 3 different types of 2-0 suture with SH1 needle and 4) bovine intestinal viscera.

Technique: one port is placed for the 4 mm scope and a stab incision in the flank is used for the 3 mm instrument.

Step 1: After selecting a segment, take the intestinal loop with a transparietal stitch with the assistance of endo-surgical instruments. By doing so, one would achieve "hanging" the intestine from the simulator's cover. This maneuver is performed in each selected area to be biopsied using different suture colors in order to then identify each intestinal section.

Step 2: All the strands of the sutures are taken with an endo-surgical instrument and they are externalized outside the cavity through the scope port.

Step 3: By pulling the externalized strands, the intestinal area taken with the color stitch given in step 1, is selectively eviscerated through the scope port. Biopsy is performed outside the cavity with conventional instruments and then the intestine is reintroduced by the same site.

After validation and improvement in the endo trainer, this technique was reproduced in 5 patients. 4 of them, to determine the extent of Hirschsprung's disease and one to confirm visceral myopathy diagnosis.

Quantitative variables expressed in median and range were: age, operative time, oral tolerance time, hospital discharge time. The qualitative ones were: gender, complications and anatomopathological result.

Results: Five patients were operated with this technique. One female and 4 male. Age (range 4 - 24 months). The total operative time was 30 minutes (range 25-40 minutes) for taking 4 biopsies. Oral tolerance was restored within 12 hours after surgery (range 6 - 24 hours). The hospital discharge was 24 hours PO (range 12 - 72 hours). There were no complications. The biopsy confirmed visceral myopathy in one case and determined the extent of the disease in the rest.

Conclusion: The STRING Technique was born in the operative limitations of video surgery. Its development and improvement in inanimate models have been reproduced in vivo guaranteeing its feasibility and safety. We believe that the use of simple maneuvers reduces surgical time and extends the use to most operators.

(S17) CAP-ANASTOMOSIS VERSUS COMPLETE EXCISION FOR CYSTIC TYPE CHOLEDOCHAL CYST:?40 YEAR ULTRA LONG-TERM FOLLOW-UP OF 204 CASES.

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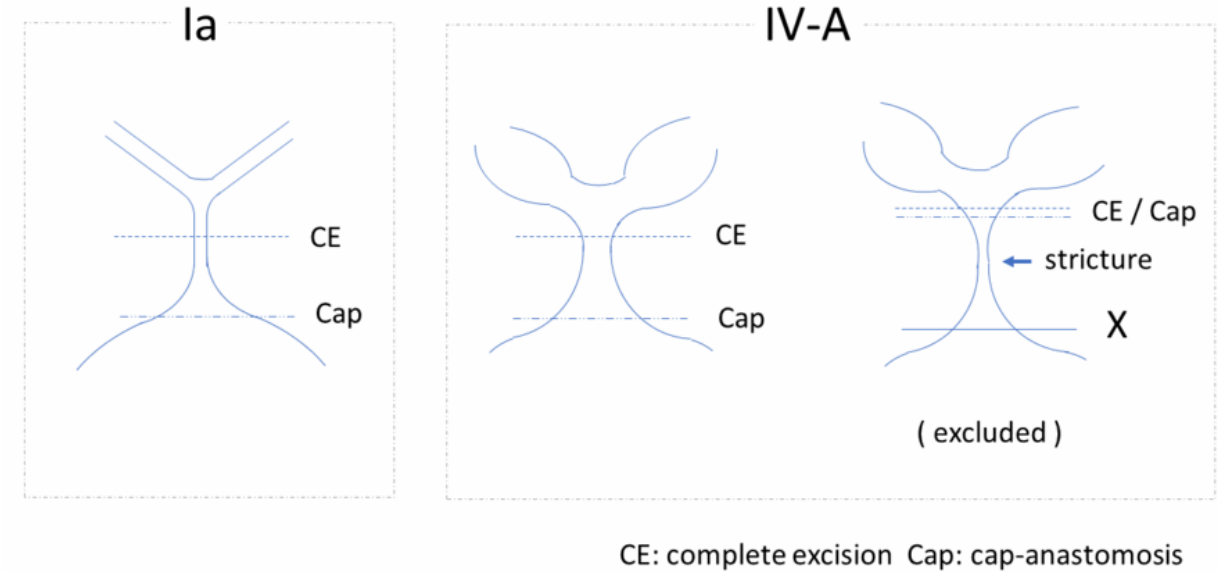
Aim: Laparoscopic choledochal cyst repair is common, but somewhat controversial, because some surgeons believe that the entire dilated choledochal cyst (CC) should be excised completely (CE), necessitating complex Roux-en-Y hepaticojejunostomy (HJ) reconstruction (Figure-1), which is technically demanding to perform laparoscopically, while others prefer to decrease the complexity of reconstruction, leaving some 10-20mm of proximal cyst wall as a cap (Cap) to facilitate the HJ anastomosis. We compared Cap with CE for treating CC, focusing only on ultra long-term patients, followed-up for at least 20 years (maximum duration: 40 years).

Methods: 204 pediatric CC patients diagnosed between 1978 and 1998 and followed-up for at least 20 years were reviewed retrospectively. Fusiform/non-dilated type CC and CC requiring intrahepatic bile duct (IHBD) plasty were excluded (n=118), leaving 86 cystic type CC (Cap=44; CE=42). Types of CC were: Ia: (n=50; Cap=24; CE=26) and IV-A: (n=36; Cap=20; CE=16). Magnetic resonance cholangiopancreatography (MRCP) was performed routinely every 2 years postoperatively in Cap cases, and when indicated in CE cases. Histopathology results for Cap cases were also reviewed.



Results: Mean age at surgery (Cap 4.8, CE 3.3 years old), gender ratio (Cap 9m/33f, CE 6m/38f), mean follow-up period (Cap 28.1, CE 30.8 years), diameter of cyst (Cap 43.7, CE 48.2 mm) were similar. There was no perioperative complication. Mean diameter of the hepatic orifice at the HJ anastomosis was 15.8mm (range: 10-20 mm) in all Cap cases and 14.8 mm (range: 10-20 mm) in type Ia Cap cases. Differences in perioperative complications were not significant according to type of repair, specifically, HJ anastomotic stricture: Cap=1 (2.3%, 14 years post operatively) versus CE=1 (2.4%, 13 yrs post-Op); calculi: Cap=1 (2.3%, 14 yrs post-Op) versus CE=3 (7.1%, 9, 15, 25 yrs post-Op); pancreatitis: Cap=0 (0%) versus CE=1 (2.4%, 9 yrs post-Op), and ileus: Cap=2 (4.8%, 5, 12 yrs post-Op) versus CE=2 (4.5%, 4, 6 yrs post-Op). Type Ia CC were involved in 24 Cap cases and 26 CE cases; of these there was one case of calculi for each type of repair: Cap (n=1; 4.2%) and CE (n=1; 3.8%). Cap histopathology showed two hyperplasia. No malignant transformation has been identified on routine MRCP performed for a mean of 29.5 years (range: 20-40 years).

Conclusions: Cap does not appear to be associated with extra morbidity or malignancy in Ia and IV-A cystic type CC on ultra long-term follow-up and is easier to perform than CE.

(S18) COMPARISON WITH OPEN SURGERY TO LAPAROSCOPIC SURGERY FOR CONGENITAL BILIARY DILATATION SURGERY IN INFANTS; SEMI-EMERGENCY SURGERY FOR BILIARY SYMPTOMS IN PRENATAL DIAGNOSIS PATIENTS WILL UNDERGO SAFELY AND EFFECTIVELY IN LAPAROSCOPY.

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Purpose: Radical surgery for congenital biliary dilatation (CBD) in infants under one year of age requires advanced skills due to their small size. In addition, the timing of surgery for prenatal diagnosis of CBD is not clearly defined. We have been introducing laparoscopic surgery for CBD since 2013. In this study, we examined whether laparoscopic surgery for CBD in infants can be performed safely and effectively, comparing to open surgery. Next, the appropriate timing for laparoscopic radical operation in prenatal diagnosis cases was considered.

Methods: Twenty-one infant patients with CBD underwent surgery from January 2006 to December 2019. In cases of prenatal diagnosis, elective surgery in patients with no biliary symptoms (at about 6 month-old) was basically adopted. If patients had any biliary symptoms, they underwent semi-emergency surgery. Patients were divided into two groups, laparoscopic surgery (Lap group) and open surgery (Op). The operation time, the amount of blood loss, length of hospital stay (LOS), and postoperative complications were retrospectively compared between the two groups. In the Lap group, the outcomes of cases who required semi-emergency surgery (EM group) were also compared with those of the patients who underwent elective surgery (EL group).

Results: Fourteen patients and 7 patients were included in the Lap group and in the Op group. The age at surgery was 3 and 6 months ($p=0.08$), the body weight was 5.6 and 7.1 kg ($p=0.26$), respectively. Operative time was longer in Lap group (358 vs. 243 min, $p<0.05$), the amount of blood loss was less in the Lap group (19 vs. 82ml, $p<0.05$). Intrahepatic bile ductoplasy was required in 12 (86%) and 7 (100%) cases ($p=0.53$). Postoperative complications were similar (4 vs. 1, $p=0.62$). The length of hospital stays (LOS) was 10 and 13 days ($p=0.26$). Eight cases in the Lap group and 3 cases in the Op group had the prenatal diagnose, 7 (50%) and 5 (71%) cases had the preoperative symptoms, respectively. Semi-emergency surgery was performed in 6 of the Lap group. In comparison with EM group (N=6) to EL group (N=8), body weight at surgery was smaller in EM group (4.6 vs. 7.2kg, $p<0.05$). Operative time and the amount of blood loss were similar between the two groups (350 vs. 389 min., $p=0.25$, 12 vs. 22ml, $p=0.20$). Postoperative complications and LOS were similar between the two groups (2 vs. 2 cases, 10 vs. 11 days).

Conclusion: Laparoscopic surgery for infants with CBD took a long time, but the amount of bleeding was less. The postoperative results in the Lap group were similar with the Op group. Semi-emergency laparoscopic surgery in infants, which was required due to the biliary symptoms, could undergo safely and effectively. Therefore, the patients with prenatal diagnosis might undergo radical surgery soon after they have any biliary symptoms. Further studies are needed for late complications.

ARM & Robotics Scientific Session

Friday, September 25, 2020

Moderators/Panelists: Drs. Marcela Bailez, Belinda Dickie, Matthijs Oomen John Meehan, Atul Sabharwal, Karen Diefenbach

(S19) LAPAROSCOPIC MOBILIZATION OF UROGENITAL STRUCTURES IN THE REPAIR OF LONG COMMON CHANNEL CLOACA

Farokh R Demehri, MD[1]; Timothy F Tirrell, MD, PhD[1]; Donald B Shaul, MD[2]; Roman M Sydorak, MD[2]; Wei Zhong, MD[3]; Joseph G Borer, MD[1]; Belinda H Dickie, MD, PhD[1]; [1]Boston Children's Hospital; [2]Kaiser Permanente; [3]Women and Children's Medical Center of Guangzhou

Purpose: Patients with cloaca malformations have a wide range of presentations, each of which requires a tailored surgical approach. The common channel length dictates operative approach and a longer common channel (>3cm) often necessitates an abdominal and perineal approach. While laparoscopy has been applied to rectal separation, the use of minimally invasive techniques for urogenital separation has not previously been described.

Methods: We conducted a review of nine children with cloacal malformations who underwent operative repair by two primary surgeons that included laparoscopic rectal mobilization and urogenital separation. Relevant clinical parameters were reviewed to evaluate the safety and efficacy of this procedure. This study was approved by the institutional ethics review board.

Results: Laparoscopic assisted posterior sagittal anorectovaginourethroplasty with urogenital separation was successfully performed in all nine patients. Median [interquartile range] age was 12 [7, 15] months, at a weight of 7.6 [7.0, 8.8] kg. Common channel length was 3.5 [3.0, 3.6] cm, urethral length was 1.1 [0.9, 2.1] cm, and vaginal length was 4.8 [4.1, 5.4] cm. Operative time was 544 [529, 569] minutes, with estimated blood loss of 40 [20, 50] cc and intraoperative blood transfusion requirements of 0 [0, 10] cc/kg. There were no intraoperative complications. Perioperative complications included one bowel obstruction due to twisted pull-through, two patients with rectal prolapse, four patients with vaginal stenosis, and one patient with urethral stricture. Postoperative length of stay was 6 [5, 11] days.

Conclusions: Complete separation of the rectum as well as urogenital structures in long common channel cloaca can be safely performed without laparotomy. Urogenital separation enables repurposing of the common channel into a functional urethra, which may play a role in enhancing urinary continence. The primary perioperative complications seen (bowel twist, urethral stricture, and vaginal stenosis) may occur regardless of approach and further prospective study is required to establish if their incidence differs between laparoscopic and open approaches.

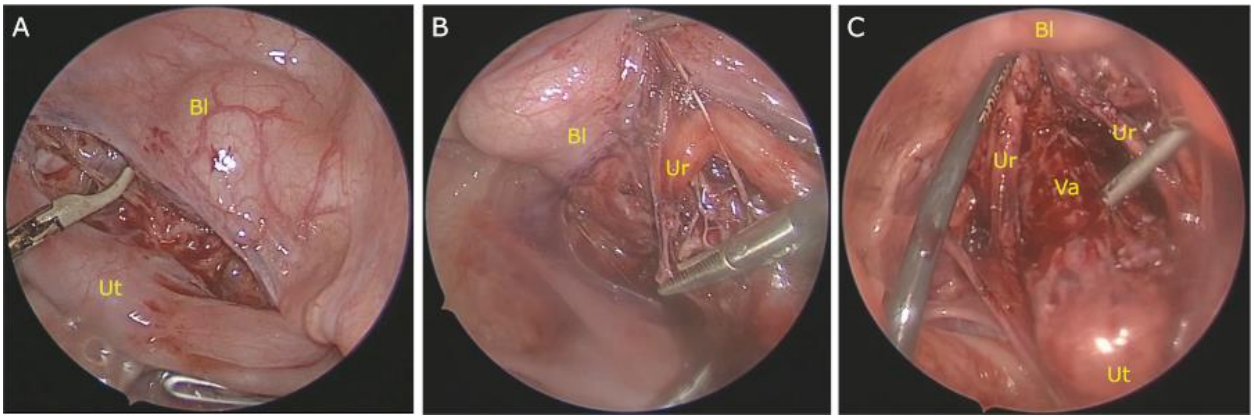

Image Laparoscopic view A) after opening of the peritoneum between the bladder (easily identified by the presence of Foley catheter balloon) and vagina, B) visualizing and protecting the ureter during dissection, and C) after dissection is complete. Bl = Bladder, Ut = Uterus, Va = Vagina, Ur = Ureter.

(S20) SINGLE-INCISION LAPAROSCOPIC-ASSISTED ANORECTOPLASTY FOR TREATING INTERMEDIATE ANORECTAL MALFORMATIONS CHILDREN WITH RECTOBULBAR FISTULA

Xianghai Ren, MD[1]; Hang Xu, MD[2]; Long Li, MD, PhD[2]; [1]Graduate School of Peking Union Medical College; [2]Capital Institute of Pediatrics

Purpose: Laparoscopic-assisted anorectoplasty (LAARP) is considered to benefit to the patients with vesico-prostatic fistula. The aim of this study is to present the details of our LAARP technique for improving the short- and long-term outcomes in the patients with high and intermediate types of anorectal malformations (ARM).

Methods: 330 patients with high-type (174 cases) and intermediate-type (156 cases) anorectal malformation (aged 8 days to 15 years) underwent LAARP from 2001 to 2019. LAARP was performed for full mobilization and resection of the dilated rectum, visualization and enlargement of the center of the longitudinal muscle tube (LMT) from pelvic and perineal aspects, intra-rectal closure of the fistula and rectal pull-through in the LMT.

Results: LAARP was performed in all patients and no patient was converted to open procedure. The urethral diverticulum was found in three patients (1.02%, 3/294) according to postoperative protocol voiding cystourethrogram withoutbut was not associated with any symptoms such as urinary tract infection, urinary incontinence and dysuria. Rectal prolapse requiring surgical intervention developed in 25 (7.6%) of 330 patients needed surgical intervention. Anal stricture occurred in three patients and anoplasty was performed 5 months after LAARP. Anal retraction occurred in two patients and re-pullthrough was conducted at 5 and 6 days respectively after LAARP. 228 patients who were older than 3 years were followed up. The median follow up period was 5.8 years (range =3-15 yrs). 217 patients (95.2% (217/228)%) had voluntary bowel movement. movements ; 202 patients (88.6% (202/228) patients %) were free from soiling or with grade 1 soiling. ; 30 patients (13.6%) and 25 patients (11patients11.3%) suffered from grade 1 and grade 2 constipationsconstipation respectively, while no patient withhad grade 3 constipation.

Conclusion: Our experiences demonstrateexperience demonstrates that the LAARP has advantages on rectal mobilization and resection, intrarectal fistularintra-rectal fistula closure and accurate tunnel formation in the LMT with minimal trauma. The improvement of the short-term and long-term outcomes after LAARP has been shown not only for high-type ARM but also for intermediate-type ARM.

Keywords: Laparoscopic-assisted anorectoplasty, high-type anorectal malformation, intermediate-type anorectal malformation, sphincter muscle complex, long-term outcomes.

(S21) RECTAL PROLAPSE AFTER LAPAROSCOPICALLY ASSISTED ANORECTOPLASTY FOR ANORECTAL MALFORMATIONS

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Aim: Rectal prolapse is one of the common postoperative complications of anorectoplasty for anorectal malformations (ARM). Laparoscopically assisted anorectoplasty (LAARP) was introduced in 2000 and has been implemented widely. However, the incidence of rectal prolapse is said to be more frequent in patients who had undergone LAARP than in those who had undergone the conventional procedure. Clinical research in patients with rectal prolapse after LAARP remains scarce, and little is known about the characteristics, etiology, and relationship of bowel function with rectal prolapse after LAARP. The aim of this study was to clarify the characteristics of patients with rectal prolapse after LAARP and to estimate the causes and evaluate the impact of rectal prolapse after LAARP on postoperative bowel function.

Methods: Our hospital introduced LAARP in 2000. The medical records of patients who underwent LAARP for high- or intermediate-type ARMs at a single institution between 2000 and 2019 were retrospectively reviewed. Clinical data, including postoperative fecal continence, were compared between patients with (group P) and without prolapse (normal, group N). Fecal continence was evaluated using the clinical assessment score for fecal continence developed by the Japanese Study Group of Anorectal Anomalies. For patients who underwent pelvic magnetic resonance imaging (MRI) prior to LAARP, atrophy or asymmetry of the anal sphincter and levator ani was evaluated by a radiologist.

Results: Of the 49 patients, 29 (59%) had a rectal prolapse after LAARP (group P) and 20 did not (group N). We found no significant difference in sex, type of ARM, the incidence of associated spinal or lumbosacral anomalies, procedure time, and postoperative bowel function at ages 4, 8, 12, and 16 years. However, LAARP was performed significantly earlier in group N (median [range], 180 days [123–498 days]) than in group P (210 days [141–570 days]). In group P, 18 patients (62%) developed prolapse before colostomy take-down at a median (range) onset of 20 days (5–1130 days) after surgery. Twenty-six patients (90%) underwent surgical prolapse repair, but 8 patients required redo procedures. The indications for surgery and the procedures performed varied. Among the 25 patients who underwent preoperative pelvic MRI, 22 (88%) and 12 (48%) had abnormalities of the sphincter muscle or levator ani, respectively. No significant relationship was found between the muscular abnormalities and the incidence of postoperative rectal prolapse.

Conclusions: More than half of the patients had rectal prolapse prior to colostomy closure, implying that the prolapse might be caused by congenital or procedural factors rather than postoperative bowel control, including constipation. However, the preoperative MRI scans showed no relationship between the congenital abnormalities in the pelvic muscles and the incidence of prolapse. Although recurrence after anorectoplasty for prolapse is common, performing LAARP at a younger age and concurrent laparoscopic rectopexy might be useful to prevent postoperative prolapse.

(S22) SINGLE STAGE LAPAROSCOPIC ANORECTAL PULLTHROUGH FOR HIGH ANORECTAL MALFORMATION IN MALE NEONATES

Hesham El Saket, MD[1]; Ahmed Azzam[1]; Mostafa Gad, MD[1]; Ahmed Fares, MD[2]; Khaled Bahaaeldin, MD[1]; [1]Cairo University; [2]Fayoum University

Introduction: Anorectal malformations occur approximately 1 in 4000 to 5000 live births , with imperforate anus the most common malformation. The standard approach to males with high imperforate anus (HIA) has been a three staged procedure. Thanks to the great advance in neonatal laparoscopy, many pediatric surgeons adopted the single stage laparoscopic anorecal pull through (LAARP) in male neonates. Our study aims to evaluate the effectiveness and the applicability of this technique for male neonates with HIA.

Methodology: Our prospective outcome study included 20 male patients suffering from HIA. It was conducted at the Pediatric Surgery Department , Cairo University during the period from September 2017 to September 2019. Our patients were carefully selected before undergoing the procedure. Ascending cystourethrogram was a fundamental step to properly detect the rectourinary fistula site. Our technique focused performing the rectal pullthrough primarily and anoplasty without a covering colostomy.

Results: Out of the 20 patients, 18 patients had undergone a successful single stage LAARP. Whereas, 2 patient required a covering colostomy to protect the repair following pelvic soiling. 15 patients had recto-prostatic fistula while the remaining 5 had recto-bladder neck fistula. All patients passed stool at the 1st 48 hours postoperatively and were carefully followed up at our NSICU.

Conclusion: Although, it seems challenging to perform it primarily in neonates, our early results are encouraging. Laparoscopy provides excellent visualization of the fistula site and the precise location of the rectum through the complex.

(S23) THE VALUE OF ASCENDING CYSTOURETHROGRAM IN THE DETECTION OF RECTO-URINARY FISTULA IN NON-COLOSTOMIZED ANORECTAL MALFORMATION IN MALE NEONATES

Hesham El Saket, MD[1]; Ahmed Azzam[1]; Mostafa Gad, MD[1]; Ahmed Fares, MD[2]; Khaled Bahaaeldin, MD[1]; [1]Cairo University; [2]Fayoum University

Introduction: Congenital recto-urethral fistula (RUF) is the most common form of anorectal malformations (ARMs) found in boys.

A recent trend in pediatric surgery has been to perform definitive repair of complex anomalies in one-stage if possible. The issue with single stage repair is that there is no information about the presence of recto-urinary fistula.

In our study, 30 patients were included in order to evaluate the feasibility of ascending cystourethrogram in detection of the recto-urinary fistula and its level.

Methodolgy: The study included 30 male neonates diagnosed with high anorectal malformation and were planned to undergo one-stage repair of the anomaly.

The patient is positioned in dead lateral position with flexed hips & knees. The fluoroscopic C-arm is positioned over the patient's pelvis

The contrast was injected through the catheter under pressure in order to visualize the urinary tract along with the fistula if present.

Results: The study included 30 male patients with high anorectal malformation. ACU study has successfully detected the site of the recto- urinary fistula in 26 candidates while the other 4 were not visualized. The results were 15 recto- prostatic and 5 recto-bladder neck, 6 recto-bulbar and 4 were non visualized.

Conclusion: ACU study is a highly significant preoperative investigation for detection of the fistula level without the need for colostogram in non-colostomized male neonates.

(S24) MASTER AND APPRENTICE OR A SLAVE TO TECHNOLOGY? A RANDOMIZED CONTROLLED TRIAL OF MINIMAL ACCESS SURGERY SIMULATION-BASED TRAINING TECHNIQUES

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Introduction: As Minimal Access Surgery (MAS) simulators become both more advanced and more accessible to surgical trainees, the following question arises; how can these simulators be used to most effectively improve trainees' technical skills? This study set out to assess the efficacy of three different approaches to simulation-based training using a 3D printed neonatal thoracoscopic simulator.

Methods: This was a randomized controlled trial of medical students, novices to MAS, from May to June 2019. Participants (N = 32) were given study information and signed consent forms. Participants performed two tasks on the neonatal thoracoscopic simulator, "ring transfer" and "needle pass", which have previously been shown to have construct validity, as baseline skills testing and were then randomly allocated into four intervention groups of 8.

- Group 1: Three standardised consultant paediatric surgeon supervised sessions on a thoracoscopic simulator.
- Group 2: Three 20-minute self-directed learning sessions on the same simulator.

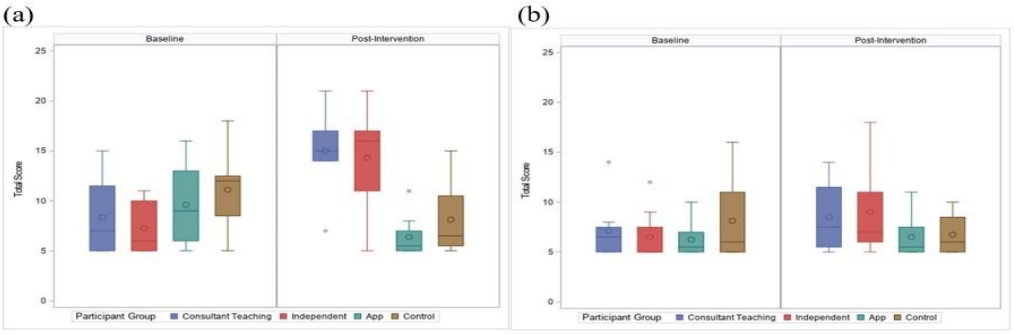
- Group 3: Self-directed 'virtual training' on the "SimuSurg" minimal access surgery smartphone application (accredited to the Royal Australasian College of Surgeons).
- Group 4: Control, no training.

Post intervention participants repeated both tasks. Videos of the task attempts were de-identified of participant and pre- and post-intervention status and marked by a blinded consultant paediatric surgeon using the Objective Assessment of Technical Skills (OSATS). Ethics were reviewed retrospectively; no concerns were raised.

Results: There was no significant difference in participant demographics (gender or year of study) between groups. There was no significant difference in the baseline OSATS scores for either task in any group. For the 'ring transfer' task Group 1 (mean increase of 6.6, $p<0.001$) and Group 2 (mean increase of 6.3, $p<0.05$) showed significant improvement between their pre- and post-intervention scores across all domains, with no significant change in Group 3 or 4 (figure 1, a). There was no significant difference between Group 1 or 2 in post-intervention scores. For the needle pass task, no group demonstrated significant improvement after intervention (figure 1, b) although there was a trend to improved scores in groups 1 and 2.

Conclusion: This RCT identified that practice on a physical simulator either with consultant tuition or self-directed led to a statistically significant improvement in scores for MAS novices when compared with a smartphone MAS training application or no intervention for a ring transfer task. There was no significant difference between consultant taught or self-directed learning, this suggests that time on the simulator was the most important factor in improvement. This implies that trainees could practice at their convenience rather than requiring consultant supervision. This improvement is not seen in more challenging tasks such as the needle pass, requiring needle manipulation. App-based MAS training with the SimuSurg smartphone application did not improve skills on this simulator.

Figure 1:
Box plots of total OSATS score pre- and post-intervention for the ring transfer task (a) and needle task (b) by group.



(S25) COMPARISON OF ROBOTIC VS LAPAROSCOPIC-ASSISTED ENDORECTAL PULL-THROUGH FOR HIRSCHSPRUNG'S DISEASE: A PROSPECTIVE STUDY

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Background: Minimally invasive devices for Hirschsprung's disease (HD) have upgraded to the current da Vinci surgical robot. Accordingly, surgeons need to be instructed by a comparative evaluation of outcomes after robotic surgery and classical laparoscopic surgery for HD.To prospectively compare the surgical outcomes between laparoscopic and robotic-assisted endorectal pull-through procedures for HD.

Methods: In this cohort study during the period from November 2015 to November 2018, 144 children with rectosigmoid HD in Wuhan Union Hospital were enrolled with an informed consent form their guardians. According to the surgical devices, children with HD were generally divided into 2 groups: laparoscopic group (LG) and robotic group (RG). Pelvic dissection in LG was adjacent to the rectum, as with the classical laparoscopic techniques. Rectal dissection in RG was between the proper facia and the muscular layer of the rectum, reaching a deeper and more precise anatomical level.

After the trans-anal dissection was established, a pull-through was performed to all patients. Bowel function score questionnaires were sent to children followed up ≥ 3 years and their guardians. The questionnaires were collected in the outpatient setting or on the phone. When stratified by age at surgery, a subgroup of children younger than 12 months (followed up ≥ 3 years) was selected to analyze separately. Clinical data on basic characteristics (age, weight and hospital stay), operative parameters (pelvic dissection depth and retraction time) and postoperative outcomes (defecation frequency, complications and bowel function) in LG and RG were recorded and analyzed.

Results: A total of 62 children (15d~1106d, mean 176d) were allocated to LG, and a total of 82 children (17d~1143d, mean 184d) were allocated to RG. The follow-up period was from 7 months to 3 years (mean 38 months). No differences in age, weight, follow-up time, hospital stay and the overall incidence of complications were found in RG compared with LG ($P>0.05$). RG had significantly deeper pelvic dissection depth compared with LG (LG 1.4cm vs RG 4.2cm; $P<0.001$). As a result, the time interval of anal retraction in RG was obviously reduced during the pull-through procedure (LG 77min vs RG 46min; $P=0.016$). Children gained normal defecation frequency (1-3 times/day or 1 time/1-3 day) sooner after robotic surgery. In the investigation of the postoperative bowel function score among the children followed up ≥ 3 years, a total of 73 questionnaires were provided and the effective recovery copies were 64 (LG=34, RG=30). No significant difference revealed in scores for fecal soiling, fecal accidents or constipation between both groups. However, within the subgroup of children younger than 12 months, more patients in RG obtained better scores for both fecal soiling ($P=0.007$) and fecal accidents ($P=0.009$). The constipation scores were not statistically significant.

Conclusions: Robotic-assisted endorectal pull-through is comparable to the laparoscopic endorectal pull-through. For younger patients (<12 months) with HD, robotic-assisted endorectal pull-through is promising to restore a better long-term functional recovery by further decreasing the injury for nearby neuro-vascular tissue and anal sphincters.

Urology Scientific Session

Monday, September 28, 2020

Moderators/Panelists: Drs. Sabine Zundel, Sameh Shehata, Holger Till, Yuri Kozlov, Philipp Szavay, Eduardo Perez

(S26) PNEUMOVESICOSCOPIC CORRECTION OF PRIMARY VESICOURETERAL REFLUX (VUR) IN CHILDREN. - OUR INITIAL EXPERIENCE-

A. M. Benaired, Pediatric, Surgeon; H Zahaf, Pediatric, Surgeon; Military Central Hospital

Purpose: Vesicoureteral reflux is a common urological abnormality predisposing risk of childhood hypertension and chronic renal failure. It is called primitive when it is due to an abnormality of the vesicoureteral junction. Different treatment approaches have been proposed a long time. Two main trends can be identified, conservative and operative approach. The main objective of our prospective study is to demonstrate the feasibility of vesicoscopic crosstrigonal ureteral reimplantation under CO2 pneumovesicum in treatment on primary vesicoureteral reflux and analyze results of this approach.

Methods: A total of 60 patients underwent transvesicoscopic ureteral reimplantation (33 boys, 27 girls) by the same surgeon from Mai 2011 to Mai 2015. All patients had primary vesicoureteral reflux, and surgery was performed because of breakthrough urinary tract infection despite antibiotic prophylaxis, persistent high grade of vesicoureteral reflux especially in association with significant renal scarring, mean age at operation was 47.47 month (5 month - 12 years). Of the 60 patients, 34 had bilateral reflux and 26 had unilateral reflux. The reflux grade in the total of 94 ureters was grade IV, V in 59.57%, grade III in 35.11% and grade II in 5.32% in association with contralateral high grade vesicoureteral reflux. Our surgical methods followed those reported by Valla et al.

Results: The transvesicoscopic procedure was successfully completed in all patients without perioperative complication except one case of pneumoperitoneum that required exsufflation by open laparoscopy. The mean overall operative time decreased significantly with an average of 58.43 +/- 11.26 minutes for unilateral reimplantation and 101.18+/- 26.5 minutes for bilateral reimplantation. The postoperative hospital stay was 3 days for all patients. The mean follow-up period was 03 years. Cystography was performed 3 month after surgery in all patients and showed the disappearance of vesicoureteral reflux in 57/60 patients (95%) or 91/94 of ureters (97%). Persistent vesicoureteral reflux was documented in 3 of 94 ureters and had resolved spontaneously at 12 month after reimplantation.

Conclusion: Our preliminary results indicate that vesicoscopic ureteral reimplantation is safe and effective procedure with minimal morbidity when compared to traditional open method. It can be apply in children under 12 months.

Key words: Primary vesicoureteral reflux, surgical treatment of primary vesicoureteral reflux, vesicoscopic CrossTrigonal Ureteral Reimplantation, diagnostic and therapeutic recommendations of primary vesicoureteral reflux in children.

(S27) COMPARISON OF LEARNING CURVES FOR ROBOTIC PYELOPLASTY BETWEEN SENIOR AND YOUNG SURGEONS

Grazia Spampinato[1]; Aurelien Binet[2]; Laurent Fourcade[1]; Mario Mendoza Sagaon[3]; Thierry Villemagne[2]; Karim Braik[2]; Celine Grosos[1]; Caroline Szwark[2]; Hubert Lardy[2]; Quentin Ballouhey[1]; [1]Service de chirurgie viscérale pédiatrique, Hôpital des Enfants,Limoges Cedex, France; [2]Service de chirurgie viscérale pédiatrique, Hôpital de Clocheville, Tours Cedex, France; [3]Ospedale Regionale Bellinzona e Valli, Bellinzona, Switzerland

Introduction: The widespread use of robotic surgery has given surgeons a high quality and alternative method to perform pyeloplasty. In fact robot-assisted technology has made more achievable the advanced technical skills required to perform this procedure.

The learning curve (LC) represents how an increase in learning comes from greater experience. Robotic Assisted Laparoscopic Pyeloplasty (RALP) represents a well standardized and reproducible procedure whose LC can give reliable results.

The aim of our study is to compare LC for RALP between senior and young surgeons.

Materials and Methods: We reviewed all RALP performed in three pediatric surgery centers between November 2007 and November 2018. Three senior surgeons and four young surgeons performed the robotic procedures. Both senior and young surgeons did not have previous experience with robotic surgery; they had experience with conventional laparoscopic procedures but not with laparoscopic pyeloplasty.

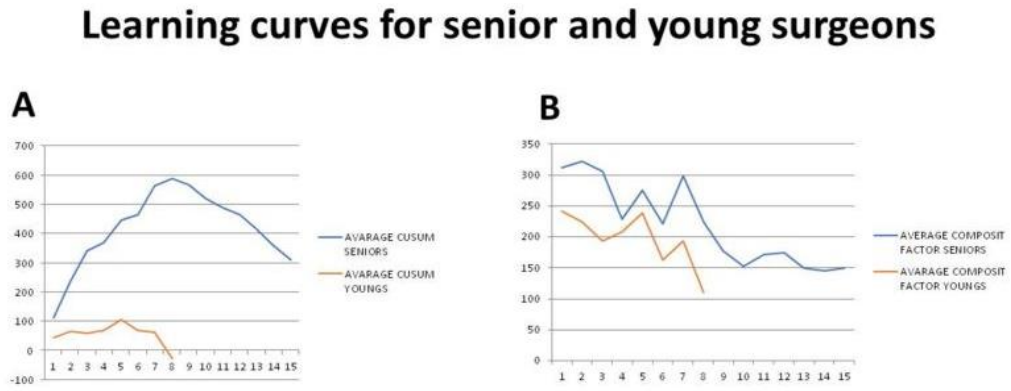
The primary metric that we selected to evaluate competence acquirement was a composite outcome defined by a combination of operative time, complications and surgical success.

Complications were classified according to the Clavien-Dingo classification expressed by a complication factor (Fc); surgical success was expressed by a success factor (Fs) and we used a cumulative sum (CUSUM) analysis to determine the learning curve. The CUSUM method, through its multi-outcome approach, has a valuable role for learning curve evaluation.

Results: Between November 2007 and November 2018 three senior surgeons and four young surgeons performed 88 RALP. Patients with a median age of 6.1 years (range 7 months – 16 years) were included in our study. The median duration of follow-up was 6.4 years (range 14 months – 12 years). The median operative time was 203.5 minutes (range 106 – 335 minutes).

Thanks to the CUSUM analysis for composite outcome we found out that, despite young surgeons had performed less procedures than senior surgeons, their learning curve showed a faster inflection point (Figure 1) followed by a constant rate of proficiency, displaying a more rapid learning process. Median composite score was 299 (range 210-370) and 193 (range 131-255) after 7 procedures for respectively senior and young surgeons.

Conclusion: Assuming proper exposure to robotics and adequate case volume, we demonstrated that young surgeons can quickly achieve comparable levels of expertise in comparison with senior practitioners in the field of pediatric RALP. It can be assumed that LC in robotic pyeloplasty is not directly influenced by individual surgical experience but also by the experience of the surgical team.



Learning curves for senior and young surgeons respectively, concerning CUSUM score (A) and composite factors (B)

(S28) SHOULD WE BETTER SWITCH BACK FROM RETROPERITONEAL TO TRANSPERITONEAL APPROACH FOR LAPAROSCOPIC PYELOPLASTY?

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Introduction: The retroperitoneal approach (RP) for pyeloplasty has been proposed to be associated with a lower complication rate than the transperitoneal pyeloplasty (TP), however, TP offers larger working space, allows an anastomosis in front of the lower pole vessels and the peritoneum can be easily reconstructed at completion. Similarly,

there is no difference in cosmesis. We reviewed our experience with RP and TP, in comparison to the classic open retroperitoneal procedure (OP).

Material and Methods: Comprehensive data of 156 pyeloplasties at a single centre were reviewed. TP: 40 consecutive cases, including 3 redo cases (27 cases over 5-years old, 13 below 5-years, including 3 below 1-year and the youngest was 5-months old). RP: 56 consecutive primary cases (all over 5-years of age). OP: 60 primary cases (41 over 5-years, 19 under 5-years, 9 under 1-year and the youngest was 3-months old). The operative time, conversion rate and postoperative complications were all assessed. Unpaired t-test was used to compare the means and SD. Chi-squared test was used to compare proportions (%). P-value of <0.05 was considered significant.

Results: There were no intraperitoneal surgical complications in the form of injury of abdominal organs or intestinal adhesions with TP. The operative time was shorter in TP than RP (230.4 ± 29 min vs. 249.8 ± 46 min, p=0.0036). The conversion rate was lower in TP than RP [1/40 (2.5%) vs. 3/56 (5%) p=0.380). There was no statistically significant difference in hospital stay (3 days) and complications requiring second intervention like JJ stenting, balloon dilatation and redo pyeloplasty [TP: 4/40 (10%) vs. RP: 4/ 56 (7%) p=0.6003 vs. OP 5/60 (8%) p=0.7308).

Conclusion: TP is safe, effective, and has a relatively has a shorter operative time than RP. It is suitable for much younger patients and for redo cases as well. In our practice, it may be worth to switch our standard approach from RP to TP.

(S29) MINIMALLY INVASIVE VASCULAR HITCH TO TREAT PEDIATRIC EXTRINSIC URETEROPELVIC JUNCTION OBSTRUCTION BY CROSSING POLAR VESSELS: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Maria Enrica Miscia, MD[1]; Giuseppe Lauriti, MD, PhD[1]; Angela Riccio, MD[1]; Dacia Di Renzo, MD, PhD[2]; Valentina Cascini, MD, PhD[2]; Pierluigi Lelli Chiesa, MD, Prof[1]; Gabriele Lisi, MD, PhD[1]; [1]"Gabriele d'Annunzio" University of Chieti-Pescara; [2]Department of Pediatric Surgery "Santo Spirito" Hospital of Pescara

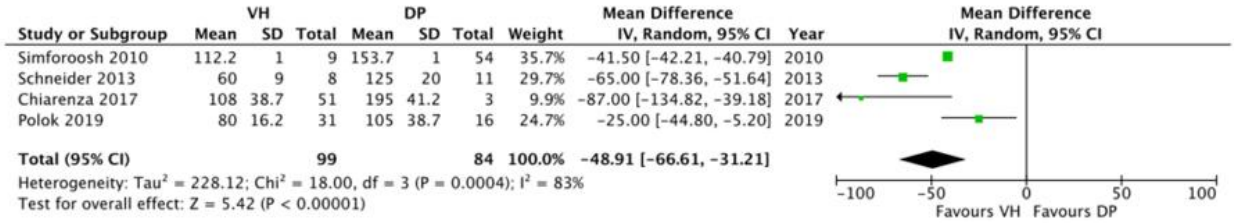
AIM OF THE STUDY: Vascular hitch (VH) has been gaining an increasing success in treating extrinsic ureteropelvic junction obstruction (UPJO) by crossing polar vessels (CV) in infants and children. Although minimally invasive VH has been reported to be associated with improved outcomes compared to dismembered pyeloplasty, the accumulated evidence to support this concept in children is lacking. The aim of the present study was: (i) to determine whether laparoscopic VH was superior to laparoscopic dismembered pyeloplasty (DP) for the treatment of extrinsic UPJO by CV; (ii) to review the published results with regards to robot-assisted laparoscopic VH.

METHODS: Using a defined search strategy (PubMed, Medline, OVID, Scopus, Cochrane databases), three investigators independently identified all studies reporting the results of laparoscopic VH to treat extrinsic UPJO by CV in pediatrics. Those studies comparing laparoscopic VH versus laparoscopic DP or versus robot-assisted laparoscopic VH were included in the meta-analysis. Case reports and opinion articles were excluded. Both the systematic review and the meta-analysis were conducted according to the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The meta-analysis was conducted using RevMan 5.3. The present study was registered on PROSPERO - international prospective register of systematic reviews. Data are expressed as mean±SD.

MAIN RESULTS: Systematic review - Of 1,838 titles or abstracts screened, 37 full-text articles were analyzed. Thirteen studies (295 children) reported an overall success rate of laparoscopic VH in 267 cases (90.5%), with 4 intra-operative complications (1.3%). Meta-Analysis - Four retrospective studies comparing laparoscopic VH versus laparoscopic DP were included (183 patients). Operative time was significantly reduced in VH (95.7±56.5min) compared to DP (142.1±53.7min; p<0.00001, mean difference (MD) -48.9, 95% confidence interval (CI) -66.6 to -31.2, I2=83%; Figure). The incidence of complications was similar between the two groups (VH 3/99pts, 3.0% versus DP 4/84pts, 4.8%, p=ns, risk ratio (RR) 0.6, 95% CI 0.1 to 2.8, I2=0%). The length of hospital stay was significantly shortened in VH (1.9±0.7dd) compared to DP (5.9±4.0dd, p=0.0008, MD -2.6, 95% CI -4.2 to -1.1, I2=91%). The success rate was comparable between the two procedures (VH 97/99pts, 97.9% versus DP 80/84pts, 95.2%, p=ns, RR 0.99, 95% CI 0.90 to 1.1, I2=0%). Only two retrospective studies compared robot-assisted laparoscopic VH to laparoscopic VH (53 patients). No differences were found with regards to complications (robot-assisted VH 0/13pts, 0% versus laparoscopic VH 1/40pts,

2.5%, p=ns, RR 1.50, 95% CI 0.1 to 30.5) and success rate (robot-assisted VH 13/13pts, 100% versus laparoscopic VH 39/40pts, 97.5%, p=ns, RR 0.99, 95% CI 0.9 to 1.1, I2=0%).

CONCLUSIONS: Laparoscopic vascular hitch seems to be a safe and reliable procedure to treat extrinsic ureteropelvic junction obstruction by crossing polar vessels. The procedure has been reported to be quicker than laparoscopic DP, with shortened hospital stay. Further high-quality studies would be needed to corroborate these results, as well to establish further amelioration given by a robot-assisted procedure.



(S30) ASSESSMENT OF THE EFFECT OF SURGICAL CORRECTION OF VARICOCELE IN CHILDREN ON TESTICULAR CONDITION.

S. P Yatsyk; A. O Tarzyan; A. A Rusakov; E. L Semikina; A. A Gusev; A. P Fisenko; E. Y Dyakonova; FSAI "NMRC for Children's Health" MH RF

Relevance: One of the most adverse consequences of having an uncorrected varicocele in a man is infertility. In this regard, early diagnosis and the right treatment tactics are extremely important for maintaining reproductive function.

The purpose and objectives: Determine the criteria for violation of the hematotesticular barrier (GTB) before and after surgical correction in children with varicocele. To assess the state of GTB in children with varicocele in the pre and postoperative periods based on indicators of inhibin B and claudine 11.

Materials and Methods: The study included 76 boys aged 11 to 17 years with grade III varicocele. The control group consisted of 20 boys aged 11 to 17 years without andrological pathology. The research method was ultrasound of the scrotum organs, determination of the level of Inhibin B and the titer of claudine 11 protein in the blood serum before surgical treatment and in the postoperative period.

Results: In the preoperative period, the decrease in the volume of the left (9.76 ± 0.58 cm3) control - 13.5 ± 1.03 cm3, p <0.001) and the right testicle (10.96 ± 0.614 cm3, control - 13.3 ± 0, 73 cm3, p <0.001). 6 months after surgical correction, an increase in testicular volume was established: on the left 10.53 ± 0.55 cm3 (p <0.001), on the right 11.88 ± 0.59 cm3 (p <0.001). The resistance index (RI) in the intraparenchymal vessels of the left testicle before surgical treatment was lower (0.53 ± 0.009) in the comparison group (p <0.001). 6 months after surgery, a significant 0.6 ± 0.006 (p <0.001) increase in RI. An increase in Inhibin B levels was observed after 6 months (to 181.19 ± 9.5 pg / ml, after 6 months 205.8 ± 10.7 pg / ml, p <0.001). A positive relationship between the level of inhibin B and the volume of testicles (rs = 0.44, p = 0.018 on the left; rs = 0.34, p-0.02 on the right) in the late postoperative period. No marked changes in the claudine level 11 before and after the operation were observed (0.632 ± 0.002 ng / ml) control (0.608 ± 0.002 ng / ml), 6 months after surgical correction (0.719 ± 0.002 ng / ml).

Conclusion: A comprehensive analysis of the markers of the state of the hematotesticular barrier, in combination with ultrasound of the scrotum organs, showed that surgical correction of varicocele does not negatively affect the testicular condition in the early (after 1 month) and long-term (after 6 months) postoperative period, and also positively affects the further the formation of the reproductive sphere in adolescents.

(S31) LAPAROSCOPIC REMOVAL OF RETROPERITONEAL EXTRAORGANIC TUMORS IN CHILDREN

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Objective: To determine the effect of minimally invasive access on the results of surgical treatment of children with retroperitoneal extraorgan tumors. To develop indications and contraindications for the use of minimally invasive operations for retroperitoneal extraorgan tumors in children and adolescents.

Results: From 2007 to 2016, 24 patients underwent laparoscopic removal of retroperitoneal extraorganic tumor. Boys 7 (29.2%), girls 17 (70.8%). The average age was 5.66 ± 0.97 years. Neuroblastoma detected in 12 (84.1%) cases. Ganglioneuroblastoma in 2 (8.4%) patients. Benign pathology was represented by gangloneuroma detected in 5 (20.83%) patients. Mature teratoma in 5 (20.83%) cases. The average tumor size was 5.68 ± 0.41 cm.

Intra / postoperative complications not reported. The average blood loss was 7.5 ± 4.09 ml. The duration of the operation was 73.75 ± 2.74 minutes.

Duration of drainage, stay in the intensive care unit and general rehabilitation of patients was 1 day. The average hospital stay is 3 ± 0 days. Relapse-free and overall 5-year survival rates were 100%. Median follow-up was 58.63 ± 8.06 months

Conclusion: Laparoscopic removal of retroperitoneal extraorganic tumors in children with benign and malignant organ tumors has established itself as an effective and safe method that is accompanied by minimal surgical trauma and excellent cosmetic results, reduces the duration of the postoperative period and does not worsen the oncological prognosis, minimally invasive technologies can be considered preferred surgery for the removal of uncomplicated, not associated with the surrounding organ mi and tissues of retroperitoneal extraorganic tumor.

(S32) A COMPARISON OF TESTICULAR VOLUME AND CREMASTERIC REFLEX AFTER LAPAROSCOPIC (PIRS METHOD) AND OPEN INGUINAL HERNIA REPAIR.

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Introduction: Laparoscopic and open inguinal hernia repair can lead to decreased testicular volume and testicular atrophy due to operative trauma of vessels. This is a rare postoperative complication described in literature after open inguinal hernia repair in boys.

The aim of the study: The purpose of the study is to determine, how profile (elective or emergency) and type-laparoscopic or open inguinal hernia repair, influence testicular volume. The secondary aim is to assess the presence of the cremasteric reflex after laparoscopic and open inguinal repair, as well as after emergency and elective surgery.

Materials and Methods: We conducted prospective analyses of testicular volume among boys who underwent unilateral inguinal hernia repair between 2016 and 2019 in a single institution. The preoperative ultrasound of testis was performed one day before or on the day of the surgery. It consisted of taking measurements in three dimensions of both testes. The postoperative ultrasound was performed at least three months after the surgery. Additionally, cremaster reflex was checked on those patients. Patients with unilateral inguinal hernia and without any comorbidities were qualified for the study. Exclusion criteria consisted of the following: bilateral inguinal hernia, cryptorchidism or any procedure performed on the testis. The statistical analyses of the data were conducted. To determine the differences between the studied groups, the non-parametric Mann-Whitney U test was used. The level of significance $\alpha = 0.05$ was adopted in the study. Data was collected in a spreadsheet and statistical data analysis was carried out using the TIBC STATISTICA ver. 13.

Results: A total of 44 patients aged 1-106 months old were included. Patients were asked to come for the follow-up study at least 3 months after the surgery. The mean time of the follow-up study was 19 months. The study consisted of 31 patients after laparoscopic inguinal hernia repair and 13 boys after the open method. The mean testicular volume boys

operated electively with laparoscopic approach (n=25) was 0.633 ml. The average postoperative testicular volume was 0,697 ml. The mean preoperative testicular volume of patients operated with the elective open method (n=8) was 0.748 ml, while postoperative measurements showed an increase and the average was 0.805 ml. The mean testicular volume after emergency laparoscopic inguinal hernia repair (n=6) preoperatively was 0.533 ml and postoperatively decreased to 0.517 ml. The mean preoperative testicular volume of patients operated with open approach due to incarcerated hernia (n=5) was 0.446 ml and postoperatively increased and was 0.564 ml. There was no statistically significant difference observed in those groups.

It was shown that after laparoscopic inguinal hernia repair, there was less impairment of cremasteric reflex observed, then after open repair. There was no correlation with surgery profile (emergency or elective) recorded.

Conclusions: Inguinal hernia repair method does not impact the testicular volume.

The profile of surgery: elective or emergency does not influence the presence of cremasteric reflex. Although, it was shown that open inguinal hernia repair may lead to the weakening of cremasteric reflex.

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HIGHLIGHTS OF THE WEEK – All released videos

- **Thoracoscopic Division of a Double Aortic Arch Vascular Ring Anomaly**
  Presented by: Claire Gerall, MD
- **An Unusual Flexible Ureteroscopy**
  Presented by: Marc Barras, MD
- **DEVELOPMENT OF AN ORIGINAL DEVICE THAT REPLACES THE LAPAROSCOPIC TOWER IN PEDIATRIC SIMULATORS**
  Presented by: Ruth Kaller, MD
- **Thoracoscopic lingulectomy for a Prenatally diagnosed CPAM in a 3 month old infant**
  Presented by: Steven Rothenberg, MD
- **Laparoscopic resection of pancreatic head with Roux-en-Y pancreaticojejunostomy for congenital hyperinsulinism in a 4-month infant**
  Presented by: Yuri Sokolov, MD, PhD
- **Laparoscopic Repair of a Complicated Morgagni Hernia after Multiple Recurrences**
  Presented by: Hallie J Quiroz
- **Utilizing laparoscopy in rectovaginal fistula repair**
  Presented by: Timothy F Tirrell, MD, PhD
- **Laparoscopic Hiatal Hernia Repair, Collis Gastroplasty, and Nissen Fundoplication with Gastrostomy Tube Placement**
  Presented by: Nathan S Rubalcava, MD

- Retroperitoneoscopic Resection of Thoracolumbar Paraspinal Ganglioneuroma
  Presented by: Phillip B Ham, MD, MS
- First Laparoscopic Pediatric Nissen Fundoplication using the Human Xtensions Handheld Software-driven Platform
  Presented by: Thomas M Benkoe, MD, PhD
- Thymic hyperplasia or thymoma: a doubt solved after surgical removal
  Presented by: Sara Fernandes, MD
- Robotic Surgery for Iatrogenic Ureterovesical Stenosis
  Presented by: Suzi Demirbag
- Primary rectourethral fistula repair in a 17 year old male
  Presented by: Timothy F Tirrell, MD, PhD
- Robotic excision of reduntant rectal pouch in HSCR after Duhamel procedure
  Presented by: Alessio Pini Prato, MD
- Laparoscopic Assisted Excision of a Type III Sacrococcygeal Teratoma
  Presented by: Jerry Xiao, BA
- Laparoscopic Left Mesocolic Hernia Repair
  Presented by: Phillip B Ham, MD, MS
- Thoracoscopic Repair of an extremely rare variant of Esophageal atresia with Tracheoesophageal fistula
  Presented by: Ayushi Vig
- Robotic Cloaca repair with image-guided and combined endoscopic and laparoscopic (CELS) anorectoplasty with delayed urogenital reconstruction
  Presented by: Brian P Fallon, MD
- Crucial steps in in laparoscopic management of torted paraovarian cysts
  Presented by: Malgorzata Fryczek, MD
- Laparoscopic Treatment of Esophageal Obstruction Caused by Embryonic Remmants
  Presented by: Carlos García-Hernández, MD
- Robotic Duodenal polypectomy in a case of Peutz-Jeghers
  Presented by: Rosie Cresner, MD
- Pericardial Agenesis
  Presented by: Trenton E Burgess, MD
- Robotic Colostomy Takedown in a Pediatric Patient
  Presented by: Elizabeth R Raskin, MD
- Laparoscopic Ligation of Duplicated Urethra & Excision of Urachal Remnant in an Infant Male
  Presented by: Kristen M Meier, MD
- Robotic excision of type IV choledochal cyst with hepaticoduodenostomy
  Presented by: Sarah Khalil, MD
- Prophylactic total laparoscopic gastrectomy in a teenager with CDH1 mutation for the prevention of hereditary gastric cancer
  Presented by: Diego Gallegos, MD
- PHELPS (Pediatric Hernia Extraperitonal Ligation and Percutaneous Suturing)- Ideal Method of Laparoscopic Herniorrhaphy or End of the Story of Hooks and Needles
  Presented by: Yury Kozlov, MD
- Clip & Go Technique for Thoracoscopic Repair of H-type Tracheoesophageal Fistula
  Presented by: Fernando P Rabinovich, MD
- Developing simulation models for MIS Pediatric Urology
  Presented by: Javier Ruiz, MD

- **Laparoscopic Takedown of an Ileocolic Fistula**
  Presented by: William Wong, MD
- **Laparoscopic Excision of Intra-Abdominal Extralobar Bronchopulmonoary Sequestration**
  Presented by: Kanika A Bowen-Jallow, MD
- **Robotic-Assisted Sleeve Gastrectomy Revision and Endoscopic Treatment of Gastric Stenosis**
  Presented by: Maria C Mora, MD
- **Pushing the Limits of Pediatric Robotic Surgery**
  Presented by: Maria C Mora, MD
- **Persistent Müllerian Duct Syndrome (PMDS) type 1 in a 46XY Male. MIS Trick to Preserve both Gonads**
  Presented by: Marcela Bailez, MD
- **Thoracoscopic Pulmonary Metastasectomy for Hepatoblastoma Using Indocyanine Green**
  Presented by: Alyssa R Mowrer, MD
- **Complex Robot-Assisted Extravesical Ureteral Reimplantation with Ureteral Tapering for Primary Obstructive Megaureter: A Case Report**
  Presented by: Maria Escolino, MD
- **Pseudopancreatic Cyst Drainage with Transgastric Laparoscopic Cystogastrostomy**
  Presented by: Paula Jaimes, MD
- **Laparoscopic Choledochal Cyst Excision with Ductoplasty and Hepaticoduodenostomy using a Right Lateral Approach**
  Presented by: Satoshi Ieiri, MD, PhD
- **Laparoscopic Duodenal Atresia Repair with 5mm Endoscopic Stapler**
  Presented by: Kayla B Briggs, MD
- **Indocyanine Green for Cortical-Sparing Adrenalectomy in a Pediatric Patient**
  Presented by: Christina M Bence, MD
- **Laparoscopic Choledochal Cyst Excision with Ductoplasty and Hepaticoduodenostomy using a Right Lateral Approach**
  Presented by: Jessica Zagory, MD
- **Single incision laparoscopic heminephroureterectomy for reno-ureteral duplication in children**
  Presented by: Tran N Son, PhD
- **Endoscopically Assisted Laparoscopic Transgastric Resection of Pancreatic Rest Utilizing Laparoscopic Ultrasound and Esophagogastroduodenoscopy Case Report**
  Presented by: Afua Amoabin, BS
- **Thoracoscopic Repair of Right Congenital Diaphragmatic Hernia on ECMO**
  Presented by: Wendy Jo Svetanoff, MD, MPH

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