Arthroscopic Labral Anatomy and Management

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Anatomy of the Labrum

- Fibrocartilaginous rim that overlies the articular cartilage and surrounds the perimeter of the acetabulum, except at the base, where it attaches to the transverse acetabular ligament
- Triangular in cross section
- Widest anteriorly and superiorly; thickest superiorly
- Corresponds to weight-bearing region of acetabulum
- Normal posterior labral sulcus should not be mistaken for pathology

Function of Labrum

- Deepens acetabulum by approximately 21%
- Vascular supply comes mostly from the capsule
  - Kelly et al. Arthroscopy 2006
- Creates a seal of the hip joint
  - Maintains hydrostatic pressure enhancing lubrication
  - Maintains negative pressure enhancing stability
- Reinforces acetabular rim
  - Contributes to containment of femoral head at extremes of motion
  - Contributes to joint stability
- Questionable role in load transmission
  - Dysplasia
  - Post surgical?
Relative Stability

- Motion of the femoral head relative to the acetabulum, vertically (a) and laterally (b).
- Increased motion in the absence of the labrum.

Cartilage Compression

- Contact stresses in acetabular cartilage increase with time, and up to 92% higher in the absence of the labrum.
- The cartilage layers compress appr. 40% quicker if the labrum is removed.

Anatomy-Blood supply

- Vascular supply to the labrum is similar to the meniscus, in that vessels are found in the periphery.
Etiology of Labral Tears

- Labral Tear
  - Trauma (14%)
  - Capsular Laxity (25%)
  - Femoral-Acetabular Impingement (43%)
  - Dysplasia (4%)
  - Degenerative (14%)

Labral Tears

- Natural history of labral tears unknown
- Healing uncertain, but some become clinically quiescent
- Prevalence of incidental asymptomatic imaging evidence of pathology in high impact sports unknown

Etiology

- Wenger et al. showed that 87% of patients with labral tears had underlying structural abnormalities
  - (Wenger et al. CORR 2004)
- Ganz and colleagues introduced the concept of Femoroacetabular Impingement (FAI) as a cause of hip pain, labral tears, and early osteoarthritis
  - (Ganz et al. CORR 2003)
Anatomy/Pathology

- 3 classification systems of labral tears:

1. **Lage** - 4 types: radial flap (most common), radial fibrillated, longitudinal peripheral, and abnormally mobile


Anatomy: Labral Tears

- 2. **Seldes**
  - Type 1-full thickness detachment from rim of acetabulum
  - Type 2-intrasubstance split in labrum


Anatomy

- 3. **McCarthy** (combines labral tear with articular pathology)

  - Stage 0 - Labral contusion with synovitis
  - Stage 1 - Discreet labral tear with normal articular cartilage
  - Stage 2 - Labral tear with focal articular damage to subjacent femoral head without acetabular cartilage abnormality
  - Stage 3A - Labral tear with focal acetabular articular-cartilage lesion < 1 cm
  - Stage 3B - Labral tear with focal acetabular articular-cartilage lesion > 1 cm
  - Stage 4 - Extensive acetabular labral tear with associated diffuse osteoarthritis

Diagnosing Labral Tears?

- MRI
  - 42% false-negative
  - 10% false-positive

- MRA
  - 8% false-negative
  - 20% false-positive

- Intra-Articular Injection
  - 7% false-negative
  - 2% false-positive
  - 90% accurate

- MRA more sensitive than MRI, but 2x as many false positives
- Intra-Articular injection is the most reliable indicator of intra-articular abnormality

Paralabral Cyst
Don’t Repair Normal Labral Sulcus

Why Repair

- Ganz et al. JBJS 2006
  - Open dislocation with pincer and CAM bone resection
    - Group I: Labral resection (20 patients)
      - 2 years
        - 28% excellent, 48% good, 20% moderate, 4% poor
    - Group II: Labral repair (32 patients)
      - 2 years
        - 80% excellent, 14% good, 6% moderate
    - Significantly more osteoarthritis in Group I than Group II: P=0.009
    - “The labrum acts like a seal that prevents fluid loss from the joint and protects the articular cartilage”

Why Labral Repair

- Larson et al. Arthroscopy 2009
  - Arthroscopic approach with pincer or combined pincer and CAM type impingement.
    - Mean age 31y/o(I)/27y/o(II)
    - Group I (36 patients) mean f/u 21.4 months
      - Labral debridement
        - HHS 88.9
        - 66.7% excellent
    - Group II (39 patients) mean f/u 16.5 months
      - Labral repair
        - HHS 94.3
        - 89.7% excellent
Labral Repair

- Steps similar to labral repair in the shoulder
- Two or Three Portals
- Preparation Repair bed
- Suture Passing Instruments
- Anchors
  - Bio, peek or Metal
  - Knot-less or tie knots

Technique-Portal Placement

- Lateral portal - anterior aspect of the superior margin of the greater trochanter
- Midanterior - 6 to 8 cm distal to the anteriorlateral portal at an angle of 30 degrees to 50 degrees
  - Avoids lateral femoral cutaneous nerve hip flexors

Portal Placement
Sequence

- Capsulotomy
- Elevate capsule anterior/lateral
- Expose labral tear
- Debride delaminated acetabular cartilage
- Osteoplasty of acetabulum (guided by fluoro)
- Labral repair
  - Disposable Drill/Guide
  - 8.5mm cannulas
  - Anchor choice
  - 2.9 Push Lock (new short pushlock)
  - 30 or 45 degree Bird-Beak and/or Suture Lasso(Hip Length)
  - #2 Fiberwire

Hip Arthroscopy

Bird Beak / Penetrator / Meniscal biter

Suture Passing
Anchors

Principals for Labral Repair
- Identify type and location of tear
- Debride labral tears to stable rim
- Assess labral size and quality
- Repairable/Reconstruction??
- Decide on stitch

Labral exam, elevation & repair
**Anchor Placement**

- Watch the Acetabular cartilage when you drill.
- Drill close to Acetabular margin in order to avoid elevation of the labrum (Approx. 1 mm)
- Typically between 10 and 2 o'clock position
- Typical repair is 3-4 anchors
- Don't be afraid to place a 3rd portal; makes life much easier!!

**To Repair or Debride**

- If you take it off . . .
  - PUT IT BACK
- Beware small labrum (anterior zone)
- Beware DYSPLASIA!

- If it's torn traumatically . . .
  - More rare
  - Fix when you can
  - Remove what you must
  - Think "hoop fibers"
  - No segmental resection

**Goal: Reproducing Labral Anatomy**

- [The labrum's] sealing mechanisms are dependent on the fit of the labrum against the femoral head

  - Ferguson, Ganz et al, J Biomechanics, 2002
Evolution of repair Techniques

Simple Stitch
- Labrum everted + bunched
- No contact with femoral head
- No suction seal

Labral Base Stitch
- Triangular shape preserved
- Restore transitional zone
- Restore suction seal

Labral Base Refixation
- Maintain labral contact with femoral head.
- Usually reserved for larger labrum

Labral Repair Techniques
Labral Repair Techniques

Anchor Fixation

Labral Repair Techniques

Iberian Suture Technique
Labral Repair Techniques

Iberian Suture Technique

How I Do It Now?!

- Limit labrum detachment
- Base refixation when possible
- I like tying knots
- Never create segmental defects

- Repaired tissues can fail to heal
- Meniscus, Rotator Cuff, SLAP
- Embark on repair BUT must re-look if persistent pain
Treat Associated Injuries

Treat Associated Pathology

Associated Pathology