

EVIDENCE SUMMARY

Acetabular labral tear

Anatomy & Pathophysiology

BONY ANATOMY & VASCULAR SUPPLY

- The acetabular labrum is a fibrocartilaginous structure that surrounds the periphery of the acetabulum and inserts on the transverse acetabular ligament [1].
- The acetabular labrum is a triangular fibrocartilaginous ring attached firmly to the acetabular rim, encompassing nearly the entire acetabulum except for the most inferior aspect bridged by the transverse acetabular ligament [2].
- Blood supply to the acetabulum is primarily through the obturator artery, superior gluteal artery, and inferior gluteal artery [1].
- The periphery of the labrum is more vascularized than the articular region [1].

BIOMECHANICAL FUNCTION

- The labrum functions to increase the stability of the hip joint and to seal the hip and prevent escape of fluid [1].
- The labrum deepens the acetabulum, increases coverage of the femoral head, and plays a role in shock absorption, joint lubrication, and pressure distribution [2].
- The most critical role of the labrum may be the creation of a negative pressure seal with the femoral head, which aids in joint stability [2].
- Removal of the labrum leads to a shift in the femoral contact point toward the acetabular rim [2].
- Removal of the labrum leads to a decrease in intra-articular fluid pressurization [2].
- Removal of the labrum leads to a loss of lateral restraint to femoral head motion [2].
- Removal of the labrum increases contact stresses between the articular cartilage of the femoral head and the acetabulum by 92% [2].

PATHOPHYSIOLOGY OF LABRAL TEARS

- In the presence of a labral tear, the sealing function is lost, which may lead to increased contact pressure thought to have a role in the development of degenerative disease [1].

- In a study of 436 patients, 73% of those with labral tears or fraying had articular damage [1].
- In a study of 436 patients, most articular damage was located in the same zone as the labral damage [1].
- The severity of chondral damage was greater in patients with labral tears than in patients who had an intact labrum [1].
- The majority of labral tears have been suggested to be related to abnormal joint morphology and function [1].
- Labral-chondral separation is more commonly seen with cam type impingement than with femoroacetabular impingement [1].
- Intrastance tears are more typical of pincer impingement [1].
- The labrum is injured most often in femoroacetabular impingement (FAI) and acetabular dysplasia [2].
- Hip trauma leading to a labral tear generally involves a high-energy contact mechanism resulting in a frank dislocation or subluxation [2].
- Traumatic hip instability is frequently associated with chondral lesions to the femoral head and acetabulum analogous to those seen in a shoulder dislocation [2].
- Sports requiring great deal of hip torsion can lead to capsule attenuation and laxity secondary to repetitive microtrauma [2].
- Attenuation of the capsule leads to microinstability of the joint, in which the femoral head subluxates anteriorly and rides on the anterior superior labrum [2].
- Microinstability can occur in patients with collagen disorders such as Ehlers-Danlos syndrome, Marfan syndrome, and Down syndrome [2].
- Degenerative labral tears are analogous to degenerative meniscus tears in the knee and are frequently associated with diffuse articular changes in an arthritic joint [2].
- Degenerative labral tears are thought to be extremely common in the aging hip and likely occur early in the arthritic process [2].
- Iliopsoas impingement on the anterior hip joint has been suggested as an additional mechanism for labral tears [2].
- An atypical labral tear pattern occurs on the anterior acetabulum directly beneath where the iliopsoas tendon crosses the hip joint, unlike the common location in FAI and dysplasia which is more superior on the anterior acetabulum [2].
- In the pediatric literature, labral tears are described in association with avulsions of the rectus femoris [2].
- It is theorized that a traction injury of sufficient energy can tear the labrum in the location near the reflected head of the rectus femoris, which is near the anterior labrum and inferior to the anterior superior iliac spine [2].

TEAR MORPHOLOGY & CLASSIFICATION

- Seldes et al. described two types of labral injuries: a separation of the labrum from its articular attachment and tears in various planes within the substance of the labrum [1].

- A morphologic classification based on arthroscopic findings includes radial flap tears, radial fibrillated tears, longitudinal peripheral tears, and unstable tears [1].
- Stable tear patterns include radial, fibrillated, and longitudinal peripheral tear patterns [2].
- Radial flap tears occur with an intra-articular free-edge disruption [2].
- Radial fibrillated tears are degenerative tears with fibrillated free margins [2].
- Longitudinal peripheral tears are stable labral separations from the acetabular margin [2].
- Unstable tears include the bucket-handle tear [2].
- Type 1 histological tears occurred at the junction between the fibrocartilaginous labrum and the articular hyaline cartilage [2].
- Type 2 histological tears occurred in various planes within the substance of the labrum [2].
- Anterior labral tears have been prevalent in most studies because of their association with FAI [2].
- Acetabular labral tears are the most common pathologic finding at the time of hip arthroscopy [2].
- Acetabular labral tears typically occur anteriorly and/or anterolaterally [2].

Clinical Presentation

- Patients with labral tears typically present with pain, usually in the groin [1].
- Patients with labral tears typically present with mechanical symptoms [1].
- Byrd described the C-sign, where patients cup their hand forming a C over the greater trochanter when asked to localize pain [1].
- Pain associated with labral tears may be minimal during level walking [1].
- Evaluation for suspected labral tears should include radiographs of the pelvis and hip [1].
- Evaluation for suspected labral tears should include advanced imaging when indicated [1].
- CT scan offers greater detail in assessing bony architecture [1].
- MRI and MRI-arthrogram are useful for identifying labral tears [1].

Investigations

CLINICAL PRESENTATION AND EXAMINATION

- Patients with acetabular labral tears typically present with pain, usually in the groin, and mechanical symptoms [1].
- The “C-sign” is described as a patient cupping their hand to form a C over the greater trochanter when asked to localize pain [1].
- Pain may be minimal during level walking in patients with labral tears [1].
- Patients may report mechanical symptoms such as clicking and catching [2].

- Pain with prolonged sitting is a common symptom of labral tears [2].
- Physical examination findings for anterior labral tears include pain in the provocative position of flexion, adduction, and internal rotation [2].
- Physical examination findings for lateral labral tears include pain in flexion, abduction, and external rotation [2].
- The FADIR test (flexion, adduction, internal rotation) is used to detect anterior labral tears [2].
- The dynamic internal rotation impingement test is used to detect anterior labral tears [2].

IMAGING

- Imaging for the diagnosis of a labral tear includes plain radiographs and magnetic resonance arthrography [2].
- A positive response to an intra-articular joint injection that brings complete pain relief is the most valuable diagnostic sign for confirming the joint as the source of pain [2].

Treatment

NON-OPERATIVE

- Initial treatment for acetabular labral tears is typically nonoperative [1].
- Nonoperative management includes rest, anti-inflammatory agents, and physical therapy [1].

OPERATIVE

- Unresolved pain after nonoperative treatment is treated with labral debridement or repair [1].
- In a 10-year follow-up study of patients with labral lesions treated with debridement, hips without signs of arthritis showed a significant increase in Harris Hip Scores that remained significant throughout the period [1].
- In the same 10-year follow-up study, seven of eight patients with associated arthritis required total hip arthroplasty [1].
- In patients with femoral acetabular impingement, improvement in Harris Hip scores was greater in the labral refixation group compared to the labral debridement group [1].
- Two main suture configurations are used for labral repair: circumferential repair and labral base repair [1].
- The decision between circumferential and labral base repair is based on the quality of the remaining labral tissue [1].
- A labral base repair is typically used in patients with robust labral tissue [1].
- A circumferential repair is chosen when the labrum is significantly frayed to avoid the suture lacerating the remaining labrum [1].
- It is essential to maintain labral contact with the femoral head to reestablish the suction seal during repair [1].

- Anchors placed too far from the acetabular rim or overtightened sutures may evert the labral edge [1].
- A retrospective study by Jackson et al. showed no difference in outcomes between suture patterns [1].

References

- [1] Campbell S Operative Orthopaedics 4 Volume Set. ANTERIOR CRUCIATE AND ANTEROLATERAL LIGAMENT RECONSTRUCTION (BOX 51.8) > ARTHROSCOPIC MANAGEMENT OF LABRAL TEARS.
- [2] Orthopaedic Knowledge Update Sports Medicine 6. Athletic Hip Injuries > Acetabular Labral Tears.