Part II: Imaging Hip Problems in Athletes

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Outline

- Imaging techniques
- Hip pathology
  - Osseous
  - Intra-articular: Labrum, LT, Chondral
  - FAI
  - Snapping hip
  - Bursitis
  - Muscle/tendon

Anteroposterior (AP) pelvis

- Comparison to contralateral hip
- Coccyx must be centered over the pubic symphysis (not more than 2 cm)
**Indications for Routine Hip MRI**

- Stress fracture (fatigue)
- Nonspecific hip pain
- Pubalgia ("osteitis pubis/sports hernia")
- Muscle/tendon injuries
- Osteonecrosis
- Tumor

**Indications for MR Arthrography**

- Assess the intra-articular structures
  - Labrum
  - Cartilage
  - Intra-articular loose bodies
  - Ligaments
  - Capsule

**Indications for Sonography**

- Snapping hip
  - IPT
  - IT band
- Guidance for injection
  - Iliopsoas bursa
  - Greater trochanteric bursa
  - Synvisc injection

**OSSEOUS ABNORMALITIES**
Stress Fractures
Femoral Neck: Fatigue

- Ass. with IA pathology
  - Labral
  - Chondral
  - Loose fragments
  - Tear LT
- Complications: AVN
  - MRI initially
  - If neg, repeat MRI in 6-12 weeks to exclude traumatic AVN (ok to return to play if -)

Hip Dislocation

Prior Posterior Hip Dislocation

Avulsion of Sartorius from ASIS

Avulsion

- 14 y/o boy with right sided hip pain following hockey injury

Causes of Labral Tears

- Trauma (posterior dislocation, twisting injury)
- Osteoarthritis
- Acetabular dysplasia
- FAI
- Idiopathic

MR Arthrography

- Labral tear detection: ↑distension of joint
  - Sensitivity: 90%
  - Accuracy: 91%
  - Specificity: 90-100%
- Conventional MR imaging:
  - Sensitivity: 30%
  - Accuracy: 36%

Anterior Superior Labral Tear

22 year-old runner with hip pain

Superior Labral Tear

51 y/o athletic man with hip pain

Paralabral cyst

Anterior Superior Labral Tear & Paralabral cyst
Posterior Labral Tear & Paralabral cyst

28 yo soccer and prior football player with hip pain

Labral surgical techniques

Debridement  Repair

Larson CM Arthroscopy 2009;4:369-376

Chondral Lesions

MR Arthrography

- Cartilage abnormality detection:
  - Sensitivity: 79%
  - Specificity: 77%


Chondral Lesions

34 yo with hip pain

IA loose bodies

27 yo athletic male with hip pain
Capsule injury

22 year-old football player with hip pain

• LT connects the fovea to the PI acetabular fossa
• Mechanical symptoms can occur with ruptured LT; clicking/ "giving away"
• ? Repair

Ligamentum Teres

T2 Fat Sat

Hip Plica

T1 FS

Femoroacetabular Impingement (FAI)

• FAI results from anatomic abnormalities of the proximal femur and/or acetabulum
• FAI can cause:
  – Labral tears
  – Cartilage lesions
  – Premature OA

Ganz Clin Orthop 2003; 417:112-120.

Femoroacetabular Impingement (FAI)

FAI

http://www.edwino.com/hip-arthroscopy.html

Mechanisms of Impingement

• Cam ("femoral"FAI)
  – Abnormal morphology anterior femoral head-neck junction
  – Seen in younger individuals
Mechanisms of Impingement

- Cam ("femoral" FAI)
  - Abnormal morphology at the femoral head-neck junction
  - Seen in younger individuals
- Pincer ("acetabular" FAI)
  - Abnormal acetabulum contacting a normal femur
  - More common in older women
- Both types are common in athletes

Clinical Presentation

- Slow onset of groin pain after minor trauma
  - Intermittent
  - Exacerbated by athletic activities, walking
- P.E.
  - Limitation of motion
    - Internal rotation and adduction in flexion
  - Positive impingement test

Cam FAI

- 29 y/o man with hip pain
  - Radiographic findings can "predispose" to cam FAI

Bilateral FAI changes

- 20 year-old man with bilateral hip pain
Bilateral FAI changes

20 year-old man with bilateral hip pain

Pincer FAI: Retroversion

Pincer FAI: Coxa Profunda

Acetabular fossa is medial to ilioischial line

Pincer FAI: Protrusio Acetabuli

Femoral head is medial to ilioischial line

Snapping Hip

Painful snapping hip

External
Internal
Intra-articular

ITB
G. Max
IPT

Loose bodies
Synovial folds
Torn acetabular labra
Femoral head subluxation
Synovial chondromatosis
Cartilage abnormalities
Iliacus

Psoas

Iliopsoas Tendon

Most common internal cause:

- iliopsoas tendon rolling over the medial part of the iliacus muscle onto the superior pubic ramus

Deslandes et al. AJR 2008;190:576-581

Normal iliopsoas tendon

- Pain & audible or perceived snapping during hip movement
- Extension of flexed abducted and externally rotated hip
  - abrupt motion of iliopsoas tendon

Snapping iliopsoas tendon

Iliopsoas bursa injection

Corticosteroid + anesthetic (8ml)

BURSITIS
**Bursitis: iliopsoas**
- Sport-related: overzealous hip flexion & extension
- Rowing, running uphill, competitive track/field, strength training

**Bursitis: Trochanteric**

**Trochanteric bursa injection**

**Gluteus minimus partial tear**

**Muscle/Tendon Injury**
- Partial Tear Hamstring Origin
Muscle/Tendon Injury
Complete Hamstring Avulsion

10 y/o girl with left hip and groin pain after snowboarding injury

Muscle/Tendon Injury
Partial Tear Iliopsoas

Ischiofemoral impingement
• Impingement btwn ischium & lesser troch.
  - Described by Johnson in 1977
  - Seen in pts with prior hip surgery (THA)
  - Pain relief after lesser troch. Excision
• Consider in cases with MR signal abn. quadratus femoris

Torriani M et al. AJR 2009;193:186

32 y/o woman with hip and thigh pain

Ischiofemoral impingement

ATHLETIC PUBALGIA
Athletic Pubalgia

In Athletes

- Adductor/gracilis syndrome
- Osteitis pubis
- Sportsman’s hernia

”Athletic Pubalgia”

Omar IM et al. Radiographics 2008; 28:1415-1438

Osteitis Pubis

- Painful condition of the symphysis pubis
- Self-limited, but very painful
- Etiology: overuse injury with repeated stress, shear forces, microtrauma, ?AVN, instability
- Other assoc’s: spondyloarthrop, pregnancy, SI dysfunction
Osteitis Pubis

Adductor Injury

Adductor Injury

Rectus abdominus

common aponeurosis

Adductors

Conclusion

• Many causes for hip pain in athlete
• MRI imaging technique of choice injured athlete
  – Diagnosis
  – Guide rehab & treatment

15 year-old male goalie on the school soccer team

OSTEOMYELITIS WITH SEPTIC ARTHRITIS