Hip Arthroscopy

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Disclosures

• I have no disclosures relevant to this topic.
Outline

1. Brief History
2. Review of hip pathology (FAI)
   1. Pathophysiology of FAI
   2. Evaluation
   3. Radiographs
3. Technical considerations
History of Hip Scope

• First described by Michael Burman in 1931
  o Experimented on cadavers to determine feasibility
  o Identified & described the anterolateral portal
  o “Visualization of the hip joint is limited to the intracapsular part of the joint. It is manifestly impossible to insert a needle between the head of the femur and the acetabulum”

• Little use until late 70’s
  o Richard Gross – use in pediatric disorders 1977
  o James Glick & Thomas Sampson – described lateral position and distraction – 1980’s
  o Thomas Byrd – Refinements to supine position, portal anatomy, & using fluoroscopy for safe entry – 1990’s
History of Hip Scope

• Few early indications
  o Diagnosis, Dx biopsies, loose body removal
  o Sampson 1996 – “procedure looking for indications”

• Reinhold Ganz, 2003 – describes FAI
  o “…in certain aberrant morphologic features of the hip, abnormal contact between the proximal femur and the acetabular rim that occurs during terminal motion of the hip, leads to lesions of the acetabular labrum and/or the adjacent cartilage.”
  o Describe surgical dislocation to treat FAI
  o Early studies showed could treat the majority of FAI with arthroscopic methods

Arthroscopic procedures grow exponentially!!!
Hip Scope Indications

- Femoroacetabular Impingement
- Labral tears
- Loose Body Removal
- Synovial chondromatosis
- Snapping Hip
- Recalcitrant trochanteric bursitis
- Gluteal tears
- Hip instability
- Ischiofemoral impingement
- Proximal hamstring tears
Pathophysiology of FAI

- An abnormal bony morphology of the proximal femur and/or acetabulum
  - Retroversion, relative anterior overcoverage, coxa profunda, protrusio acetabuli, coxa vara, extreme coxa valga, subtle dysplasia, Perthes, SCFE,
- Reduced joint clearance with physiologic terminal motion (flexion & IR) of the hip
- Acetabular cartilage/labral lesions
- Osteoarthrosis?
Labral Function

- Provides mechanical stability
  - Substantial extension of acetabular rim

- Contributes to load transmission
Labral Function

- Seals pressurized fluid layer within joint
  - Lubricates, prevents direct cartilage contact
- Slows rate of fluid expression from porous cartilage layers
  - Limits cartilage deformation and stress
  - Joint contact stresses 92% higher if resected
Pathophysiology of FAI

- 2 Main types
- Presentation w/ both more common than either alone
- Beck et al in JBJS (Br) 2005 - analyzed 302 symptomatic hips w/ FAI
  - 86% had mixed impingement pattern
  - 26 pts isolated cam & 16 w/ isolated pincer
Pathophysiology of FAI

- Non-spherical portion usually anterosuperior
- Labrum displaced outward & superiorly - results in articular sided tear perpendicular to joint surface
- Thought to cause delaminating effect on acetab cartilage as “bump” impacts it
Pathophysiology of FAI

- Due to focal or global overcoverage
- Labrum crushed against normal femoral neck
- Focal area of cartilage behind incompetent labrum gets damaged
- Thought that head starts to lever out of acetabulum creating counter-coup cartilage injury

Line drawing illustrating the pathomechanism of “pincer”-type impingement, which is the result of contact between the acetabular rim and the femoral head-neck junction.
Cam and pincer impingement with the hip in extension (A) and flexion (B)
Patient Evaluation
Labral Tear Prevalence

- **Lee et al. Bone & Joint J 2015**
  - 3T MRI performed on 70 asymptomatic volunteers; mean age 26
  - 27 (38%) had labral tears on MRI

- **Tresch et al. J Magn Reson Imaging 2016**
  - Compared MRI in 63 asymptomatic volunteers to 63 pts w/ symptomatic FAI
  - 44% of volunteers had labral tears vs 61% of patients

Not all labral tears are symptomatic!
Differential Diagnosis of Hip Pain in an Athletic Patient

Traumatic Causes
- Subluxation or dislocation
- Fracture or stress fracture
- Hematoma
- Contusion

Labral Pathology
- Femoroacetabular impingement
- Hypermobility
- Trauma
- Dysplasia

Infectious/Tumorous/Metabolic Conditions
- Septic arthritis
- Osteomyelitis
- Benign neoplasms of bone or soft tissue
- Malignant neoplasms of bone or soft tissue
- Metastatic disease of bone

Inflammatory Conditions
- Rheumatoid arthritis
- Reiter syndrome
- Psoriatic arthritis

Chondral Pathology
- Lateral impaction
- Osteonecrosis
- Loose bodies
- Chondral shear injury
- Osteoarthritis

Capsule Pathology
- Laxity
- Adhesive capsulitis
- Synovitis or inflammation

Nonmusculoskeletal Causes
- Psoas muscle abscess
- Spine problems
- Hernia
- Endometriosis
- Ovarian cyst
- Peripheral vascular disease

Unknown Etiology
- Transient osteoporosis of the hip
- Bone marrow edema syndrome

Synovial Proliferative Disorders
- Pigmented villonodular synovitis
- Synovial chondromatosis
- Chondrocalcinosis

Metabolic Causes
- Paget disease
- Primary hyperparathyroidism

Extra-Articular Pathology
- Coxa saltans (internal or external)
- Psoas impingement
- Abductor tears (rotator cuff tears of the hip)
- Athletic pubalgia
- Trochanteric bursitis
- Ischial bursitis
- Osteitis pubis
- Piriformis syndrome
- Sacroiliac pathology
- Tendinitis (hip flexors, abductors, adductors)
Common Points in FAI History

• Pain
  o Many patients will complain of insidious history of groin pain, some may call it “stiffness”
  o Pain mainly in groin. Also can have trochanteric or buttock pain
  o Initially during athletic activity but can progress to pain w/ prolonged sitting
  o Athletes – difficulty squatting, cutting, starting/stoping

• Demographics
  o Predominantly cam – young athletic men
  o Predominantly pincer – middle aged woman
Physical Examination

- Gait evaluation
  - Trendelenburg or antalgic gait
- Palpation
  - Adductor tendons
  - Symphysis pubis
  - SI joints
  - Greater trochanter
- Spine, neuro and abdominal exam
Physical Exam

• Hip Range of Motion
  o Log roll test while supine
  o Flexion, extension, internal & external rotation
    • Flexion & IR often decreased
  o Abduction & Adduction
  o Ober Test

• Strength Testing
  o Abductors – Trendelenberg Test
  o Adductors
  o Iliopsoas
The impingement test is performed with the hip in 90° of flexion with additional internal rotation and adduction of the femur.

Radiographic Assessment
Line drawing representing an anteroposterior radiograph showing the pistol-grip deformity (arrow).

Schematic drawing of an anteroposterior radiograph of the hip, showing an anteverted acetabulum (A) and retroverted acetabulum (B).

A retroverted hip is demonstrated on a coned-down anteroposterior pelvic radiograph.
In a patient with a positive impingement test, decreased internal rotation of the hip, and groin pain, an abnormal alpha angle of 74° is measured on an axial oblique fast-spin-echo magnetic resonance imaging scan.


General population avg 42°
Cam impingement avg 74°
50-55° used as upper limit normal
T1-weighted magnetic resonance arthrographic image shows a lack of head-neck offset.


Full-thickness loss of articular cartilage (white arrow) is shown at labral-chondral transitional zone.

Flap Tear of anterior-superior labrum.
FAI Treatment

Non-operative

• Rest & activity restriction
• Minimal literature available to support effectiveness

Operative

• Optimal timing unknown
• If pt has both cam & pincer – treat both or is treating one component enough?
• **Set-up**
  - Pt positioned on fracture table w/ well padded perineal bolster.
  - Traction applied to operative hip using fluoroscopy to assess joint distraction – 8-12 mm
  - Continuous traction time should be limited to < 2 hrs
Arthroscopic Approach

- **Portal Placement**
  - Anterolateral portal – 1-2 cm anterior & proximal to greater troch
  - Anterior – Directly distal to ASIS – usually placed under direct visualization
  - Mid Anterior – point distal to AL & A portal creating equilateral triangle
Arthroscopic procedure of the hip

Acetabulum with labrum at the outer rim

Femoral head

Arthroscope

Irrigation fluid and instruments
Arthroscopic Rim Trimming
Arthroscopic Cam Resection
Arthroscopic Cam Resection

- Area of cam impingement – identified by location, color changes, & texture
- Know location of retinacular vessels
- Resect only what is necessary to relieve impingement
  - Mardones et al. JBJS 2006
    - Cadaver study showing up to 30% of femoral neck can be resected before compromising structural integrity
Arthroscopic Treatment Results

- Several outcome studies exist showing good to excellent results in 67-96% of patients.
- Most studies only have short term follow-up (avg 2 yrs).
- Increased articular cartilage damage consistently correlated with poor outcome:
  - Tonnis grade 2
  - Outerbridge grade 3 or 4 at arthroscopy.
Arthroscopic Treatment

Results

• Bedi et al. AJSM 2011
  o Compared open to arthroscopic treatment for FAI
  o 30 pts treated open & 30 arthroscopically
  o No significant difference in deformity correction

• Botser et al. Arthroscopy 2011
  o Systematic lit review comparing open (O), arthroscopic (A) & combined (C) treatment of FAI
  o Mean improvement in Harris hip score 26.4 (A), 20.5 (O), 12.3 (C)
  o Complication rate 1.7% (A), 9.2% (O), 16% (C)
Arthroscopic Treatment Results

- Athletes?
- Philippon et al. AJ SM 2010
  - 28 NHL players treated for symptomatic FAI
  - Avg age 27; f/up 24 months
  - 26 returned to play at avg 3.4 months
  - Modified HHS improved from 70 to 95
Thank You!

Photo courtesy Bobby Ellis / The State Journal