MRI of the Hips and Pelvis

Hips and Pelvis
- Protocols
- Vascular abnormalities
- Fractures
- Soft tissues
- Labrum and FAI

Hips and Pelvis
Protocol
- Coil - TORSOPA, Body
- Plane - coronal, axial
- FOV - 24-30 cm (iliac crest to lesser troch)
- Slice thickness 6-7mm/3mm
- T1 and T2WI

Labrum
- Protocols
- Vascular abnormalities
- Fractures
- Soft tissues
- Labrum and FAI

Labrum Protocol
- Coil - flexible wrap
- Plane - axial, coronal
- FOV - 14-24 cm (supraacetab to l. troch)
- Slice thickness - 3/.3 mm
- T1 and T2WI (+ contrast)
Vascular abnormalities

- Avascular necrosis (AVN)
- Idiopathic Transient Osteoporosis of Hip (ITOH)/TPBME

AVN

MR findings

- Diffuse edema (early) ??
- Serpiginous line of low SI (between 10-2 o’clock on axials)
- Collapse, joint space narrowing
- Volume of head involved (axial plane)

25 y.o. known AVN left hip

AVN

What the surgeon wants to know

- Volume of head involved (axial)
- Evidence of degenerative dz
- Presence of collapse

AVN

Treatment

Early diagnosis:
- joint-sparing techniques -
  core decompression, rotational osteotomy, FVFG

Idiopathic transient osteoporosis of the hip (ITOH)

- Uncommon, painful, self-limited
- Uncertain etiology, likely vascular
- No trauma
- Young adults, M > F (left)
- Can migrate to other joints
- Resolves spontaneously

ITOH

MR findings

- ↑ signal femoral head to intertrochanteric region
- Joint effusion

DDX: septic hip, AVN, stress fx

ITOH

Treatment

Protective weight-bearing
Hips and Pelvis
- Protocols
- Vascular abnormalities
- Fractures
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Fractures
- Stress/Fatigue
- Occult traumatic
- Insufficiency

Stress fractures
- Femoral neck - compressive, tensile
- Pubic rami
- Sacrum
20 y.o with left SI joint pain

Occult traumatic fractures

- MR strongly indicated for negative plain film
- Recommend exam by ortho
- Include sacrum in FOV

Kirby, et al  AJR 2010; 194: 1054-1060

- 92 pts ER hip films (avg age 71yrs)
  films read as wnl or ?? for fx
- 6 hip fx
- 17 pelvic fx


- fractures – 162 (42%)
- hip fx – 39 (10%)
- pelvic fx – 68 (17%)
- AVN – 33 (9%)
Sens & spec = 99%

Abbreviated MRI for patients presenting to ED with hip pain

Coronal STIR & T1  N = 385

- Fracture demonstration within 24 hrs
- Specific--fracture line
- Cost effective

Deutsch et al.Radiology 170:113 1989
Verbeeten et al. Eur Radiol 15: 165 2005
84 y.o. female with Right hip pain No h/o trauma

Insufficiency fractures

- Bone weakened by osteoporosis/radiation
- May be radiographically occult
- Multiple fractures can co-exist
- Subcapital, intertrochanteric, sacral, supraacetabular, pubic bones

80 y.o. with severe low back pain

Insufficiency fractures

- Supraacetabular
  - Curvilinear ("eyebrow-shaped") low signal
  - Parallels roof acetabulum
Hips and Pelvis

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Sports hernia

aka pubalgia, osteitis pubis

- Imbalance btw rectus abd and adductor muscles

- Symphyseal instability

- Pain can be in symphysis, hip or back
Hamstring injuries

- Athletes, older pts
- Systemic disease
- Biceps femoris, semitendinosus, semimembranosus
- Avulsion fracture, partial tear, tendinopathy

Greater trochanteric bursitis

- Pain lateral aspect of hip
- Usually due to repetitive hip flexion
- Mimics gluteus min/medius tendon tears (often associated)
- Rx anti-inflammatories/steroid injection
Hips and Pelvis

- Protocols
- Vascular abnormalities
- Fractures
- Soft tissues
- Labrum and FAI

Labrum

- Rim of fibrocartilaginous tissue around acetabulum
- Low signal, triangular structures (axial and coronal)
Labral tears

- Persistent pain, clicking ± ROM
- Single traumatic event, chronic stress, DDH

Labral tears

Appearance - seen best with surface coil and MRA
- Linear, diffuse high signal
- Deformity of contour
- Detachment from acetabulum
- Paraarticular cyst

Labral tears

• Most tears anterior-superior labrum
• Posterior and posterosuperior tears more common in younger individuals
• Chondral defects associated 30% of labral tears and detachments

Labrum

• CMR - 8% SEN. LARGE FOV
• CMR - 25% SEN. SMALL FOV
• MRa - 92% SEN. SMALL FOV

p < .05


Labral tears

• Labral - 76%
• Neck – 97%
• Ligamental – 78%

HIP PLICA

Bencardino, et al; Skel Rad 2011; 40: 415-421

N=30
Labral tears

Mimickers

- Iliopsoas tendon crosses over labrum
- Acetabular cartilage extends medially
- Sublabral recess

Sublabral recess

Studler, et al. Rad 2008; 249: 947-954

- 57 pts
- 10 (18%) recesses
  44 (77%) tears
- Recess: linear contrast, partial separation, no peri-labral abn
- Most recesses in ant-inf labrum

27 y.o. tennis player with right hip pain

30 y.o. professional golfer

22 y.o. female w/ 2 “normal” CMF
60 y.o with acute hip pain

Femoroacetabular impingement

- Abnormal configuration of acetabulum “Pincer” type
- Bony protuberance of femoral neck (abnormal femoral head/neck junction) “Cam” type
- Synovial herniation pit

Kassarjian et al, Rad.236(2)p.588-592.

ALPHA ANGLE

- Not reliably reproduced
- Not necessary to obtain

Kassarjian A et al. Radiology 2005;236:588-592
Confirmation Arthro Study 1 month later
34 y.o. male with left hip pain

Acetabular cartilage defect w/ loose body

40 y.o female with hip pain after yoga

Conclusions

- Hip MRI increasingly relied on by surgeons
- Hip pain and negative x-rays = MRI
- Measurements for FAI not needed