Hip Labral Pathology – From Diagnosis to Functional Rehabilitation

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No Grandma,
Listen,
Double-click the Internet Explorer icon.
Objective

• Overview of labral tears

• Hip impingement
  -what does that mean?

• Review of traditional exam

• Treatment philosophy

• How functional assessment can confirm diagnosis and drive treatment plan
The labrum is a ring of fibrocartilage (fibrous cartilage) that extends around the majority of the acetabulum, increasing its depth.

The labrum acts as a suction seal around the femoral head maintaining the joint fluid within.

The fluid protects the articular cartilage layers of the femur and acetabulum. The labrum does act as a stabilizer of the femoral head within the acetabulum as well.
Labral Tears are Typically the Result of Some Underlying Etiology

**Bony**
1. Static overload
   - femoral anteversion
   - valgus femoral neck orientation
   - acetabular dysplasia (ant/lat)
2. Dynamic Impingement
   - CAM impingement
   - femoral retroversion
   - pincer impingement

**Soft Tissue**
1. Psoas Impingement
2. Laxity – collagen disorders

**Traumatic**
1. Subluxation
2. Dislocation
AAOS Classification of labral tears

- **Stage 0** – labral contusion with synovitis
- **Stage 1** – discreet labral tear with normal articular cartilage
- **Stage 2** – tear with focal articular damage to subjacent femoral head, no acetabular cartilage abnormality
- **Stage 3A** – tear with focal acetabular cartilage lesion <1cm
- **Stage 3B** – tear with focal acetabular cartilage lesion >1cm
- **Stage 4** – extensive acetabular labral tear with associated diffuse osteoarthritis
Labral Tear
Multiple cadaveric studies have shown labral tears to be quite common.

McCarthy et al found 53 of 54 acetabular specimens to have at least one labral tear, while Seldes et al found 53 of 55 cadavers to have labral tears.

In an additional study of 365 cadaveric hips, Byers et al found that the labrum was detached from the articular surface of the acetabulum in 88% of people over the age of 30.

Symptomatic acetabular labral tears are most common in the ages 25-40 (Burnett) and are of equal prevalence among men and women (Narvani).
Labral Management

• Not all labral tears are the same

• Isolated labral tears are uncommon

• Most have associated chondral damage (Byrd & Jones, AAOS '02)

• Studies (MRI/MRA) best at detecting labral damage

• Poor at detecting articular damage (Byrd & Jones, AJSM '04)

• Extent of chondral damage - less favorable prognostic indicator
Femoroacetabular Impingement

Femoroacetabular Impingement (FAI)

- Condition in which femoral head, acetabulum or both are shaped abnormally

- Ball and socket do not fit perfectly

- Damage may occur to articular cartilage or labral cartilage

- Impingement can occur as a result of femoral sided impingement (CAM)
  - Acetabular rim impingement (pincer)

- Combination of both
Impingement Syndromes

**CAM Impingement**
- Predominately affects the cartilage within the hip joint
- Results in characteristic peeling of cartilage off the bone

**Pincer Impingement**
- Refers to the “over cartilage” of the acetabulum in respect to femoral head
- “Extra” bone of the acetabulum repetitively hits upon the femoral neck, resulting in pinching of the labrum

**Combined**
- CAM lesions often coexist with pincer lesions
- CAM lesions lead to articular cartilage injury
- Pincer lesions crush and tear the labrum
• 92% of individuals complain of anterior groin pain with symptomatic labral tears
• Conversely, it is a symptom that has a very low specificity for labral injury
• 33% of individuals with a confirmed labral tear recalled a trauma that started their symptoms
• 66% of labral tears are suspected of being degenerative in nature
• 56-71% of people complain of night pain
• 9-89% of individuals reported limping
• 67% reported clicking
• >50% reported locking up or catching
• Overuse activities is common in labral tears specifically external rotation, hyperabduction
How Does a Labral Tear Present?

- Labral tears commonly result in "groin" pain
- Localized to anterior hip
- Less commonly, posterior or lateral pain
- Pain described as deep and sharp
- Reproduced with high degrees of flexion and IR
- Prolonged sitting can increase pain
- Activity can increase pain
- Pain is Intermittent
- Referred pain down the leg
- Disturbed sleep secondary to pain
- Referred pain and disturbed sleep tend to be more common in those with arthritis of the hip.
Imaging

- x-ray – standard/special views
- CT – 3D reconstruction
- MRI / MRI arthrogram

Dunn lateral radiograph (elongated-neck lateral view) of the hip, demonstrating an osseous offset (yellow arrow) at the femoral head-neck junction, indicating a cam lesion.

Coronal fast-spin-echo magnetic resonance image of a patient with combined femoroacetabular impingement with a cam lesion (arrow) and ossification of a torn superior portion of the labrum (arrowhead) consistent with pincer-type impingement.
Physical Exam

• Observation
• Gait pattern- antalgic/ trendelenburg
• Palpation- iliac crest height symmetry
• AROM/PROM bilaterally into all planes
• Strength
• Flexibility
• Joint mobility
• Special tests
• Functional Tests
Traditional Exam

- AROM/PROM
  Normative ranges:
  - hip flexion – 0-120 degrees
  - hip extension – 0-30 degrees
  - hip ER/IR – 0-45 degrees
- Flexibility of muscles
  - RF, PF, HS, ITB, Illipsoas
- MMT
- Joint mobility
  - anterior/inferior/posterior capsule restrictions
- SI screen
Special Tests

- **FABER test** - hip flexion, abduction, ER
- **Thomas test** – flex hips and lower affected leg
- **Impingement test** – hip flexion, adduction, IR
- **Ober test** – knee/hip extension, hip abduction
- **Lateral rim impingement** – flexion->extension in abduction
- **Craig test** - rotate limb until greater trochanter is parallel to floor
- **Ely test** – flex knee and draw lower leg to thigh
One study found FABER (Patrick) test to be positive in 88% of those tested. Seven studies evaluated Flexion/ Adduction/ Internal Rotation (FADIR) and found sensitivities between 95 - 100%, with positive predictive values between 64 - 100%.
Thomas Test

- Therapist observes position of contralateral hip while patient holds flexed hip

- Positive test is indicated by the contralateral leg rising from the table secondary to hip flexion contracture
Interesting phenomenon in which a portion of the tendinous area of the psoas, running outside the joint (in the majority of cases), becomes symptomatic, in that it tightens causing it to snap (internal snapping hip) across either the rim of the acetabulum or the femoral head.

The psoas itself can become painful from this repetitive motion. In other cases, the psoas compresses the labrum resulting in crushing and sometimes tearing of the labral tissue due to the close proximity of the two structures.

Several patients do present with an internal snapping hip, over coverage of the acetabulum and labral tear, for which we have deemed the term "triple impingement."
Everything should be made as simple as possible, but not simpler.

Albert Einstein
Functional Exam

- Lower extremity assessment incorporates tri-planar movements
- Open and closed kinetic chain motions
- Overall mobility and functionality
- Deficits identified drive the treatment plan
- 5 basic lower extremity tests assess hip-core mobility and strength
Functional Exam

- Core Motion / Hip Mobility
- Abdominal-psoas relationship
- Functional squat
- Single leg squat
- Medial step down
Core ROM

Assesses all three planes

• Rules out:
  - Spinal deviations
  - Musculoskeletal restrictions
  - Capsular restrictions

SP motion

• Ideally enough motion to touch toes and extend 50 degrees
• During SP motion fluid hip translation and minimal thoraco-lumbar compensation should be present
Sagittal Plane Motion
Core ROM

**FP motion**
- Lateral pelvis translation is evaluated ideal range 50 degrees or more from center
- Limited FP motion can be due to restrictions in quadratus lumborum, ilio-psoas, and hip inferior capsule

**TP motion**
- Focuses on symmetric trunk/pelvis rotation ideal range 50 degrees or more from center
- Shoulders and hips should move symmetrically
- Minimal compensation at the lumbar-thoracic regions
Frontal Plane Motion
Transverse Plane Motion
Abdominal-Psoas Relationship

- Hip mobility works in conjunction with eccentric abdominal-psoas functionality

- Poor control /deficits of eccentric motion can lead to excessive or restricted pelvis translation in all planes

- Tri-planar motions can be modified with poor balance/control

- Assessment of functional relationship looks at objective data
Sagittal Abdominal-Psoas Functional Relationship

• Patient faces away from wall with heels 6 inches away

• Single leg balance with raised hip and knee at 90

• Arms are crossed behind the head

• Patient translates hips anteriorly and taps wall with back of hands

• Returns to upright position while maintaining SLB for 20 sec

• Time, repetitions, quality of motion are assessed
Frontal Abdominal-Psoas Functional Relationship

- Patient stands perpendicular to wall
- Single leg balance on the outside leg with hip and knee at 90
- Arms are crossed over chest
- Patient taps shoulder to wall by shifting the hip laterally towards the outside foot
- Returns to upright position while maintaining SLB for 20 sec
- Time, repetitions, quality of motion assessed
Transverse Abdominal-Psoas Functional Relationship

- Patient faces away from wall with heels 3 inches away
- Single leg balance with hip and knee at 90
- Arms are crossed over chest
- Patient alternates tapping left and right shoulders to wall
- Returns to upright position while maintaining SLB for 20 sec
- Time, repetitions, quality of motion assessed
Functional Squat

• Assessing functional squat emphasizes problem areas
• Assessment of trunk shift, hip excursion, anterior knee translation, quality of motion
• Measurement assessed in degrees
• Ideally Feet are shoulder width apart
• Hips excursing posteriorly
• Knees centered over toes
• Heels to the ground while maintaining good control
• Trunk shift away from affected side during motion may be indicative of labral pathology
Single Leg Squat

- Evaluates balance, strength, hip mobility, motions of foot, ankle and hip
- Patient stands on 12” box
- Balances on 1 leg while translating opposing leg forward while lowering into a single leg squat
- Femur should be parallel to the ground
- Posterior pelvic translation with minimal trunk compensation
- Assessment of pelvic translation and quality of load at foot, ankle, knee
Medial Step Down

- Evaluates balance, strength, hip mobility, flexibility
- Patient stands on 6 inch box
- Balances on 1 leg while medially lowering opposing heel to ground
- Tap ground and raise back up and repeat 5 times
- Test focuses on foot and ankle evaluation
- Quality of eversion, dorsiflexion, pronation
- Ineffective foot and ankle motions can contribute to pathology
Non – Operative Rehabilitation

Active Warm up – elliptical, forward/backward walking, side stepping carioca, progressive warm up

**Weeks 1-2:**

- Focus on hip mobility/ core-psoas relationship
- Core walks
- Core exercises in all 3 planes starting at level 1 progressing to level 3
- Good hip mobility, core mobility and hip translation should be present before moving to next level
- Closed chain step up/downs
- Dynamic flexibility
  - 2D gastroc
  - dynamic HS
  - rectus femoris/psoas
  - chop/lift
Core SP Level I
Core SP Level II
Core FP Level I
Core FP Level III
Core Walk
Chop / Lift
2D Gastroc
Non-Operative Rehabilitation

- **Weeks 2-3**
  - Start working eccentric psoas in relation to core
  - Low level SAP, TAP, FAP eccentric loading
  - Modified functional squat for strengthening
  - Low level side lying total gym hip isolation
  - Start to build strength for reaches and step ups

- **Weeks 3-4**
  - Build strength for balance reaches down
  - Step ups progressing to step downs after one week
  - Good control and good eccentric loading should be demonstrated
  - Progress to arms overhead with step exercises to incorporate core
Lunge Series
Lunge Series
Non-Operative Rehabilitation

Weeks 4-5
- Core ROM exercises continue to progress through level 3
- Consider functional warm up as resistance increase with other exercises
- Continue to build in repetitions/ weight as appropriate
- Add spider mans, crawls, hurdles, mini-bands, SP/FP/carioca
- Additional LE flexibility exercises continued to be progressed through the 3 planes of motion, piriformis, 3D gastroc, rotation with HS stretch

Week 5-6
- Manual treatment should be incorporated into each treatment session and progressed as tolerated
- Cone touch
- Continue to re-evaluate using the same progression tools
Mini - Bands
Spiderman
Hurdles
Summary

• Labral tears are usually due to some type of underlying etiology

• Evidence of hip impingement is often associated with hip labral pathology

• Functional Exams confirms the Traditional Exams and drives treatment plans

• Tri-planar programming is essential for all types of Injuries
Making Sense Of It All!!!!

OMG!!

THAT WASN'T A FART
Disclosures


Questions???
Thank You!!

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