Magnetic resonance imaging of glenoid labral tears in patients with shoulder trauma

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Abstract- The glenoid labrum is a soft tissue component that helps to stabilise the shoulder joint. When the labrum is damaged, patients may have shoulder instability and repeated dislocation. The aim of our study is evaluate glenoid labral tears in patients with shoulder trauma. The study was carried out at Department of radio-diagnosis, Maharajah’s institute of medical sciences, Nellimarla with PHILIPS Ingenia CX 1.5 Tesla Machine. Thirty eight patients with shoulder trauma were included in study. The age ranges from 21 years to 72 years. 27 Patients (71%) were males and 11 patients (29%) were females. Glenoid labral tears were seen in 14 (36.8%) out of 38 patients. The most common labral tear is bankart lesion, found in 5 patients (35.7%), other labral tears were found to be SLAP tears (21.4%), reverse bankart (7.1%), ALPSA (14.2%), Perthes lesion (14.2%) and Posterior GLAD (7.1%). Magnetic resonance imaging (MRI) has an established accuracy in determining labral injuries following shoulder trauma.

Index Terms—Shoulder trauma, Glenoid labral tears, Bankart, SLAP - Superior labral anterior posterior tear, ALPSA-Anterior labral periosteal sleeve avulsion, GLAD -Glenoid labral articular defect

I. INTRODUCTION.
The human shoulder is the body's most dynamic joint with wide range of movements. This range of motion also renders the shoulder joint unstable and prone to acute and repeated damage. Because the humeral head is three times larger than the glenoid surface of the scapula, the glenohumeral joint is unstable. The glenoid labrum increases the surface area of the glenoid fossa to strengthen the stability of the glenohumeral joint. The static stabilizers of the glenohumeral joint are the Glenoid labrum, Joint capsule, and Glenohumeral ligaments, whereas the dynamic stabilisers are the rotator cuff tendons [1]. A tear of the anteroinferior labrum, known as the "Bankart lesion," is the most common lesion associated with a traumatic anterior dislocation of the shoulder. The most common type of shoulder dislocation is anterior dislocation, which is accompanied with Bankart lesion in glenoid labrum and hill sachs in head of humerus. [2]. Anterooinferior glenoid labral lesions are most common than superior and posteroinferior labral lesions [3]. Anterooinferior labral lesions are of various types including Bankart lesion and its variants such as Perthes, Anterior labral periosteal sleeve avulsion (ALPSA) & Glenoid labral articular defect (GLAD). Posterooinferior glenoid labral tears are reverse bankart lesion, Posterior GLAD, Posterior labral periosteal sleeve avulsion (POLPSA) & KIM lesion [4].

Of these lesions, Bankart lesion and its variants like anterior labroligamentous periosteal sleeve avulsion (ALPSA), and Perthes lesions are associated with gleno humeral instability. Noninstability labral lesions include the SLAP lesion and the glenolabral articular disruption (GLAD) lesion [5].

MRI offers a high spatial resolution for evaluating soft tissue, such as labral, tendon tears and muscular edema. Furthermore, there are no radiation risks associated with MRI. [6]

II. MATERIALS AND METHOLOGY
This is a hospital based prospective study among 38 patients referred for Shoulder MRI to the Department of Radiology. Patients with Shoulder pain were referred for MRI to the Department of Radiology, maharajahs institute of medical sciences Nellimarla. A structured format containing the patient details, clinical history, physical examination & investigations who meet the inclusion criteria were prepared and patients were subjected to plain MRI Shoulder using With PHILIPS Ingenia CX 1.5 Tesla Machine.

III. PROTOCOL:
MRI of the Shoulder was performed using PHILIPS Ingenia CX 1.5 Tesla Machine.
No specific preparation was advised for the study.
The sequences used in the shoulder MRI Protocol are:
AXIAL- T1W, T2W, FFE & PDFS
CORONAL OBLIQUE- PDFS.
SAGITTAL OBLIQUE- T2W and PDFS.
No medication/IV contrast was used in the study.
Inclusion criteria:
• All patients with Shoulder trauma were referred to the Department of Radiology for Shoulder MRI.
• Patients of 21 – 72 age groups are included in the study without gender predilection.

Exclusion Criteria
• Patients with benign/ malignant lesions of bone.
• Patients who have contraindications for MRI like pacemaker, metallic implants, claustrophobia etc.

IV. RESULTS

Out of 38 patients included in this study, 27 patients were (71%) males and 11 were (29%) female patients.

TABLE 1: SHOWING GENDER DISTRIBUTION AMONG STUDY POPULATION

<table>
<thead>
<tr>
<th>GENDER</th>
<th>FREQUENCY (N=38)</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALES</td>
<td>27</td>
<td>71%</td>
</tr>
<tr>
<td>FEMALES</td>
<td>11</td>
<td>29%</td>
</tr>
</tbody>
</table>

GRAPH 1: SHOWING GENDER DISTRIBUTION AMONG STUDY POPULATION

Out of 38 patients included in this study, labral tears were noted in 14 patients (36.8%). Rest of the patients had other shoulder pathologies like rotator cuff tears, tendinosis and acromio-clavicular joint disruption without labral tears.

TABLE 2: SHOWING DISTRIBUTION OF LABRAL TEARS

<table>
<thead>
<tr>
<th>Type of labra tears</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BANKART</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>SLAP</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>PERTHES</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ALPSA</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
### Graph 2: Showing Distribution of Labral Tears

<table>
<thead>
<tr>
<th>Type of Labral Tears</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bankarts</td>
<td>3.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Slap</td>
<td>1.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Perthes</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>AlpSA</td>
<td>0.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Reverse Bankart</td>
<td>0.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Glad</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**V. Representative Cases**

**FIG 1:** Bankart lesion. Axial PD fat sat image of a 45 year old male patient showing the loss of antero inferior glenoid labrum in keeping with Bankart lesion. Axial PD fat sat image at the level of coracoid process shows bony loss and edema in the humoral head, in keeping with Hill Sach lesion. Minimal joint effusion is seen.
FIG 2: ALPSA lesion. Axial FFE image showing medial displacement of anteroinferior labrum with stripped but intact periosteum.

FIG 3: SLAP tear. Coronal PD fat sat image showing SLAP tear in the form of hyperintense signal in superior labrum which is extending laterally with irregular margins.

FIG 4: Bony Bankart lesion. Axial PDFS showing antero inferior glenoid labrum tear with underlying bony cortex.
VI. DISCUSSION

The study was carried at maharajahs institute of medical sciences, Nellimarla in the department of radiodiagnosis during November 2021 to October 2022. 38 people were taken into the study with shoulder trauma referred to MRI shoulder for further evaluation in which 27 (71%) males and 11 (29%) females, ratio of males to females is 2.4:1, the mean age of the patients was 47 years (Range 21-72 years). In the present study the patients have the following symptoms, shoulder Pain was seen in all patients (100%), shoulder instability in 10 patients (71.4%).

Out of 38 patients included in this study, labral tears were noted in 14 patients accounting to 36.8%. Bankart lesion is found in 5 patients (35.7%), followed by SLAP tears found in 3 patients accounting to 14.2%, Perthes lesion were found in 2 patients accounting to 14.2%. Reverse bankart were found in 1 patient accounting to 7.1%, and GLAD were found in 1 patient accounting to 7.1%. Labral tears are classified in to three types such as Anteroinferior labral tears, Posteroinferior labral tears and Superior labral tears. Anteroinferior labral lesions are of various types including Bankart lesion and its variants such as Anterior labral periosteal sleeve avulsion (ALPSA), Perthes and Glenoid labral articular defect (GLAD). Posteroinferior glenoid labral tears are reverse bankart lesion Posterior labral periosteal sleeve avulsion (POLPSA), KIM lesion & Posterior GLAD. Superior labral tear such as Superior labral anterior posterior tear.

In our study, anteroinferior glenoid labral lesions are most common found in 9 patients accounting to 64.2%, followed by superior labral tears in 3 patients accounting to 21.4% and posteroinferior glabral lesions in 2 patients accounting for 14.2%. Along with labral tears, patients have other findings like joint effusions, paralabral cysts, rotator cuff tears and tendinosis. Of these most common finding is joint effusion followed by rotator cuff pathologies.

This study is supported by Pramod Shaha et al, in which the anterior labrum was most commonly afflicted, seen to be involved in 5 cases out of 8 labral tears, followed by Superior labrum and posterior labrum to be affected in 2 and 1 cases respectively.[7]

Rest of the 24 patients out of 38 patients, who were referred to the radiology department with history of shoulder trauma had rotator cuff tears, tendinosis and acromio-clavicular joint disruption.

VII. CONCLUSION

Glenoid Labrum is usually affected in patients with shoulder trauma. It is an important soft tissue structure that provides stability to the gleno humeral joint. When the labrum is injured, the shoulder is prone to recurrent dislocation leading
to shoulder instability. Because it is noninvasive, non-ionizing, and offers greater soft-tissue resolution, MRI is the ideal imaging modality for glenoid labral pathologies. Identifying these labral lesions in MRI is necessary for early and proper management.

VIII. REFERENCES


