Hip Instability: 
The Most Important Factor In Hip Instability Is The Labrum

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The stability of the hip has 3 major 
determinants: Bone Morphology, 
Capsuloligamentous Structures and the 
Labrum.

Acetabular Labrum

Anatomy

- The labrum is a horseshoe-shaped structure whose inferior insertions are in 
  continuity with the transverse acetabular ligament. It has a triangular shape cross 
  section. [1]

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- The labrum demonstrates 3 layers on electron microscopy (from articular to capsular):[2]
  - The first layer is 10 µm wide, presenting delicate fibrils with no orientation
  - The second layer is 40 µm wide, oriented in a lamellar fashion, corresponding to the superficial fibrocartilage
  - The third layer is 200 to 300 µm wide, consisting of circular collagen fibrils; and is the most important layer
- The acetabular labrum has no intrinsic vasculature. Most of the blood comes from the capsule and the synovium. [3–5]
- Free nerve endings and multiple sensory organs (such as Vater-Pacini, Golgi-Mazzoni, Ruffini and Krause corpuscles) are found in the labrum. [6] Labral innervation originates from a branch of the nerve to the quadratus femoris and the obturator nerve. [7]

**Biomechanics**

- The labrum increases the articular surface by 22% and the acetabular volume by 33%. It has an important role as a seal for the synovial fluid. [3,8]
- In normal circumstances the majority of load is sustained by fluid pressures, and solid-on-solid contact stresses are low, maintaining the low friction of the joint. A poroelastic finite element model study demonstrated that after removing the labrum there was 90% higher solid contact stresses. [8]
- Another study with 6 cadaveric hips demonstrated less hydrostatic fluid pressurization without the labrum. After labral resection, faster cartilage consolidation (22%) was found. [9]
- Crawford et al. studied 6 hips with a 3-D Motion Analysis System. After a 15 mm labral tear, 60% less force was necessary to distract the femur 3mm, compared with the intact state. [10]
- In a cadaveric study using biplane fluoroscopy, hip stability was tested in an intact state, after labral and/or ligament tear, and after labral and/or ligament repair. The labrum demonstrated a secondary stabilizing role in limiting external rotation and anterior translation of the femur.

**Clinical presentation**

- The diagnosis of hip instability can be challenging. Patients usually complain of hip pain, giving away, audible pops and rarely of frank instability. Differential diagnosis include femoroacetabular impingement (FAI) and labral tears. Commonly FAI, labral
tears and hip instability coexist in the same patient, hindering hip instability diagnosis.

- Patients with labral tears typically complain of anterior groin pain, but pain also can be referred to the buttock, greater trochanter, thigh, and medial knee. Other symptoms include clicking, locking, catching, giving away and stiffness. [11]
- The most reliable specific test for labral tears is the impingement test, which is done by flexion-adduction-internal rotation of the hip. This test is positive when it elicits anterior hip pain. [12]
- Hip instability specific tests include the dial test and the hip apprehension test. The dial test suggests laxity of the anterior capsule. The patient lies supine and the examiner internally rotates the limb, which is then released and allowed to externally rotate. The test is positive when the patient's limb rotates more than 45°. The hip apprehension test is performed with extension and external rotation of the hip, the test is considered positive when the patient reports pain or apprehension. [13]

Bibliography


