Hip Preservation and Replacement
Impingement and Labral Tears

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Objectives

- Define Impingement and Labral Tears
- Physical Examination of the Hip
- Imaging of the Hip
- Making the Diagnosis and Treatment
- Case Examples
Background
“Hip” has many definitions
- Labral tear/FAI
- Hamstring strain
- Snapping Hip
- Iliotibial band syndrome
- Arthritis
Hip Pain

- Early diagnosis and treatment may delay or even prevent the onset of hip arthritis

- Pain in the hip joint >6-8 weeks is unlikely a benign entity
  - *Burnett et al., JBJS ’06*
    - Patients visited avg. 3.3 health-care providers prior to dx.
    - Waited on avg. 21 mos for dx.
    - 33% received an alternate diagnosis prior to dx.

- In less than 10% of cases will there be an identifiable traumatic event
History

- William Harris CORR, 1986
- Hip impingement disease is a major cause of hip dysfunction and an etiologic factor in the pathogenesis of OA
- “It seems clear that either osteoarthritis of the hip does not exist at all as a primary disease entity or, if it does, is extraordinarily rare.”
FAI/Labral tear

- FAI = femoral acetabular impingement
  - Cam (femoral) or pincer (acetabular)
- Can be specific injury or repetitive impingement
Hip Impingement

Abnormal contact between the femoral head/neck and acetabulum

Recently described by the Bern Hip Group (Ganz) as a cause of hip pain in young active individuals

Possible precursor to arthritis

As a “new” diagnosis – kept many young athletes out of sport and activities
Femoroacetabular Impingement

Lavigne et al. 2004

Labrum

NORMAL

CAM

PINCER

MIXED
Hip impingement is a morphology diagnosis – can have impingement without pain. Pain related to pathology such as labral tear.
Hip Impingement

• **The Problem:**
  • Excessive bone on the femoral head or neck or acetabulum is present

• **What Happens?**
  • “Abnormal contact” between the socket and the femoral head/neck occurs when the hip is flexed

• **The Result**
  • Abnormal contact leads to tearing of the labrum and potentially eventual arthritis
Why do people have hip impingement?

- Siebenrock *CORR* 2011
  - Followed adolescent athletes compared to controls
  - Hockey, soccer had 10X increased risk of developing CAM deformity
  - Suggestion:
    - Activity related with high flexion sports during physeal growth

**Genetic Component as well**
Labral tear

• Common symptoms
  • Pain, often in the groin, with hip flexion and rotation
  • Locking or catching with certain activities
  • Soreness or pain with prolonged sitting
  • Decreased range of motion

• Workup
  • Physical examination
  • Xrays and MRI (with contrast arthrogram)
Internal snapping vs psoas tendinitis

- Groin pain
- Hip flexion aggravates
- Snapping may not be symptomatic
- Iliotibial band
- Greater trochanter
- May not be symptomatic
Physical Exam
Patient Encounter

- Look, listen, and feel
  - Look
    - Look at the patient walk into the room.
  - Listen
    - Listen to the patient’s complaints
  - Feel
    - Examine the patient

- Be consistent with history and exam
  - Will prevent missing the diagnosis
1. Height_____ (in)
2. Weight_____ (lbs)
   BMI______
3. Trendelenburg:
   Positive (L)____(R)___ Negative (L)____(R)___
   Unable to test (L)____(R)___
4. Limp:
   None (L)____(R)___ Slight (L)____(R)___
   Moderate (L)____(R)___ Severe (L)____(R)___
5. Leg Length Discrepancy:
   Legs Equal____Left Short______Right Short____
   True Discrepancy:__________ (cm)
6. Skin Status:
   Normal (L)____(R)___ Previous Incision (L)____(R)___
   Healed (index procedure) (L)____(R)___
7. Range of Motion: Right Left
   Start of Flexion
   End of Flexion
   IR @90 Flexion
   ER @90 Flexion
   Abduction
   Adduction
   ERE
   IRE
8/9. Abductor Strength:
   Right Left
   __5/5__ __5/5__
   __4/5__ __4/5__
   __3/5__ __3/5__
   __2/5__ __2/5__
   __1/5__ __1/5__
   __0/5__ __0/5__
9. Pulse Intact:
   Yes (L)____(R)___ No (L)____(R)___
   If No, Specify Pulse Not Intact:
   ____________________________
10. Deformity:
    Fixed Add >= 10 deg (L)____(R)___
    Fixed IRE>= 10 deg (L)____(R)___
    PFC >=30 deg (L)____(R)___
    Leg Length Discrepancy >=3.5 (L)____(R)___
    None of the Above (L)____(R)___
11. Neurological Status Intact:
    Yes (L)____(R)___ No (L)____(R)___
    If No, Specify Pulse Not Intact:
    ____________________________
12. Pain Location:
    Anterior (groin) (L)____(R)___ Lateral (L)____(R)___
    Posterior (L)____(R)___ Anterior Thigh (L)____(R)___
13. Joint Preservation Patients Only: Right Left
    Anterior Impingement
    Posterior Impingement
    Apprehension Sign
    Lateral Impingement
    Psoas Pain (circumduction)
    Patrick’s Test (groin)
    Patrick’s Test (buttock)
    Psoas Pain (resisted hip flexion)
14. Orders:
   Bone Scan
   CT
   Hip aspiration r/o infection (radiology)
   Hip joint injection (diagnostic/corticosteroid-physiatry)
   Lab Work
   MRI
   MRA
   PT
   Surgery
   Follow Up:
   ___6mo___1yr___2yr___4yr___5yr
   ___Other________________________

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Patient Evaluation - History

- **Mechanism of Injury**

- **Duration of pain:**
  - Location of pain:
    - Primary
    - Secondary

- **Aggravating activities**
  - Sitting
  - Standing
  - Walking
  - Sports

- **Clicking/Catching/Locking**
  - Internal (Psoas)
  - External (ITB)
  - Intraarticular

- **Previous surgery**
  - Hip Arthroscopy
  - Pelvic Osteotomy
  - Open Hip Dislocation
  - Hernia Surgery
  - Back Surgery
  - Other

- **Physical Therapy**
  - Duration
  - Improvement (Yes/No)
Symptoms of labral tear

- Pain in the groin
  - Worse while sitting
  - Difficult to sit for long car rides or in the classroom

- Possible locking or catching in the groin if the labrum is detached
Examination maneuvers

- Pain maneuvers
  - Anterior impingement
    - Flexion, adduction, internal rotation
Posterior Rim Impingement Test
Imaging
Radiographic Evaluation

- Xrays:
  - AP Pelvis
  - False Profile View
  - Dunn View
  - Frog Lateral View
  - Cross-table Lateral View

- MRI
  - With arthrogram (MRA)
Hip Radiographs

- AP Pelvis
AP Pelvis interpretation

- Film quality/rotation: important to standardize
- Acetabular inclination (Tonnis angle)
- Femoral Head coverage (LCEA, extrusion index)
- Acetabular Version
- Joint space (Tonnis OA grade)
- Acetabular Depth
- Head sphericity, head-neck offset
False profile view

Fig. 3

Figure 17

Line 1

Line 2
Dunn View – Alpha Angle
Frog Lateral
Comparison – Dunn vs. Frog

Anterolateral head-neck offset

Fig. 19B

Anterior head-neck offset
Head-neck offset

- HNO ratio:
  - Distance between anterior femoral head and anterior femoral neck
  - Divide this by diameter of femoral head
  - Normal: >0.17
Advanced imaging

- MRI gold standard
  - 1.5T minimum needed (add arthrogram)
  - 3T for more advanced imaging
- Slices:
  - Axial radial oblique (cuts through femoral neck)
  - Sagittal
  - Coronal views
MRI – Great and not so great

- Philippon AJSM ‘12
  - Asymptomatic volunteers for MRI
    - 73% found to have abnormal finding
    - 69% found to have labral tear

Doesn’t always tell the answer
MRI

- Should be used to confirm the diagnosis
  - Don’t use it to make the diagnosis for you (will cause misdiagnosis more often than not)
- The “Labral Tear”
  - Radiology will more often than not call a positive labral tear.
  - Look at the edema pattern in the acetabulum and femur.
  - Help to differentiate between impingement and instability
- Look at the soft tissues
  - Muscle
    - Adductor insertion
    - Rectus insertion
    - Abductor insertion
  - Tendon/Ligaments
  - Bowel wall thickness (inflammatory arthropathy)
- The other joints:
  - Pubic symphysis (osteitis pubis)
  - SI joint (inflammatory arthropathy)
Arthritis!

- Joint space narrowing (asymmetric or <2.5mm)
- Subchondral sclerosis
- Subchondral cysts
- Marginal osteophytes
Surgery
Surgical Approach . . .

- Hip arthroscopy
  - Labral repair
  - Osteochondroplasty (acetabular and/or femoral)
- Combined hip arthroscopy with mini-open
- Surgical hip dislocation
- Hip replacement
  - Total hip arthroplasty
  - Hip resurfacing
Hip Preservation: Do No Harm!!!

- Complications:
  - Labral penetration (portal placement)
  - Chondral injury
  - Neuropraxia
    - Traction related (pudendal, peroneal, sciatic, dorsum of foot)
    - Portal related (LFCN)
  - Capsulolabral adhesions/Heterotopic bone
  - Over/Under-Resection Rim
  - Over/Under-Resection Femur
Case #1 – OM

- 42 year old male driver/package handler
- Fall at work – January
- Knee pain
  - Arthroscopic surgery
- Persistent groin pain
Imaging

- Decreased head-neck offset
- Joint space maintained
- MR arthrogram
  - Posterosuperior labral tear
  - Articular cartilage thinning
Exam Findings

- Negative Trendelenburg
- Positive impingement test
- Positive Patrick’s test

ROM:
- Flexion to 95°
- IRF 10°
- ERF 30°
- Abd 30°
- Add 10°
Treatment Options

- Physical therapy
- Anti-inflammatories
- Injection
- Surgery
Hip Arthroscopy Basics
Arthroscopic surgical technique

- Manage intra-articular disease and osseous impingement deformities precisely
- Avoid large surgical exposure, trochanteric osteotomy and hip dislocation
- Minimize surgical complications
- Facilitate rehabilitation and early return of function
Surgical technique

- Supine position, general/spinal anesthesia
- Traction table/hip scope extension - need mobility of the extremity
- Fluoroscopy
Surgical technique

- Adequate distraction (central compartment)
- Portal placement (anterior and anterolateral)

8-10 mm distraction
Surgical technique - acetabular rim

- Assess labrum, articular cartilage, etc
- Assess acetabular rim deformity (preop)
- Acetabular rim preparation/trimming
Labral Tear
Femoral (CAM) Impingement
preop

femoral osteoplasty
Results

Byrd et al. (2008)
207 hips, average 16 months, MHHS improvement 20 pts
Conversion to THA 1 (0.5%)

Larson et al. (2008)
100 hips, average 9.9 months , MHHS improved 25 pts
75 % G/E, Conversion to THA 3 hips (3%)

Philippon et al. (2009)
112 hips, average 2.3 years, Mean MHHS improvement 24 pts
Conversion to THA 9%
Complications/early failures

- Hip arthroscopy- low risk (infection, DVT, major nerve palsy)
- Heterotopic ossification
- LFCN and pudendal nerve dysfunction
- Inadequate resection (FAI)
- Symptoms related to labral resection, ?healing, chondromalacia
- Failure due to secondary OA
Recovery

- Focused postoperative therapy protocol
  - Excessive or aggressive therapy troublesome
- 2 weeks TTWB on crutches
- Progressive activity
  - Running at 3 months
  - Full activity/return to sport at 4 months
Case #1 – FB

- 50 yo male truck driver
- Acute onset July
  - Initial evaluation – hip strain
  - Initial appointment - October
- R groin pain
- No antecedent pain
- Worse with any activity, especially sitting (driving) and rotation
Imaging

45° Dunn view  Frog lateral

MRI (non-arthrogram) from OSH – early degenerative changes on the right with probable labral tear, advanced degenerative changes on the left
Treatment Options

- Physical therapy
- Medication – anti-inflammatories, muscle relaxers
- Injections – diagnostic vs therapeutic
- Hip arthroscopy with labral repair
- Hip arthroplasty – total vs resurfacing
Treatment Plan

- Physical therapy for FAI with labral tear
- Oral anti-inflammatories
Treatment Plan

- Physical therapy for FAI with labral tear
- Oral anti-inflammatories
- Intraarticular steroid injection – December
Outcome

- Improvement with steroid injection
- Improved strength and activity level with PT
- Work conditioning program – December
- Return to work, full-duty – March
What if this doesn’t work?
How much arthritis is too much for Hip Preservation?

- Hip arthroscopy in patients > 50 years
  - *Philippon et al. Arthroscopy ’12*
  - Conversion to THA associated with < 2mm joint space
    - 90% survivorship at 3 years > 2 mm joint space
    - 57% survivorship at 3 years < 2 mm joint space
Approach for Older Patients

- History, PE, and Plain Radiographs
  - Consider false-profile view
- Greater than Tonnis Grade I changes
- > Tonnis Grade I Changes
  - Diffuse: NO
  - Focal: Location and size of lesion
  - Response to intra-articular injection
  - Proceed with caution if at all!!!
Remember our options!
Recovery

- Postoperative therapy protocol to focus on strength
- WBAT immediately
  - Crutches/walker to eliminate limp
- Progressive activity
- Full recovery/return to activity by 3 months
  - Return to driving – 6 weeks for right hip
  - NO limitations following hip resurfacing
Conclusion

1) Wide range of FAI deformity types and severity

2) Several surgical techniques available to address these disorders

3) Surgical treatment should correct the mechanical impingement deformities and the associated soft tissue abnormalities (labral tears, cartilage flaps, etc)
Conclusion

4) Arthroscopic techniques continue to improve and at short term follow-up seem effective and safe for the majority of FAI disease patterns

5) Need longer term follow-up data

6) Hip preservation may not be feasible, even for acute traumatic injuries – hip replacement or resurfacing can be very effective alternative
Thank you