Case Report: Posterior Glenoid Labral Tear

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History of the present illness
The patient plays running back on the football team, and he comes for complaints of left shoulder pain. He states that he was running in camp a few weeks ago where he was hit with the ball and felt like his arm pushed superiorly and inferiorly. Since that time, he has not played. He is having continued symptoms. The patient has a past history of right shoulder Latarjet procedure in 2007, and an arthroscopy performed a year before consisting of Bankart repair. The patient now states that he is unable to play and practice football and wishes to have this addressed. He describes his discomfort as pain and instability when playing. The patient states the pain is 2/10 at rest and 9/10 at its worst. The patient states that the pain does not wake him up from sleep. Rest alleviates his symptoms.

Musculoskeletal examination
Examination of bilateral upper extremities shows full strength 5/5 muscle strength in his rotator cuff as well as biceps and triceps bilaterally. More specific exam of his left shoulder shows patient has pain with anterior apprehension test and posteriorly. He has no real feeling of apprehension as it does not feel like it is dislocating in the front. He has positive O’Brien’s. He has negative Speed’s and Yergason’s. He has a mildly positive jerk test mostly with just discomfort. On load and shift, he has some discomfort when attempting to shift him posteriorly, however, no gross laxity is felt anteriorly. There is some mild subluxation posteriorly.

X-rays showed no fracture or dislocation and good maintenance of joint space. The left shoulder was imaged using a 3T Siemens MAGNETOM Verio MRI scanner. Details of the technique are shown in Table 1. MRI images (Figures 1–4) show a posterior labral tear extending through the articular and capsular margins and periosteum, with possible small reverse bony Bankart lesion as well. There is osseous edema in the anterior humeral head suggesting contusion or possible small shallow reverse Hill Sachs lesion. There is irregularity and truncation of the posterior osseous glenoid with small ossicle (long arrow), suggestive of reverse bony Bankart lesion.

Operative findings
The patient had a posterior labral tear with detachment with a flap and a loose body within the joint. The remainder of the shoulder had some anterior labral fraying and some synovitis. Otherwise, there was no Hill-Sachs or reverse Hill-Sachs and no bone loss. Biceps and biceps anchor were intact.

Procedures performed
1. Left shoulder arthroscopy with extensive glenohumeral debridement.
3. Arthroscopic posterior labral repair with capsular shift.

Discussion
Background
The shoulder is the most unstable joint in the animal kingdom, and has the greatest range of motion of any joint in the human body [1]. The humeral head and glenoid are by themselves inher-
ently unstable, and require the labrum, capsule, ligaments and tendons to help stabilize the joint. Injury to any of these structures can increase the stress on the surrounding normal structures, causing pain and instability. Glenohumeral joint instability extends over a spectrum of severity, ranging from dislocation to transient subluxation. Instability may occur in any direction, or it may be multidirectional. Posterior instability can result from repeated microtrauma. Abduction, flexion, and internal rotation (including throwing) may be the mechanism of injury. Most of these patients will respond to conservative therapy, which includes strengthening of the posterior stabilizing muscles [2].

Posterior dislocation may result from a fall on an outstretched hand, direct traumatic injury, or muscle contraction in the case of seizure. Acute dislocation may lead to instability, and surgery may be necessary. Acute posterior dislocation can be missed clinically, and lead to a later presentation of frozen shoulder. Anterior dislocation patients may develop Bankhart and Hill-Sachs lesions [3, 4]. The classic Bankart lesion is an anterior labral tear/detachment which extends through periosteum, and may involve the bony glenoid or just the labrum. The classic Hill-Sachs lesion is an impaction injury of the posterolateral humeral head, caused by contact of the humeral head, caused by contact of the labrum. The classic Hill-Sachs lesion is an impaction injury of the posterolateral humeral head, caused by contact of the humeral head relative to the glenoid. Many posterior labral tears result from multiple episodes of microtrauma, and weight training such as bench pressing may be an important causative factor.

Clinical presentation
Symptoms of a labral tear depend on where the tear is located, but may include:
- Nonlocalized pain
- Catching sensation with movement
- Popping and clicking
- Pain with specific activities
- Pain with overhead activities or when the arm is held behind the back.
- Weakness
- Joint instability
- Pain with flexion of the biceps

Posterior labral injuries are much more common with football players than in the general population [5]. In addition, similar injuries occur in non-football players whose shoulders are likely subjected to a similar posteriorly directed force leading to posterior translation of the humeral head relative to the glenoid. Many posterior labral tears result from multiple episodes of microtrauma, and weight training such as bench pressing may be an important causative factor.

MRI findings
Using MRI, findings related to posterior instability are typically the reverse of those for anterior instability. Tearing or detachment of the posterior glenoid labrum is common [2]. Capsular detachment or stripping may also be seen, as evidenced by disruption or stretching/laxity of the normal, well defined continuous low signal capsule line connecting the glenoid and labral margin to the humeral neck. There may be bony impaction or fragmentation of the posterior glenoid rim and the anterior humeral head, which are the characteristic reverse Bankhart and reverse Hill-Sachs lesions. There may be a tear of the posterior band of the inferior glenohumeral ligament. There is also an association with teres minor tears (may tear along with the posterior band of the IGHL), and internal bodies in the glenohumeral joint.

There may also be associated rotator cuff injury. Glenoid erosive changes, sclerosis, or heterotopic bone formation may be seen chronically. There may be soft-tissue findings of associated edema, hematoma, or extravasated joint fluid.
The humeral head may be posteriorly subluxed in relation to the glenoid. In chronic cases, there may be bone loss and remodeling with retroversion of the glenoid, although there is a reported wide normal range of glenoid inclination from 25° retroversion to 8° anteversion. Age-related changes are frequently found in the glenoid labrum, and labral tears are not uncommon in cadavers and older patients. Senescent changes on MRI may be diffusely increased labral signal and fraying. Location, patient age, and clinical presentation should always be part of surgical decision-making. Paralabral cysts can be classified as synovial cysts, ganglion cysts, or pseudocysts [7]. They may be unilocular or multilocular, and are nearly always related to a nearby labral tear, although the tear may not always be seen. Paralabral cysts extending into the suprascapular notch or spinoglenoid notch may cause entrapment of the suprascapular nerve, which may lead to suprascapular and infraspinatus muscle denervation atrophy for more proximal entrapment (suprascapular notch lesions or proximal spinoglenoid notch lesions extending along the suprascapular fossa of the scapula). Isolated infraspinatus atrophy may occur for more distal lesions (inferior aspect of spinoglenoid notch extending into the infraspinatus fossa of the scapula). Rarely, a large inferior cyst extending into the quadrilateral space may impinge on the axillary nerve and cause teres minor atrophy and deltoid atrophy. In the absence of pain, paralabral cysts are be treated conservatively.

### Table 1: MRI technique

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<tr>
<th>Weighting and planes</th>
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**Bennett lesion**

The Bennett lesion represents an enthesophyte arising from the posterior portion of the glenoid rim, which is commonly seen in baseball pitchers.

**POLPSA lesion**

The posterior labrocapsular periostal sleeve avulsion (POLPSA) lesion is the posterior analogue of the anterior labroligamentous periosteal sleep avulsion (ALPSA). It is associated with posterior instability. Wherein the reverse Bankart lesion the periosteum is torn, the perios- teum is stripped but intact in a POLPSA lesion.
Limitations of MRI
Variable labral shape can cause false diagnosis of labral tear. Glenohumeral ligaments can be confused with torn or detached labrum. Articular cartilage at the base of the labral attachment, can exhibit intermediate to high T2 signal, and occasionally be mistaken for labral tear or detachment.

References
1 Medscape Reference: Glenoid Labrum Injury MRI. Author: Ali Nawaz Khan, MBBS, FRCS, FRCP, FRCR; Chief Editor: Felix S Chew, MD, MBA, EdM.
2 Medscape Reference: Shoulder Dislocation Imaging Author: Gavin Yeh Tseng, MBBS, FRCR, FRANZCR; Chief Editor: Felix S Chew, MD, MBA, EdM.
5 Increased Risk of Posterior Glenoid Labrum Tears in Football Players. Eva M. Escobedo et al. AJR January 2007 vol. 188 no. 1 193-197.

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