Differential for anterior hip pain

- “Groin pull”
- Strain of hip flexor, adductor
- AVN
- Arthritis
- Osteo vs rheumatologic
- Hernia
- True groin (inguinal hernia) vs sports hernia
- Urologic / gynecologic pain
- Hip impingement

Bony “impingement” causes damage to the labrum and/or acetabular articular cartilage in the anterior / superior half of the acetabulum.

Both structures involved since the acetabular labrum is confluent with the articular cartilage.
Patient History

- 2nd-6th decades
- Typically insidious onset
  - Most do not recall specific trauma
- “C” sign for location
- Constant low level ache with sharp, intermittent groin pain
- Pivoting/twisting painful
- Pain with activity (sometimes during or often after)
- Better with rest
  - “Ceiling effect” – can’t get all the way back
- Intercourse painful
- Sitting painful
  - long car rides, sitting in class or work – need to get up and move about
- Pain waxes/wanes, generally gets worse over time – true FAI generally does not resolve spontaneously

History

- Absence of groin pain does not preclude an intraarticular hip injury
Physical Exam

• Thorough PE will result in accurate diagnosis in most patients
• Gait
  ▪ Possible - Antalgic shortened stance phase, weak abductors (single leg stand), chronic condition, overlap with glute med
  ▪ Be wary of pronounced antalgic gait (chronic pain, BWC etc)
• ROM (side to side comparison)
  Decreased IR, especially with large cam lesion

Other Diagnosis to Rule Out:

• Anterior / Groin Region:
  ▪ Inguinal hernia / Sports hernia
  ▪ Adductor strain
  ▪ Osteitis Pubis
  ▪ Psoas tendonitis (rubs over labral tear) / snapping internal hip
• Trochanteric Region:
  ▪ Snapping external hip / IT band
  ▪ Gluteal cuff (minimumus/medius) tendinopathy, tears (partial / full thickness)
• Posterior / Gluteal Region:
  ▪ Piriformis tendonitis / sciatica
  ▪ Ischio-femoral impingement / quadratus tendonitis
  ▪ SI joints / Low back
  ▪ Radicular pain
• Other lower extremity: pathology / limb mal-alignment

Radiographic Assessment: Acetabular Version
Acetabular Abnormalities

• Mild retroversion or anterior wall overcoverage
  • Crossover sign
  • Ischial spine sign


Acetabular Abnormalities

• Center Edge Angle = 30 (25-35)
  • >35-40: Pincer Deformity
  • 20-25 Borderline dysplasia
  • < 20 dysplasia

Pincer Impingement

• Linear impact of the acetabular rim against the head-neck junction in a local (anterior wall overcoverage) or global (protrusio) overcoverage of the acetabulum

Femoral Abnormalities

• Poor offset anterolateral head/neck
  • Subclinical SCFE

  High fovea with transverse physeal scar
  • Prominent anterolateral femoral head-neck junction
CAM Impingement

- Jamming of a nonspherical extension of the femoral head into the acetabular cavity
- Creates extensive chondrolabral delamination
- Associated with progressive early onset osteoarthritis

Offset measurement

- Alpha angle
  - “Normal” < 50
  - > 50 greater chance of CAM Impingement
- Axial oblique MRI
- Dunn lateral view
- 3d CT

Notzli et al, J Bone Joint Surg(Br) 2002

Impingement Damage Patterns

- CAM
  - Acetabular articular injury
  - Softening → Delamination
  - “wave sign”
- PINCER
  - Labral pathology: “crush”
- >70% combined deformity

### Diagnostic Injections

Perform when suspected intraarticular pathology but with non-definitive history and exam, (Patient pain diary, EUA often helpful)

<table>
<thead>
<tr>
<th>Relief</th>
<th>Evident of an intraarticular problem</th>
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<tbody>
<tr>
<td>No relief</td>
<td>Look for an Extraarticular component to pain (think tendinopathy, neuropathic, GI / GU etc)</td>
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</table>

### 3D CT

- Defines anatomy – correct pelvic tilt, assess femoral torsion, acetabular version, AIIS prominence / subspine impingement
- Very helpful for revision or large deformity cases

### MRI

- Define chondral / labral injury (arthrogram most definitive)
- Rule out bone lesion, avn, stress fracture, pelvic mass, high grade tendinopathy
- Stage chondral damage (Helpful to rule in / out for surgery), assess for subchondral cyst / bone marrow lesion

### Treatment: Non-Operative

- Core strengthening program – paraspinals / abdominals / gluteals to improve posture / decrease pelvic tilt
- Positional avoidance / activity mod (standing desks at work)
- NSAIDs
- Injections – joint/bursal/psoas
- Low impact -- Elliptical / bike / pool

Fair success
- Ceiling effect often seen – unable to get fully back
Surgical Options for FAI

- Labrum: suture anchor repair vs debridement, reconstruction
- Articular injury: chondroplasty, if unstable/possible microfracture
- Pincer deformity: Recess anterior wall, Supspin (AIIS) decompression, os acetabuli excision
- CAM deformity: Osteoplasty of femoral neck

Contraindications to Arthroscopy

- Arthritis with joint space narrowing, Tonnis 2 or greater
- Age > 60
- Inflammatory arthropathies
- Complex pain pattern, not clearly intra-articular, chronic disability/deconditioning – unable to adequately perform postop rehab

Femoral Acetabular Impingement as Clinical Syndrome

- Imaging findings (cam / pincer chondrolabral pathology)
- Physical Exam Findings c/w FAI
- Hip symptoms c/w FAI

Extra-Articular Hip Injuries

W. Kelton Vasileff, MD
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Hip Girdle Pain Differential

• Intra-Articular Pain - Not focus of this talk
  – FAI
  – Dysplasia
  – Labral tear
  – Articular cartilage injury
  – Arthritis
  – Insufficiency fracture
  – Bone Marrow lesion

Hip Girdle Pain Differential

• Anterior
  – Adductor injury
  – Athletic Pubalgia/Sports Hernia
  – Osteitis Pubis
  – Internal Snapping Hip
  – Stress Fracture
  – Hip Flexor/rectus tears
  – Sartorius avulsion

Extra Articular Hip Injuries

• Lateral
  – Greater Trochanteric Pain Syndrome
    • IT Band
    • Trochanteric Bursitis
    • Gluteal tendinopathy
  – Piriformis
Extra Articular Hip Injuries

- Posterior
  - Intra-Artic “C-sign”
  - Proximal Hamstring
  - Gluteal muscles
  - Piriformis
  - Sciatic/radicular pain
  - SI joint
  - Lateral Fatigue Pain

Extra Articular Hip Injuries

- Other non-MSK causes of “hip” pain
  - Ob/Gyn
  - Urology
  - Hernia
  - Gastrointestinal
  - Lumbar Radiculopathy

Extra Articular Hip Injuries

- Hip Flexor and Adductor Injuries
  - Typically Acute Event
  - Gymnastics or Martial Arts on occasion
  - Soccer Athletes
  - Typically treated conservatively
  - Rare need to fix large displaced rectus avulsion

Extra Articular Hip Injuries

- Hip Flexors and Adductors
  - Acute injuries typically resolve with appropriate non-surgical care
    - Rest, Therapy, Rehab, slow RTP program
  - Occasional indications for surgical repair
    - Large acute retracted rectus avulsion
    - Recalcitrant adductor injuries
**Rectus Femoris Avulsion**
- 37yF CrossFit athlete

**Sports Hernia/Athletic Pubalgia**
- Typical presentation is more ache, less sharp pain
  - Similar location to IA pain (may co-exist as well)
  - Tender superficially along inguinal area
  - Pain with resisted sit-up one of most sensitive tests
  - Imaging can be challenging
    - Dynamic Problem
    - Ultrasound
    - MRI
  - May need eval by Gen Surg for hernia or muscle repair
  - May overlap with FAI or adductor injuries and require combo treatment

**Osteitis Pubis**
- Inflammation of pubic symphysis and adjacent bone/tendon insert - see on XR and MRI
- Soccer, football, hockey, runners
- Repetitive microtrauma
  - Kick, Abduct, Adduct
- Vague ill-defined pain
- Tender to palpation at ramus and symphysis
- Vast majority resolve with non-op care

**Stress Fractures**
- Commonly people ramping up activity
  - Military recruits
  - Long-distance running/Couch to 5k
  - Athletes changing sports/beginning of season
- XR good first step - can show cortical thickening or beak
- MRI - edema pattern and fx line evident
- Tension sided more concerning than compression sided
Stress Fractures

• Typically treated with protected WB and shut-down
• Ensure appropriate nutrition and hormonal status
  – Endocrinology/Dietician/Dexa Scan may be indicated
  – “Female Athlete Triad”
• Surgery indications
  – Stress fracture or stress reaction fail conservative tx
  – Compression side >50% fracture line or progression
  – Tension sided with fracture line on XR or MRI
    • High risk for displacement- worse surgery/outcomes

Stress Fractures

21yF Collegiate distance runner/XC

Stress Fractures

31yF Boston Marathon Training

Stress Fractures

21yF Collegiate distance runner/XC
Stress Fractures

Lateral Pain

- Greater Trochanteric Pain Syndrome
  - Troch bursitis, gluteal tendinopathy/tear, IT band pain
  - Can be related to IA pain- “Lateral fatigue pain”
  - Diagnosis: Based on history and physical exam
    - Lateral sided complaints, lay on side at night
    - Pain with lateral palpation
    - Weakness or pain with resisted abduction
    - Pain/weakness with single leg stance (stork)
      - Inability to maintain pelvis level
    - Imaging secondary

Lateral Pain

- GTPS
  - Non-Op Treatment
    - PT/HEP, tendon loading modification, posture
    - Inject with CS vs PRP (increasing evidence)
    - Tenex
  - Surgery
    - Mini open vs scope
    - IT band window +/-
    - Bursectomy

Lateral Pain

- Gluteal tendon tear
  - Bursitis
  - Surgery
### Lateral Pain

- **Bilateral lateral pain**
  - Tendinopathy/Bursitis - Tenex

### Extra Articular Hip Injuries

### Posterior Pain
- Can be intra-articular – “C sign”
- Spine/radicular- overlap with hip pain common
  - “Hip-Back Syndrome”
- SI joint
- Piriformis pain- difficult to dx and to tx
- Gluteal pain
- Proximal hamstring
- Pelvic floor

### Typical presentation/history

- **Acute injuries**
  - Most athletes recall audible or palpable “pop”
  - Position of hip flexion and knee extension
  - Pain felt in the posterior aspect of thigh
- **Few athletes complain of progressive tightness**
  - Chronic proximal injuries may complain of sitting pain
- **Loss of flexibility and difficulty with walking smoothly also common**
### Mechanism of Injury

- **Function**
  - Extends Hip
  - Flexes Knee
  - Decelerates tibia when hip is rapidly flexed
- **Acute injury**
  - Eccentric contraction
  - Knee extended
  - Hip flexed

### Physical Exam

- Posterior thigh ecchymosis in acute injuries
- Stiff-legged gait common
- Palpation may demonstrate tenderness or defect
- ROM
- Strength- resisted knee flexion and hip extension

### Imaging

- Plain radiographs often negative
  - Exception is ischial tuberosity avulsion injury pattern
- Dynamic Ultrasound
  - Can be performed immediately, in-office
  - Can directly correlate with PE findings
- MRI
  - Most common
  - Precisely identify severity, location, number of tendons involved, chronicity, retraction, bone injury

### Treatment

- Non-op Vs. Surgical treatment decision
  - Acute Injuries
  - Surgical treatment indicated with 2 tendon tears >2cm retraction or 3 tendon complete tears
  - Non-Op treatment indicated for single-tendon injuries or those with <2cm of retraction
  - Patient factors such as age, non-compliance, activity level may affect decision process
  - Early recognition and treatment ideal
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Treatment- Surgical Indications</th>
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<tr>
<td><strong>Non-Op/Therapy</strong></td>
<td><strong>Surgical</strong></td>
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<tr>
<td>- May be best for less active patients, obese, non-compliant with postop restrictions</td>
<td>- Acute 2 or 3 tendon tears</td>
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<td>- Activity modification, NSAIDs, PT</td>
<td>- Retraction &gt;2cm</td>
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<td>- Modalities: Ultrasound, shockwave, e-stim, edema control</td>
<td>- Chronic injuries/Partial tears</td>
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<td>- Begin core, hip, quad program as symptoms allow</td>
<td>- Occasional if fail non-op care, persistent symptoms</td>
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<td>- At least 6 weeks for initial healing</td>
<td>- Complete, no retraction</td>
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<tr>
<td>- Pain, knee flexion and hip extension weakness can persist for months despite rehab</td>
<td>- Partial/incomplete</td>
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<td>- Overuse</td>
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**Conditioned Serum/PRP**
- Has shown good efficacy
- Used for injection of chronic proximal tears with excellent success return to sport
- Has also been shown to work well in partial injuries undergoing rehab and decrease the time to return to play
- Needle fenestration may also be employed

**Non-Op/Therapy**
- Full return to sport when pain free and strength within 1 grade of contralateral side
- Long-term complication include sitting pain and “hamstring syndrome”
- Scarring of proximal hamstrings to sciatic nerve
- Cause of chronic pain in posterior buttock with activity, sitting, and hamstring stretching
### Treatment- Surgical Indications

- Chronic – complete, retracted
- Surgical treatment
  - More technically challenging
  - Less optimal functional and symptomatic results
  - More complications
  - Must discuss risk / benefit ratio

### Treatment

- Post surgical rehab- Essential
- Protected Weight bearing
- Brace for restricted ROM??
  - Only if high-tension repair
- Slow advance of PROM
- Gradually increase WB/AROM
- Sport-specific train- 3mos
- Full return to play
  - 6-10 months

### Proximal HS - Slip and fall on ice

- Surgical repair and hematoma evacuation

### Proximal HS - Deadlift

- Surgical repair
Proximal HS - recreational runner

- Treated with PT, rest, PRP and fenestration