

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 Pain

- “Hip” has many definitions
- Labral tear/FAI
- Hamstring strain
- Snapping Hip
- Iliotibial band syndrome
- Arthritis

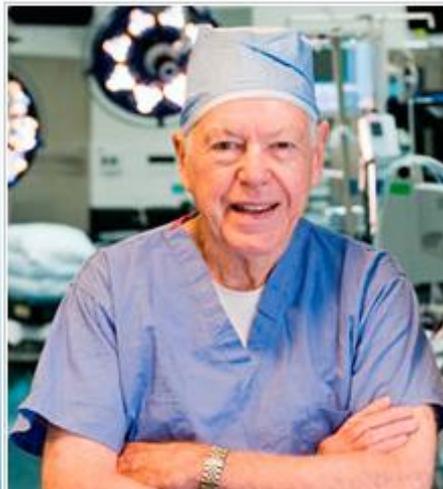


Hip Pain

- 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

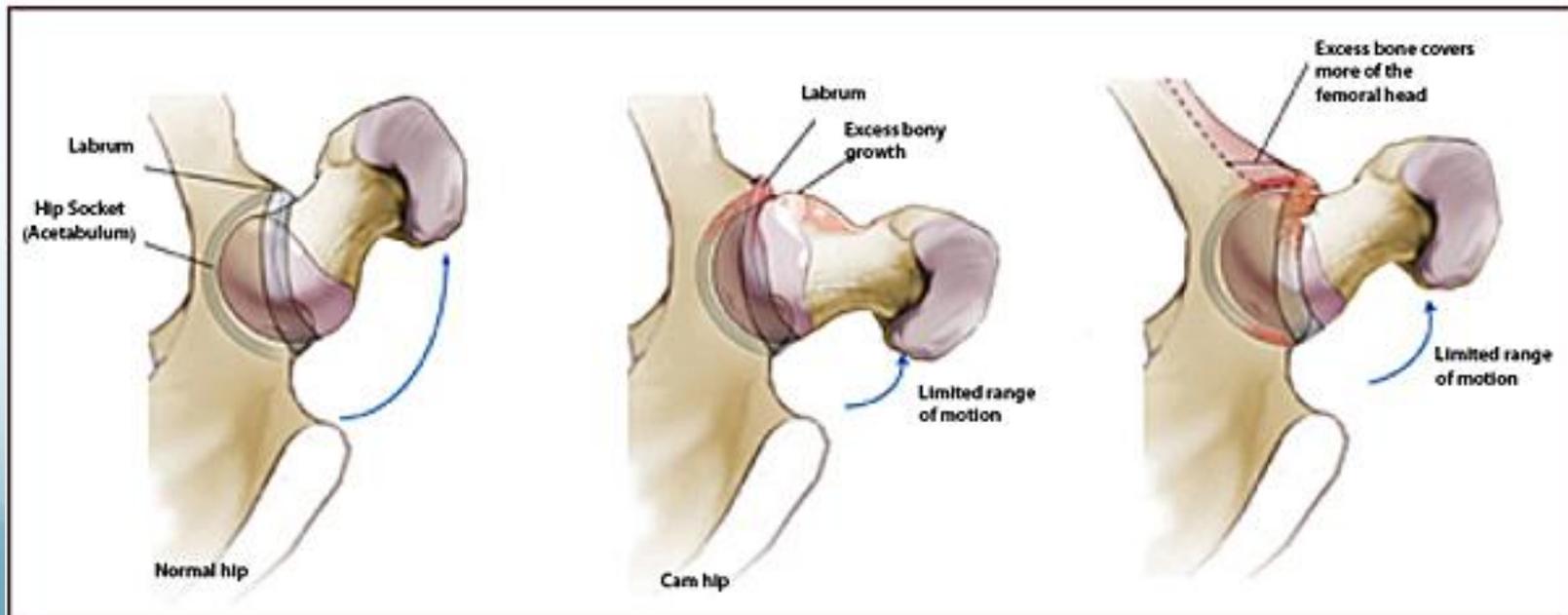
History

- 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

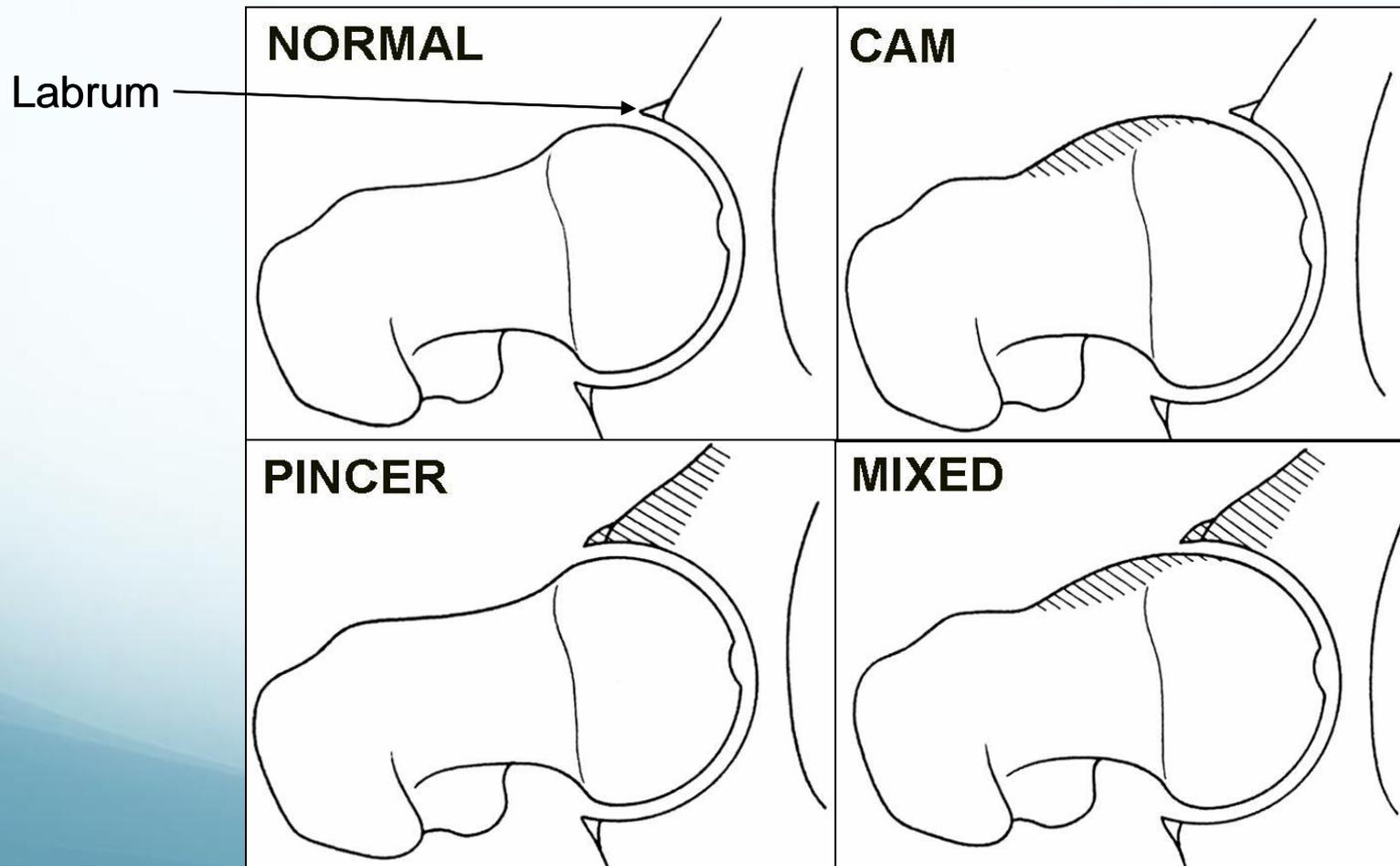
Recently described by the Bern Hip Group (Ganz) as a cause of hip pain in young active individuals

Possible precursor to arthritis

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

Femoroacetabular Impingement

Lavigne et al. 2004





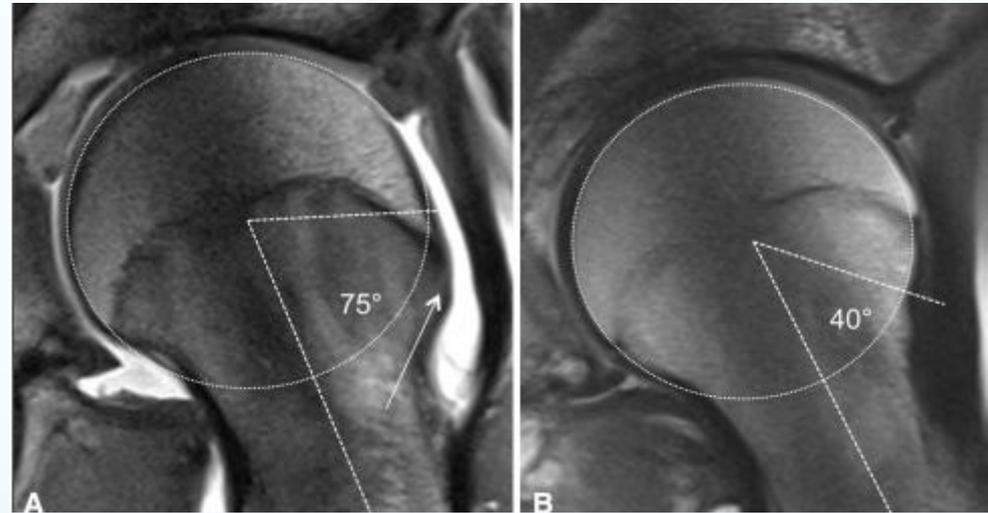
Hip impingement is a morphology diagnosis – can have impingement without pain. Pain related to pathology such as labral tear

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



Athlete

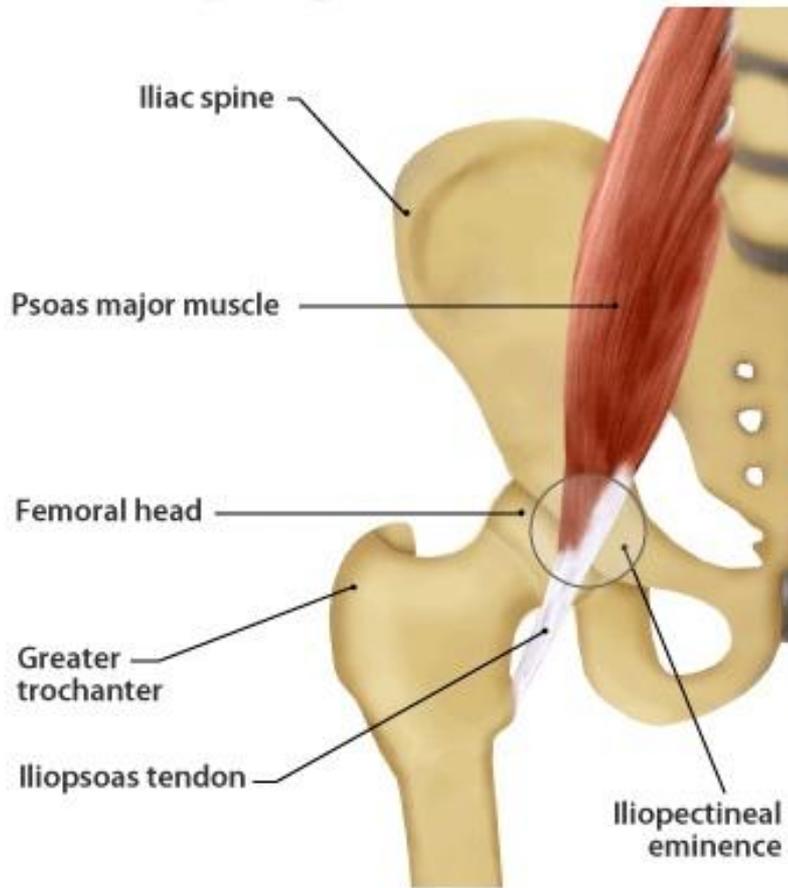
Control

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)

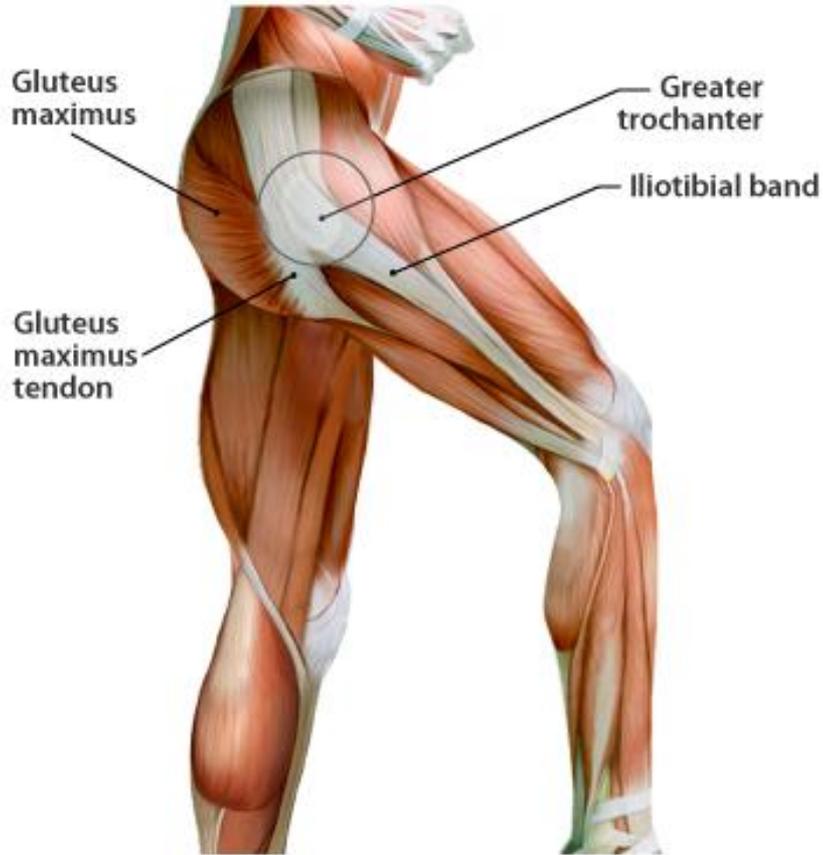
Internal Snapping Hip Syndrome



Internal snapping hip syndrome occurs when the iliopsoas tendon catches on the femoral head or iliopectineal eminence during hip flexion.

- Internal snapping vs psoas tendinitis
- Groin pain
- Hip flexion aggravates
- Snapping may not be symptomatic

External Snapping Hip Syndrome



- Iliotibial band
- Greater trochanter
- May not be symptomatic

External snapping hip syndrome occurs when the gluteus maximus tendon or iliotibial band catch on the greater trochanter during flexion.

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

Surgeon Hip Evaluation Form (Physical Exam)

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

10. Pulses Intact:

Yes (L)____(R)____ No (L)____(R)____

If No, Specify Pulses Not Intact: _____

11. 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)____

12. Neurological Status Intact:

Yes (L)____(R)____ No (L)____(R)____

If No, Specify Pulses Not Intact: _____

13. Pain Location:

Anterior (groin) (L)____(R)____ Lateral (L)____(R)____

Posterior (L)____(R)____ Anterior Thigh (L)____(R)____

NOTES

DIAGNOSIS

PRIMARY _____

SECONDARY _____

14. 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)	____-____+	____-____+

Orders:

Bone Scan

CT

Hip aspiration r/o infection (radiology)

Hip joint injection (diagnostic/corticosteroid-physiatry)

Lab Work

MRI

MRA

PT _____

Surgery _____

Other _____

Follow Up:

____6mo ____1yr ____2yr ____4yr ____5yr

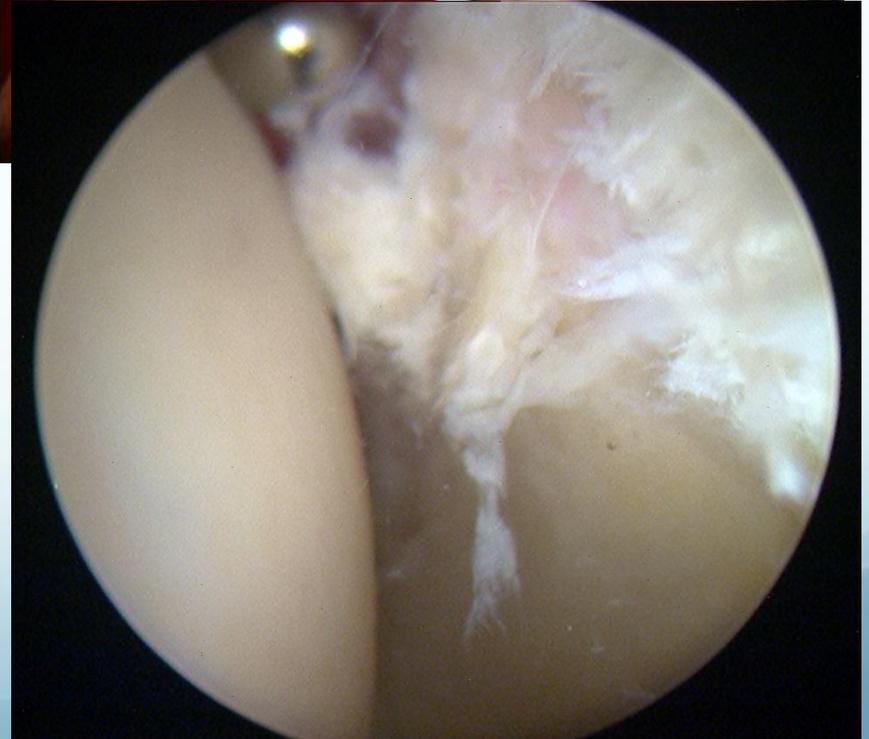
____Other _____

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



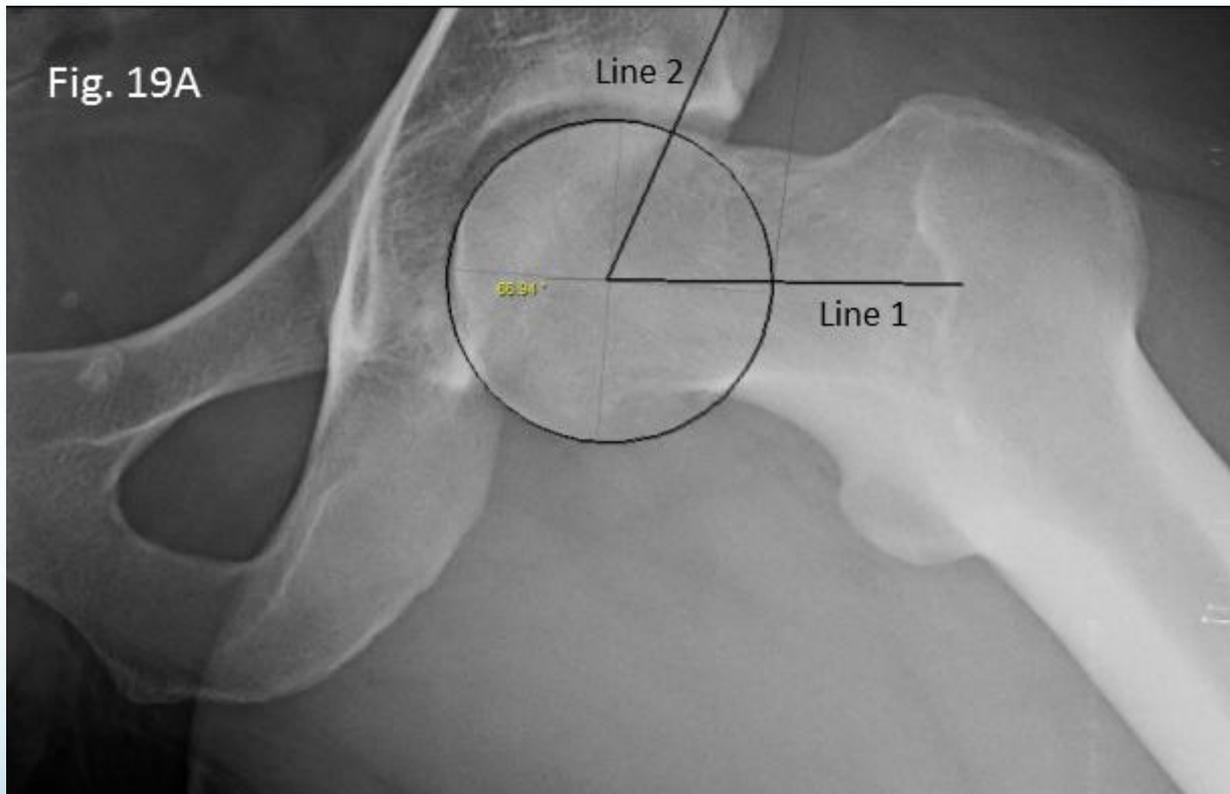
AP Pelvis interpretation

- 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

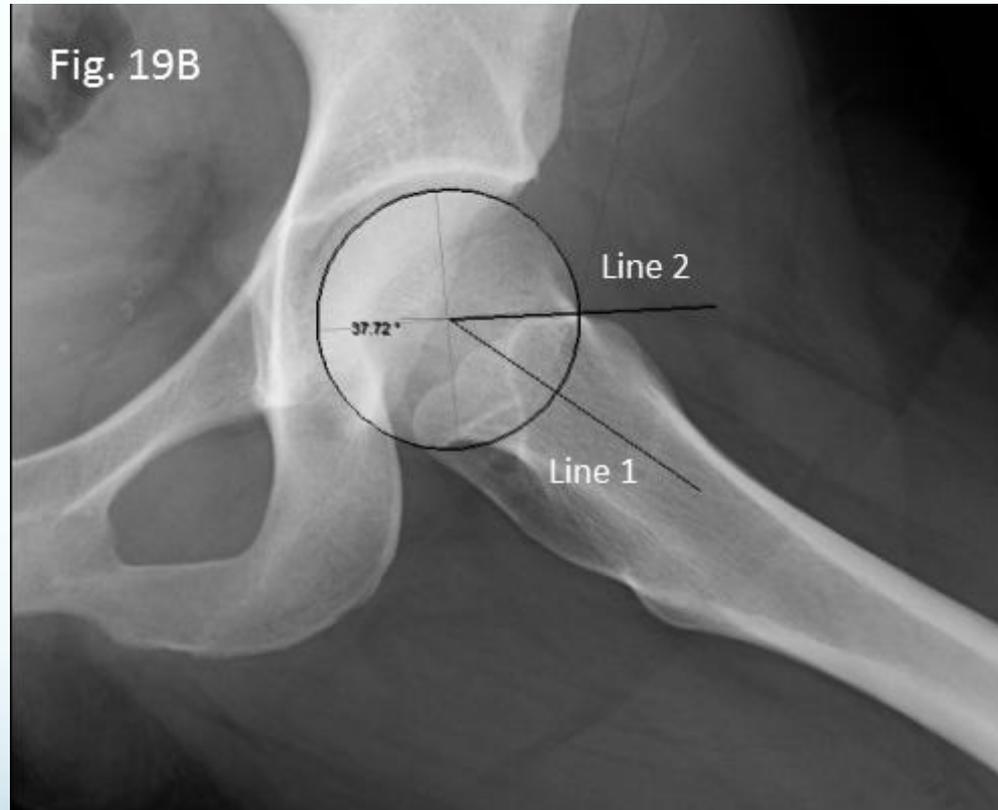
False profile view



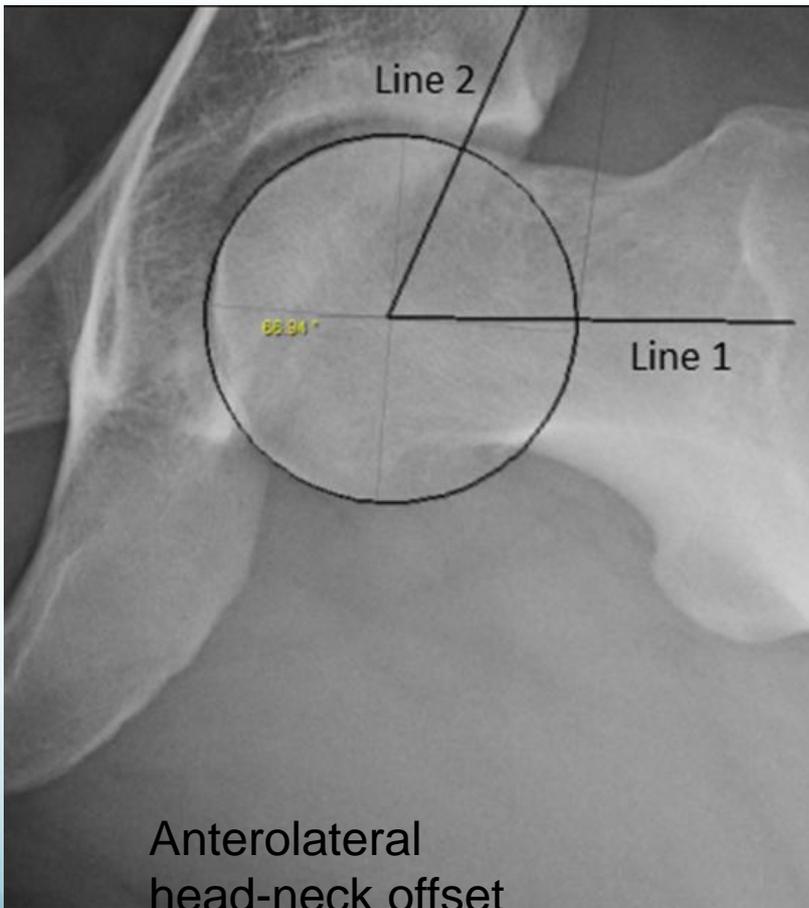
Dunn View – Alpha Angle



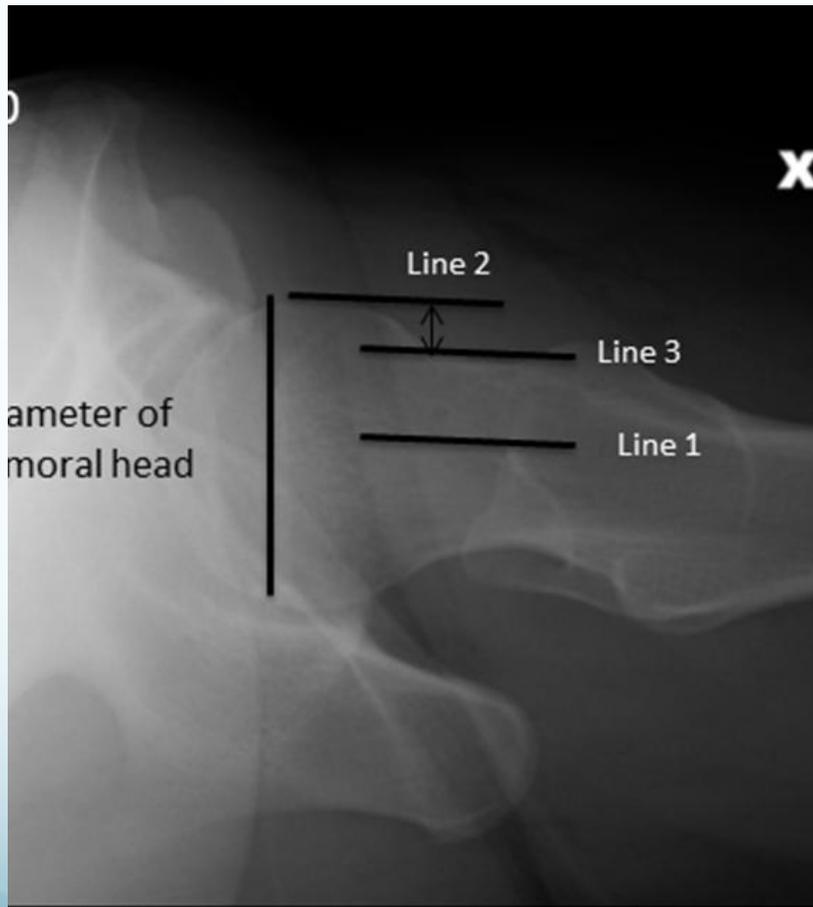
Frog Lateral



Comparison – Dunn vs. Frog

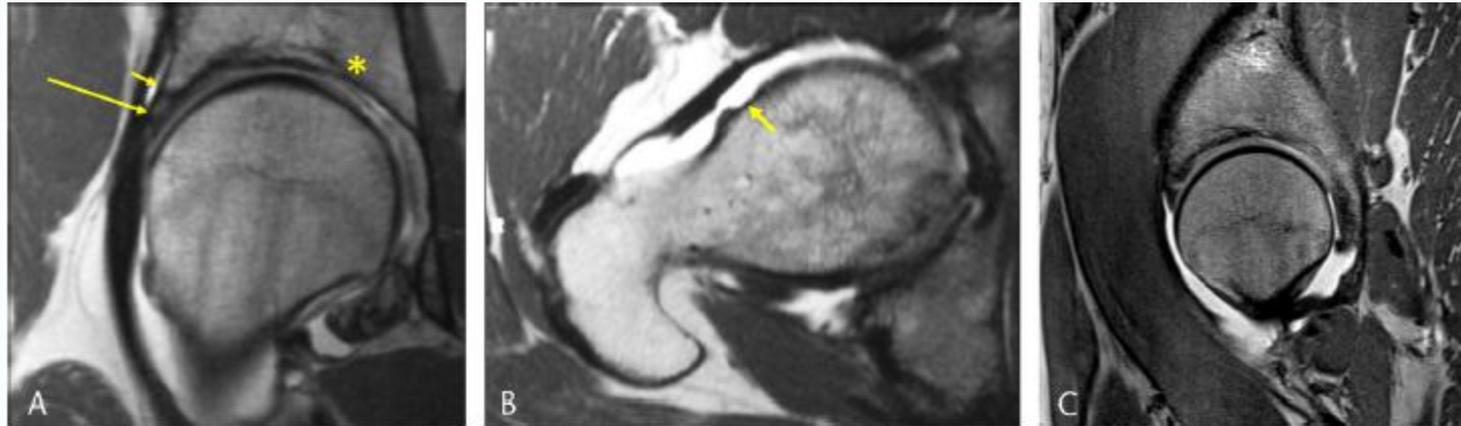


Head-neck offset



- 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 $<2.5\text{mm}$)
- 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**

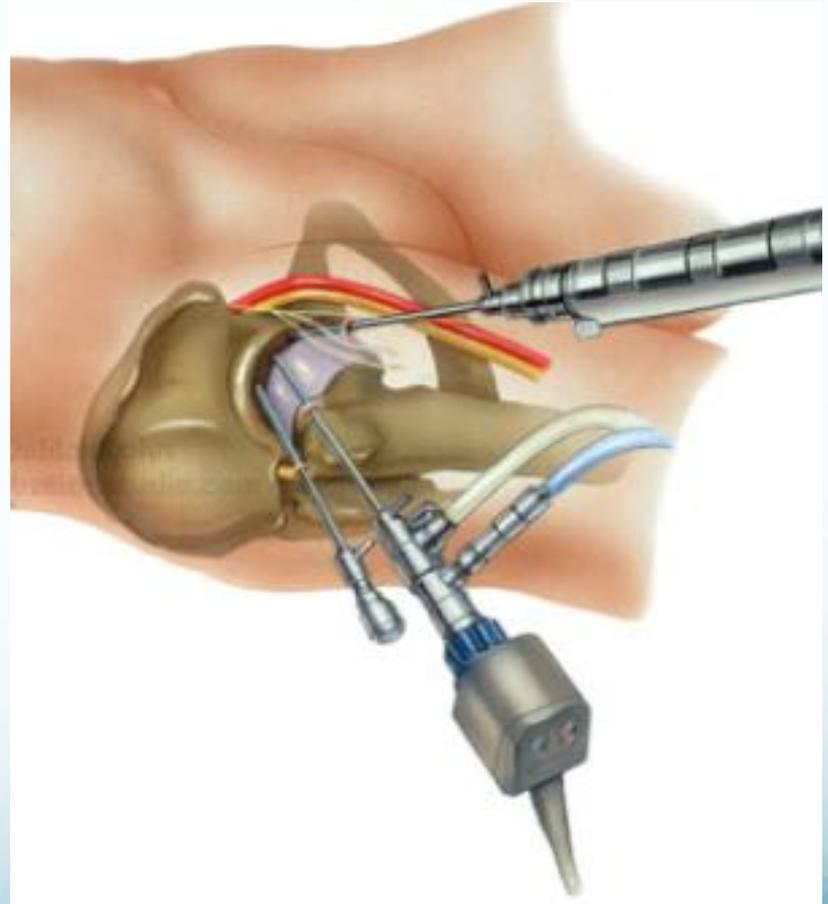
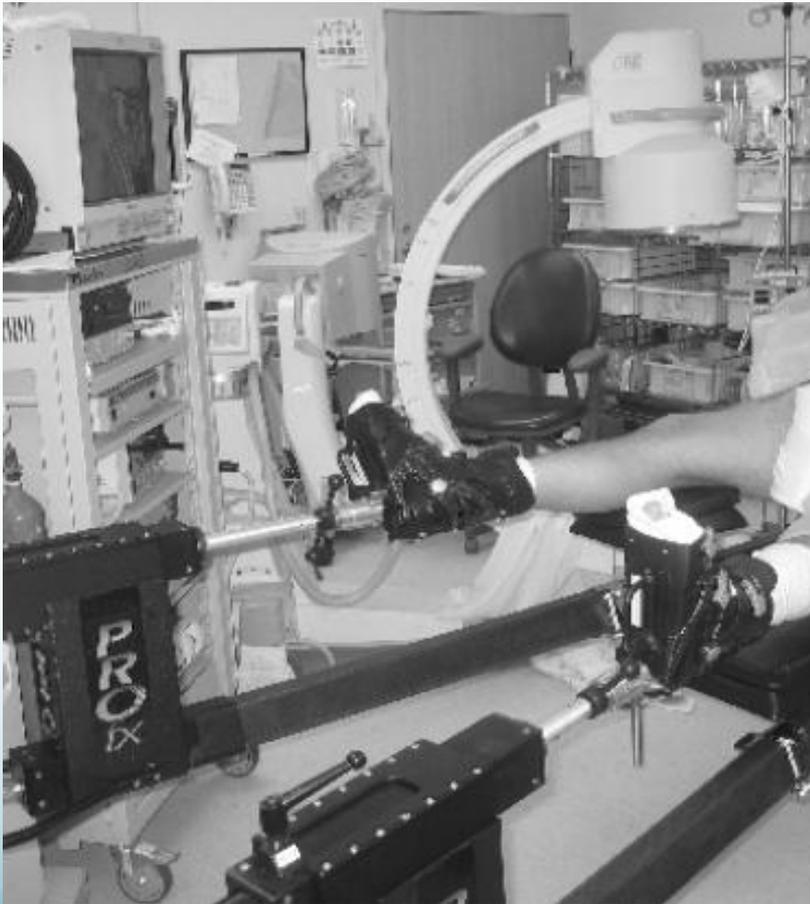
Exam Findings

- **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**
- **Flouroscopy**

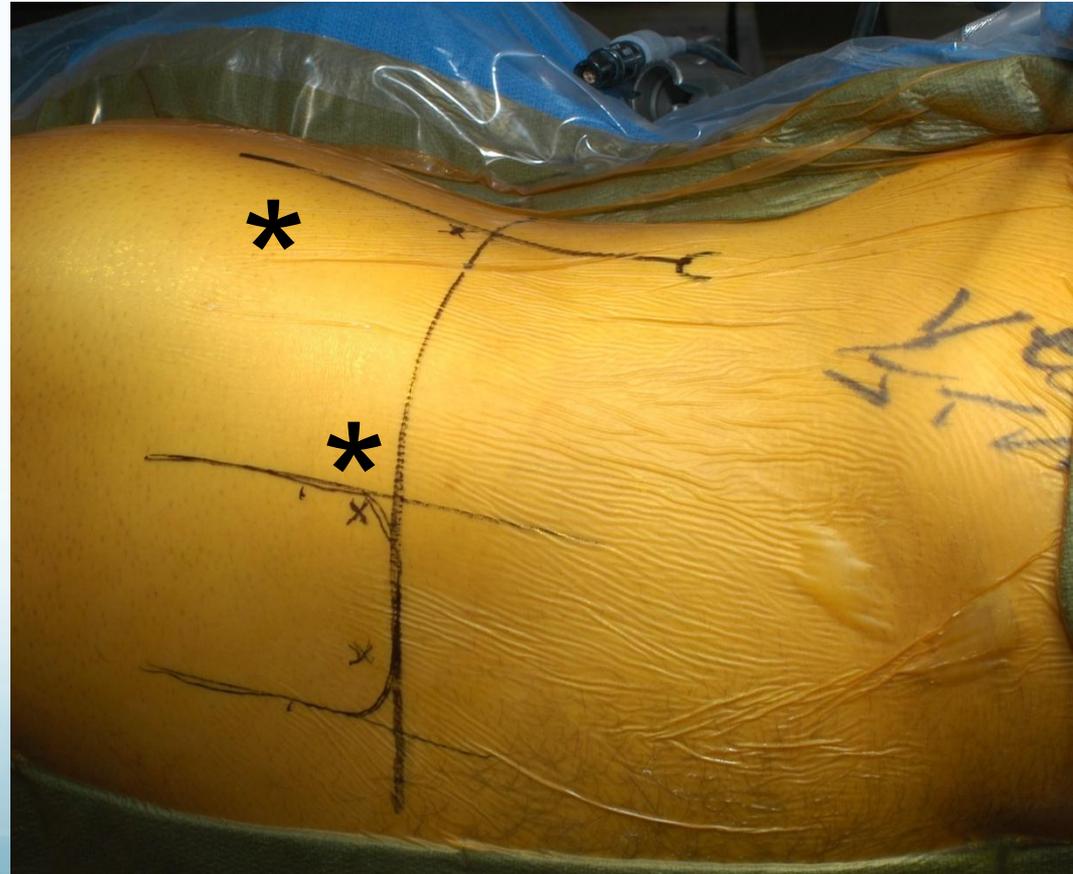


Surgical technique

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

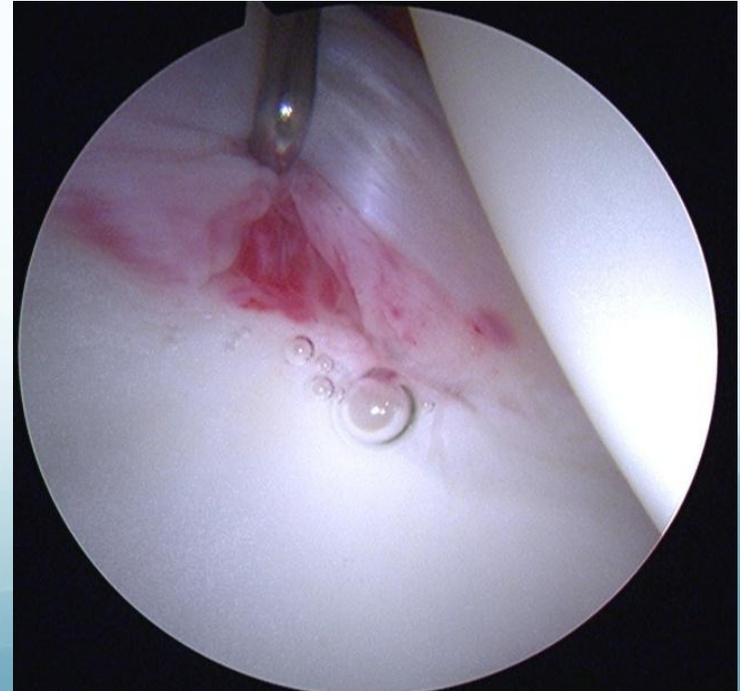
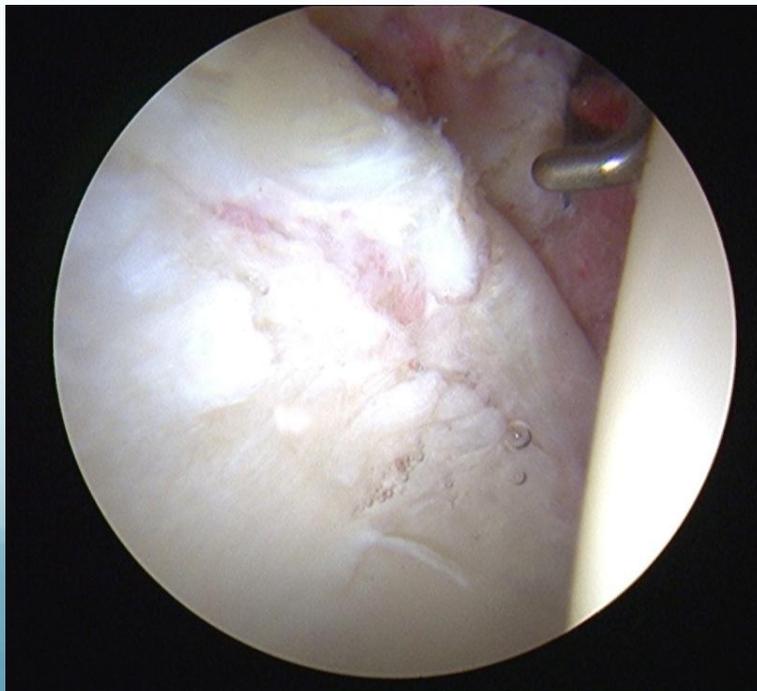


8-10 mm distraction

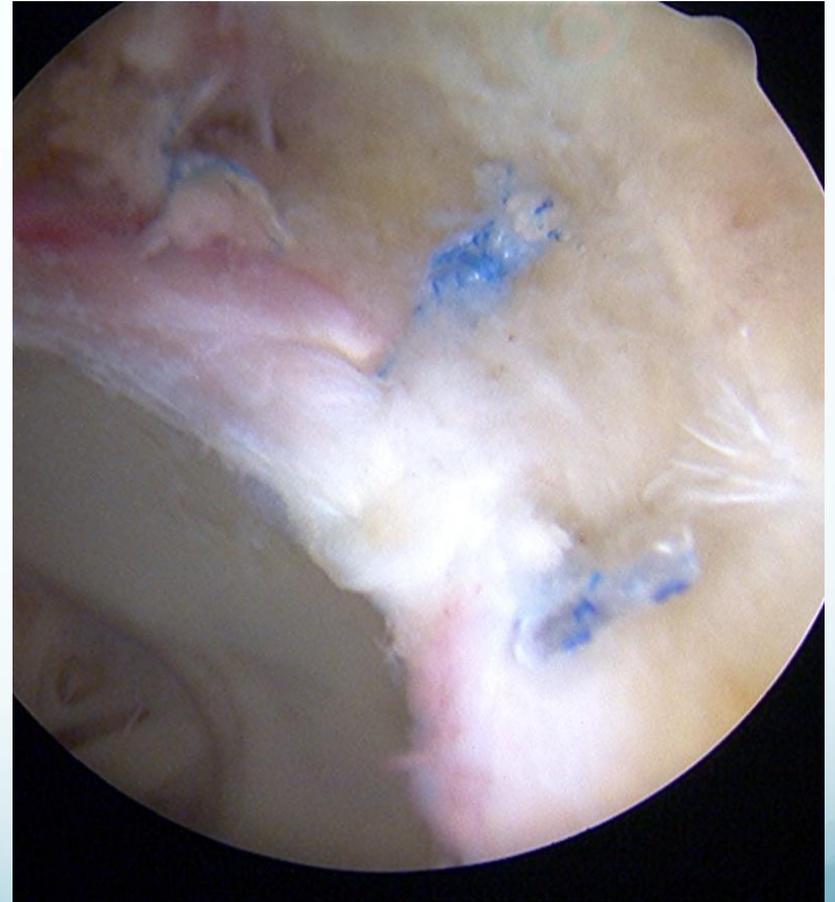
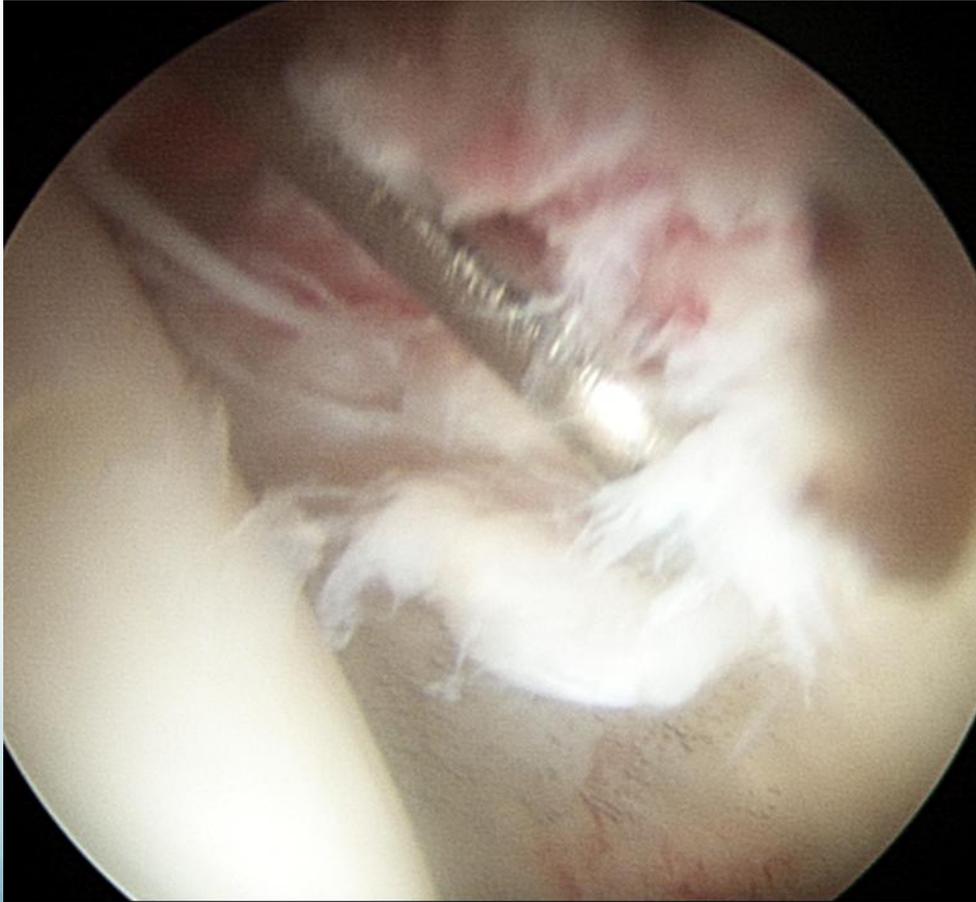


Surgical technique- acetabular rim

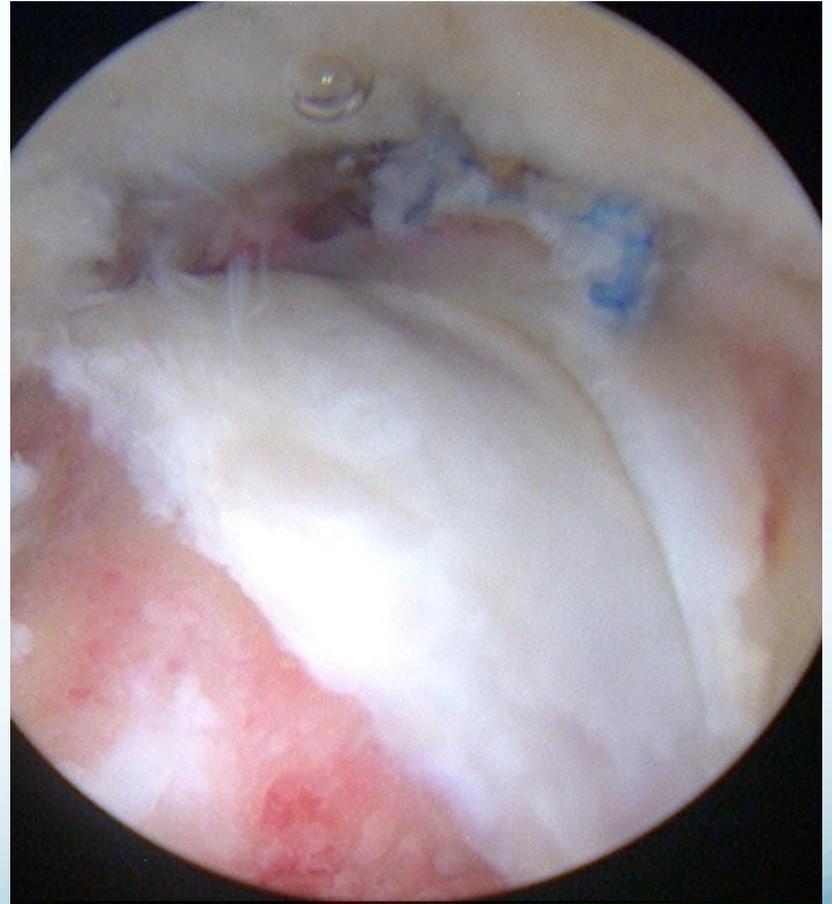
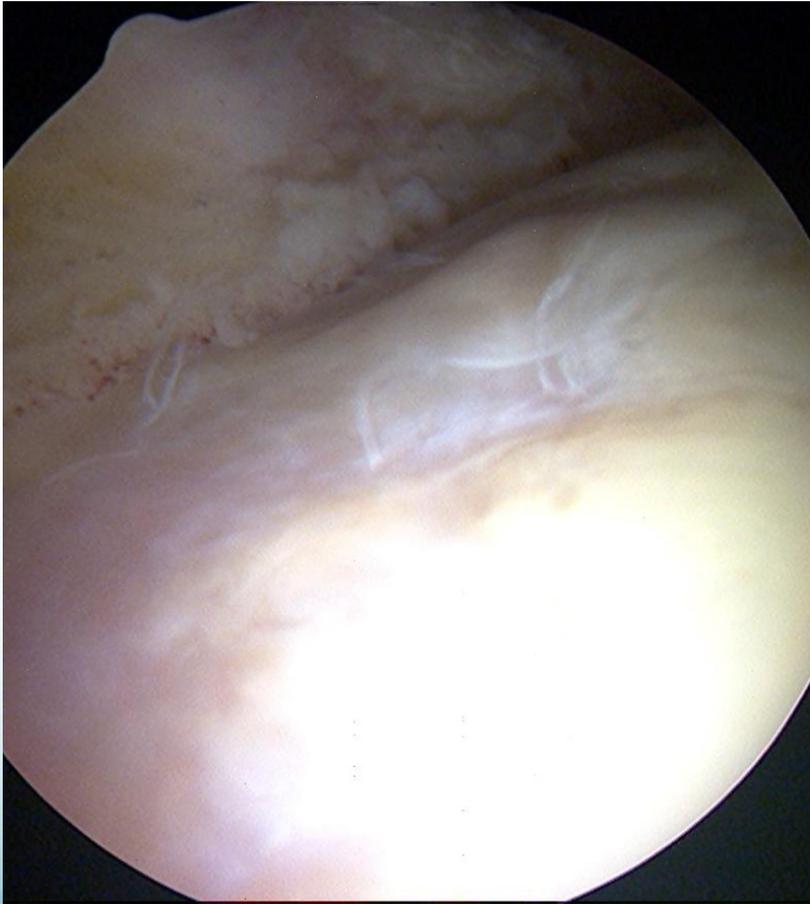
- Assess labrum, articular cartilage, etc
- Assess acetabular rim deformity (preop)
- Labral recontouring, partial resection, repair (Espinosa, et al JBJS, 2006)
- Acetabular rim preparation/trimming



Labral Tear



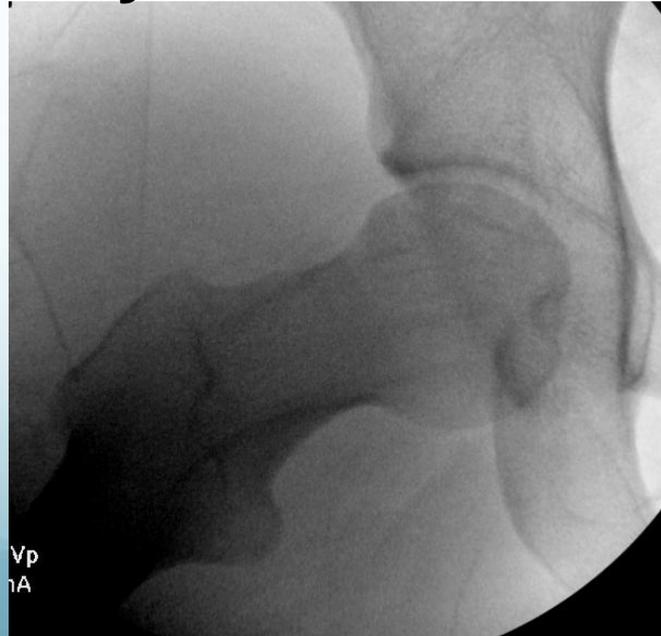
Femoral (CAM) Impingement



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%

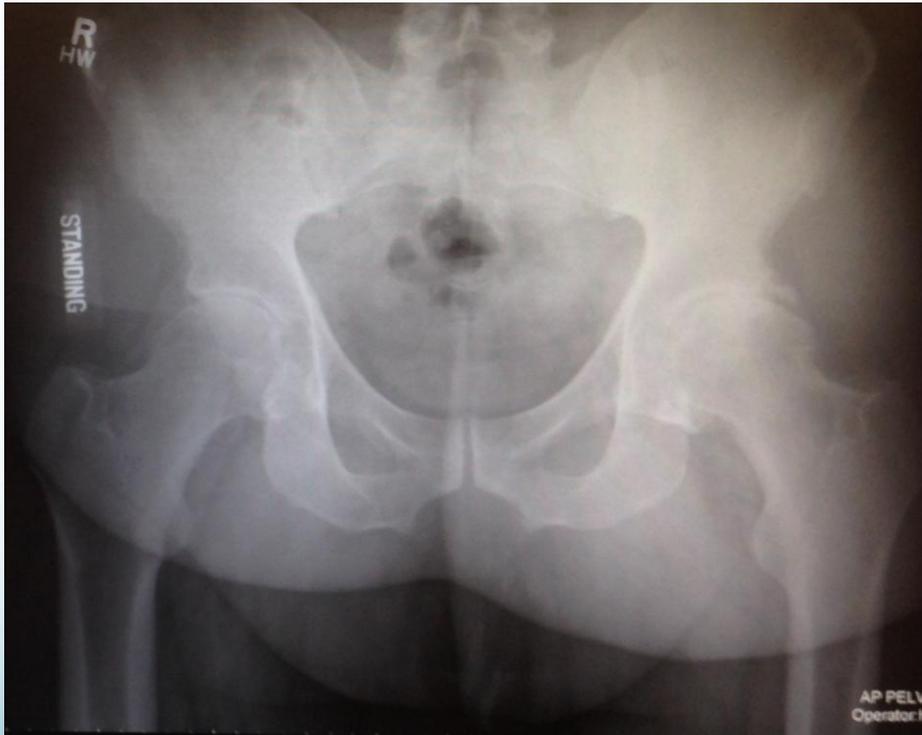
Complications/early failures

- 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

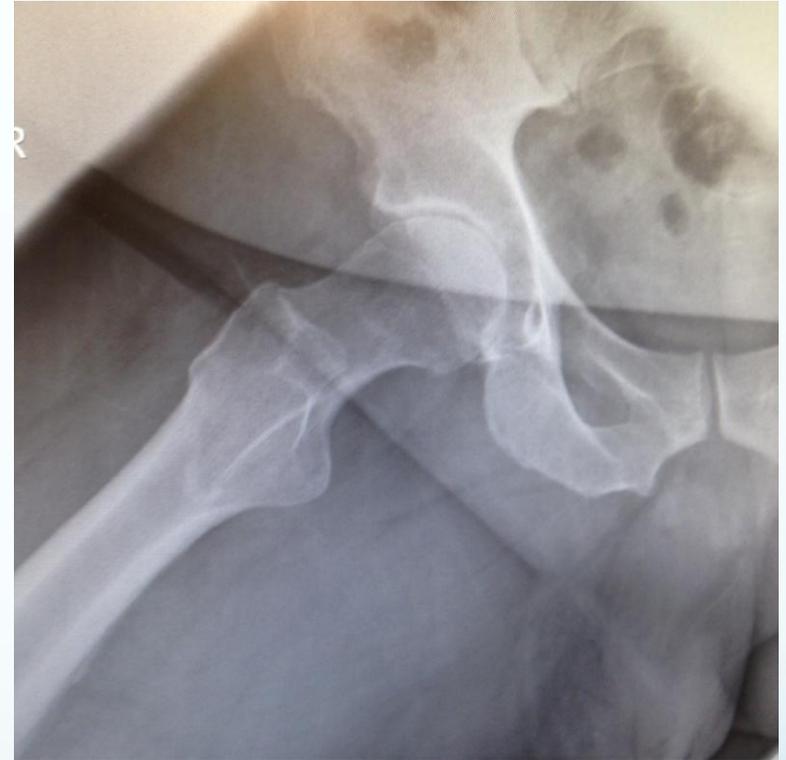


- 50 yo male truck driver
- Acute onset July
 - Initial evaluation – hip strain
 - Initial appointment - October
- R groin pain
- No antecedent pain
- Worse with any activity, especially sitting (driving) and rotation

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 < 2 mm 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

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