

Labral Tears & Femoral Acetabular Impingement

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Objectives

1. Describe anatomical and physiological characteristics of the acetabular labrum predisposing it to injury.
2. Outline risk factors contributing to the development of acetabular labral tears.
3. Identify common biomechanical/musculoskeletal deficiencies in patients with acetabular labral tears.
4. Suggest potential conservative intervention ideas for treatment of an acetabular labral tear.
5. Acknowledge the general differences between surgical options for treatment of an acetabular labral tear.

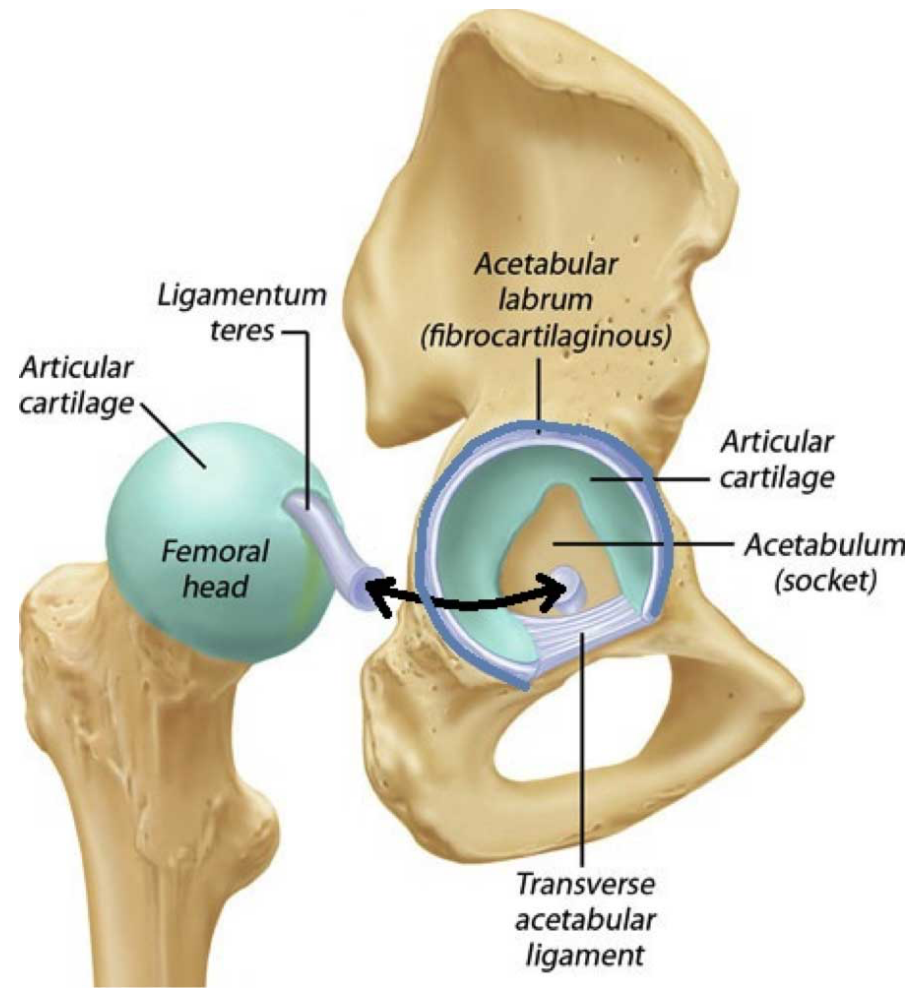


Lecture Outline

1. Labral Anatomy Review
2. Risk Factors
3. Incidence/Prevalence
4. Examination
5. Treatment Options
6. Prevention?

Acetabular Labrum Anatomy Review

- Fibrocartilagenous ring completed by transverse acetabular ligament
- Widest and thinnest in anterior half; thickest in posterior half
- Functions
 - Increase joint depth
 - Enhance stability
 - Increase congruity
 - Protection of articular cartilage

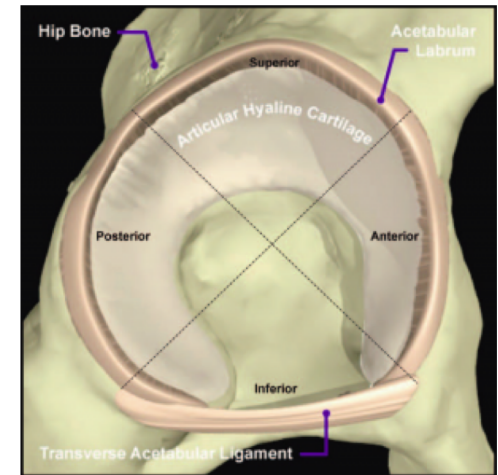


Acetabular Labrum Anatomy Review

- Vascularization on outer one third to outer one half
- Collagen fibers
 - // anteriorly
 - _|_ posteriorly
- Merges with articular hyaline cartilage
- Potential participation in nociception and proprioception

Tear Pattern Classifications

- Directional location
 - Anterior
 - Posterior
- Physical location
 - At the articular cartilage
 - Detachment of labrum from articular surface
 - Detachment of labrum *and* articular cartilage from adjacent bone (more advanced tears)
 - Within the substance of the labrum
 - Through plane of labrum \perp to surface



Risk Factors

1. FAI*

2. Others

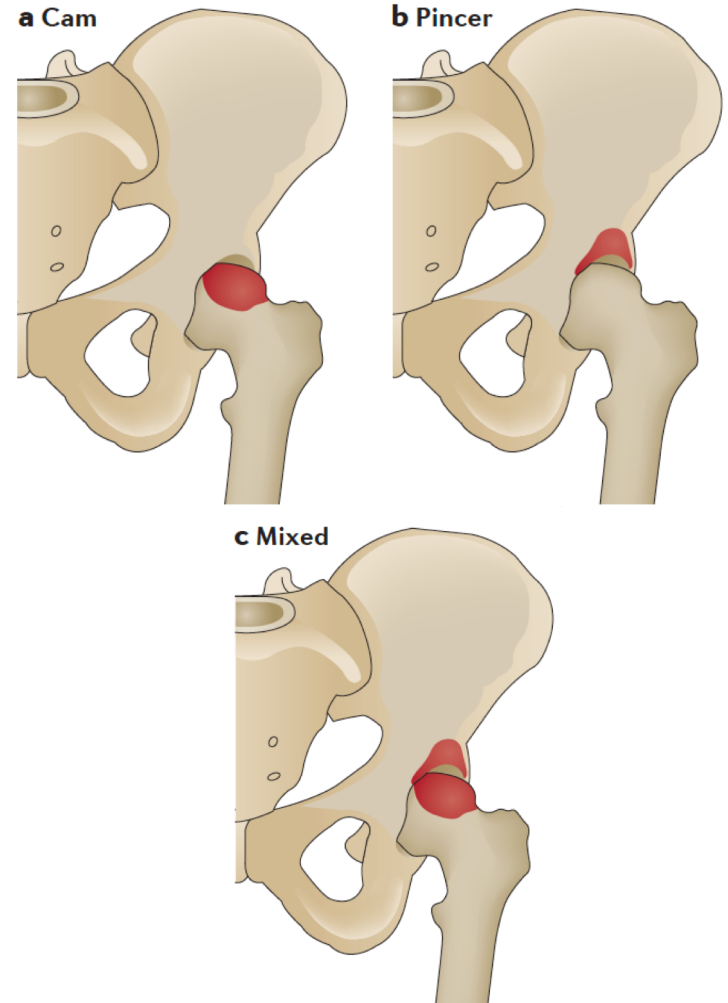
- Trauma
- Capsular laxity/hip hypermobility
- Developmental Hip Dysplasia (DHD)
- Degeneration

FAI

- Compression of anterior superior labrum between acetabular rim and anterior femoral neck
- Insidious onset
- Leading cause of hip pathology in athletes
- Types
 - CAM
 - Pincer
 - Mixed

FAI Types

- **CAM** (a): bony overgrowth of femoral neck (most common)
 - Association with labral tears: *causes direct impingement of femoral head on the labrum, creating shearing at labral and articular cartilage junction*
- **Pincer** (b): overhang of the anterior superior acetabular rim
 - Association with labral tears: *compression between femoral head, labrum, and acetabulum*
- **Mixed** (c): combination of both



FAI Diagnosis

Imaging

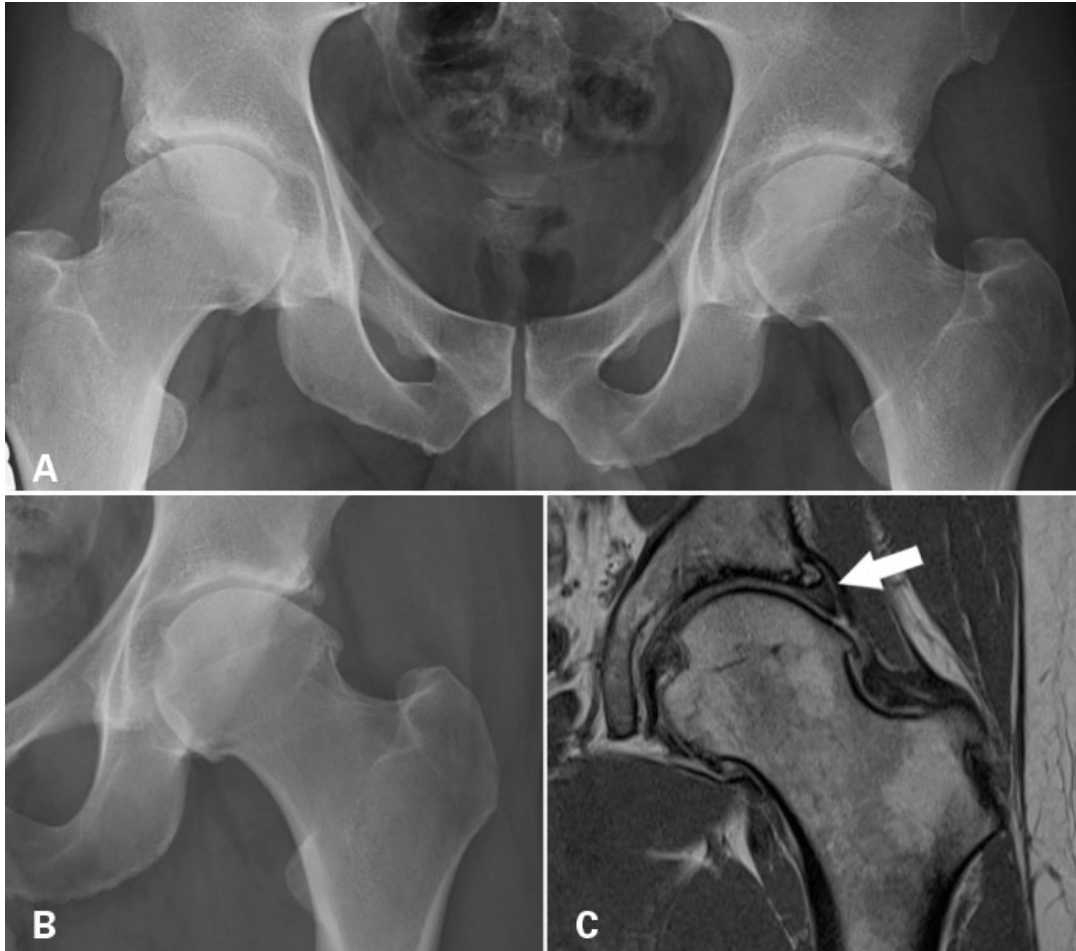
- X-rays
- MRI
- MRA

Controversial because multiple studies have shown that many people have FAI but not concurrent pain.

Special tests

- **FABER**
- **FADIR**
- **Squat**
- Anteroposterior Impingement Test
- Posteroinferior Impingement Test
- McCarthy sign

FAI Diagnosis



CAM FAI and
Labral tear

A & B: X-rays
C: MRI

Other Risk Factors

- Trauma: subluxation or dislocation of femoral head
- Capsular laxity/hip hypermobility
 - Can stem from underlying collagen disorders or hormonal influences on capsular tissue
 - Abnormal loading in hip ER can create iliofemoral ligament laxity
- Developmental Hip Dysplasia (DHD)
 - Shallow acetabulum
 - Femoral anteversion or retroversion
 - Decreased distance from center of femoral head to axis of femoral shaft
- Joint degeneration

Incidence and Prevalence

- Systematic review and meta-analysis aimed to determine the prevalence of intra-articular hip pathologies in individuals with and without pain using diagnostic imaging:
 - Symptomatic: 62% (95% CI 47% to 75%)
 - Asymptomatic: 54% (95% CI 41% to 66%)
- 22 to 55% of all pt's presenting with groin pain
 - 22% of athletes with hip pain
 - 55% of patients with hip pain of unknown etiology

Examination

- Subjective
- Objective
- Outcome measures
- Differential diagnosis

Subjective

- Patient history and/or MOI
 - Isolated traumatic event
 - Car accident
 - Fall from a height
 - Fall
 - Repetitive microtrauma
 - Soccer, hockey, golf, ballet
 - Running and sprinting

Subjective

- Functional limitations
 - Antalgic gait (limping)
 - Climbing stairs
 - Walking distances
 - Sitting for extended periods of time
- Activity limitations
 - Walking
 - Pivoting
 - Impact activities (running, jumping, etc)

Subjective

- Pain
 - Typically insidious onset
 - Deep in the hip joint; "C sign"
 - Constant, dull
 - Episodes of intermittent sharp pain
 - Night pain



Objective

- Radiographic imaging
 - X-rays
 - CT scans
 - MRI
 - MRA
 - Hip arthroscopy
- Symptoms
 - Clicking
 - Catching
 - Groin and anterior hip pain
 - Sensations of hip instability
 - Increases in pain with increases in activity

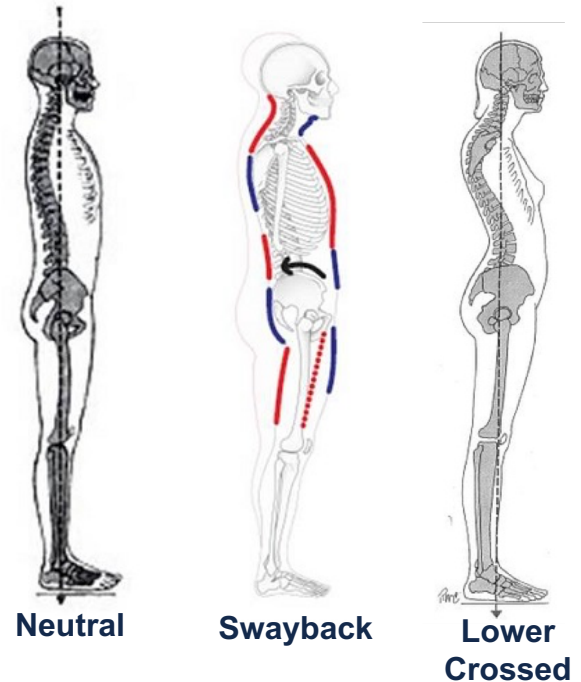
Objective

- Gait
 - Prolonged foot flattening during stance
 - Decr knee FLX at heel strike and early stance
 - Knee hyperEXT
 - Hip hyperEXT
 - Hip ER

(Lewis & Sahrman)

Objective

- Standing
 - Swayback posture
 - Hip hyperEXT evident with knee hyperEXT, or **posterior pelvic tilt**, or both
 - Shifts pelvis forward and tilts it backwards
 - Upper trunk leans forward to compensate
 - Lower crossed syndrome
 - Tightness of hip flexors and lumbar erector spinae
 - Weakness or inhibition of glutes and abdominals
 - Incr hip FLX and hyperlordosis of lumbar spine
 - **Anterior pelvic tilt**



(Lewis & Sahrman)

Objective

- ROM
 - Limitations typically in hip rotation, FLX, ADD, and ABD
- Strength
 - Limitations typically in hip FLX and ADD; potentially also ABD and ER

Objective

- Special tests
 - **FABER (Patrick's)**
 - **Scour**
 - **FADIR**
 - **THIRD test**
 - **Labral tear tests (Fitzgerald's)**
 - **Anterior labrum: FABER → EADIR**
 - **Posterior labrum: FADIR → EABER**
 - **McCarthy sign**
 - **IR Load Grind test**
 - **Eccentric hip flexion**
 - **Resisted SLR w/hip in 90°**

Outcome Measures

1. **Hip Outcome Score +/- Sport Scale (HOS)**
2. **Harris Hip Function Scale/Harris Hip Score (HHS)**
3. Lower Extremity Function Scale (LEFS)
4. Iowa Functional Hip Evaluation Form
5. International Hip Outcome Tool (iHOT)

Differential Diagnosis

- Inguinal or athletic pubalgia
- Herniated nucleus pulposus with radiculopathy
- Iliopsoas tendinopathy
- Rectus femoris tendinopathy
- Abductor muscle tendinopathy
- Hip OA
- Snapping hip (or hypermobile iliotibial tendon)
- FAI

Treatment Options

- Physical therapy
- Surgery

Physical Therapy

- Ultimate goals
 - Decreasing pain
 - Correcting/optimizing biomechanical alignment
 - Neuromuscular control
 - Strengthening
 - Addressing other issues

Physical Therapy

- **Decreasing pain**
 - Rest
 - Decreased WBing
 - Activity modifications
 - Sitting, avoid
 - Legs crossed or sitting on legs (induces hip rotation)
 - With excessive pressure on the femur as opposed to ischial tuberosities
 - Sit to stands, avoid
 - Rotating pelvis on loaded femur
 - Walking, avoid
 - If on treadmill, avoid letting the moving tread push the hip into passive hip hyperEXT
 - Exercise, avoid
 - High impact activities
 - Exercises causing hip hyperEXT
 - Manual techniques
 - Anti-inflammatories prn MD

Physical Therapy

- **Correcting/optimizing biomechanical alignment**
 - Decr anteriorly directed shear forces; can be caused by
 - Decr force contribution from glutes during active hip EXT
 - Decr force contribution from iliopsoas during active hip FLX
- **Neuromuscular control**
 - Address patterns of abnormal muscular recruitment
 - Incr participation of glute max, hip ABD, deep ER's, and iliopsoas
- **Strengthening** of weak or inhibited musculature
- Addressing issues at **other parts of the LE kinetic chain**
 - Orthotics
 - Taping

Physical Therapy, *potential treatment protocol?*

- 4 patient case series JOSPT article
- Subjects: 2 professional athletes, one recreational soccer player, and one sedentary adult
- Evaluated at baseline, 4 mos, and 6 mos after treatment
- 4 phase PT protocol focusing on: hip and lumbopelvic stabilization, correction of muscular imbalances, biomechanical control, and sport-specific functional progression
- 3x/wk for 12 weeks
- Outcomes: decr functional limitations

Physical Therapy, *potential treatment protocol?*

- Phase 1: pain control, education in trunk stabilization, correction of abnormal movement (instruction to correct excessive dynamic valgus or hip ADD and IR that incr during SL stance)
 - Progressed with decrease in pain and improved trunk control and dynamic valgus
- Phase 2: muscle strengthening, recovery of ROM, and initiation of sensory motor training
 - Progressed with strength of involved limb matching that of uninvolved
- Phase 3: advanced sensory motor training with sport-specific functional progression

Physical Therapy, *potential treatment protocol?*

- Examples of exercises utilized:
 - **Segmental stabilization:** TA and multifidus isolated contraction, light exercises such as bridging → lateral bridge and mini squat → Swiss ball exercises
 - **Strengthening:** standing hip FLX and EXT, standing hip ABD and ADD, lunges, shuttle machine, knee FLX/EXT on chair, side stepping with elastic band, dynamic valgus control with single limb squat → progressive overloading
 - **Sensory motor training:** balancing, balance board, DynaDisc, Jumping board → incorporating sport specific movements (kicking and throwing)

Surgery

- **Indications:** symptoms persisting despite conservative management, concurrent FAI
- **Contraindications:** significant hip OA, uncorrected DHD, asymptomatic patient (“treat the patient, not the MRI”)
- Types
 - [Debridement](#)
 - [Repair](#)
 - [Reconstruction](#)
- Potential complications
 - Surgical: traction related complications, portal placement related complications, inadvertent chondral and labral damage, instability, inadequate correction of FAI if concurrently correcting
 - Post-operative: excessive leaking of fluid, femoral neck fracture and avascular necrosis, heterotrophic ossification

Future Research Directions

- More subjects
- Long term outcomes
- Direct comparisons of surgical vs conservative management
- Abstract published in April 2018 in JOSPT outlining an RCT study protocol investigating arthroscopic surgery vs sham surgery for patients with FAI and/or labral tears

Prevention?

- No direct research on prevention of labral tears, but...
 - Knowing MOI and aggravating positions: avoiding
 - Hip FLX, ADD, IR
 - Hip EXT, ABD, ER
 - Caution in activity selection in hypermobile patients
 - Address muscular abnormalities and poor posture

Questions?



H i p h i p



H o o r a y !

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