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SPECTRUM OF MRI FINDINGS IN THE SHOULDER DISLOCATION

Radio-Diagnosis

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ABSTRACT

Introduction: The shoulder dislocation involves separation of the humerus from the glenoid of the scapula at the glenohumeral joint. It is the most commonly dislocated joint in the body. It is commonly seen in young individuals. Shoulder dislocation almost exclusively occurs following trauma. Shoulder dislocations are usually divided according to the direction in which the humerus exits the joint: Anterior (most common), Posterior, inferior (less common). Imaging with MRI plays a vital role in the diagnosing and staging. **Aims And Objectives:** To study the Spectrum of MRI findings in Shoulder Dislocation. To study the Hill-Sachs and Reverse Hill-Sachs lesion. To study Bankart's lesion and to calculate bone loss in bony Bankart's lesion. **Materials And Methods:** MRI study of the shoulder of 30 patients meeting the inclusion criteria was carried out by using on 1.5 Tesla SIEMENS MAGNETOM ESSENZA Perspective MRI scanner machine with patient in supine & extended arm position. Results: Anterior dislocation was most common type of dislocation in the patients as compared with posterior and inferior shoulder dislocation. Majority of the patients belonged to the age group of 20-45 years. Findings like Bankart's Lesion, Hill-Sach's Lesion, Reverse Bankart's Lesion and Reverse Hill Sach's Lesions were reported in the MRI study of these patients. **Abbreviations:** Magnetic resonance imaging (MRI), Computed tomography (CT scan)

KEYWORDS

Magnetic resonance imaging (MR imaging), Anterior shoulder dislocation, Bankart lesion, Hill-Sachs lesion, Reverse Bankart & Hill-Sachs lesion.

INTRODUCTION

The humerus is separated from the glenoid of the scapula at the glenohumeral joint during a shoulder dislocation. It is the most frequently dislocated joint in the human body. [1] It is most common in young people. Shoulder dislocation nearly always happens as a result of trauma. When the shoulder is abducted and externally rotated, it is at its weakest. Sporting injuries and automobile accidents are common causes. Shoulder dislocations are categorized based on the direction of the dislocation, the kind of clinical presentation, the etiology, damage mechanisms, and anatomical abnormalities. [2]

Shoulder dislocations are often classified based on the direction in which the humerus exits the joint: Anterior (most common) [3], Posterior,[4] Inferior. (This is less common)

X-ray radiography is the first-line imaging modality for the initial diagnosis of patients with shoulder dislocation. However, X-ray radiography has its own evaluation limitations. Imaging with MRI plays a vital role in the diagnosing and staging.

AIMS AND OBJECTIVES:

- To study the Spectrum of MRI findings in the Shoulder Dislocation.
- To study the Hill-Sachs and Reverse Hill-Sachs lesion.
- To study Bankart's lesion and to calculate bone loss in bony Bankart's lesion.

MATERIALS AND METHODS:

30 patients had an MRI study of the shoulder carried out using a 1.5 Tesla SIEMENS MAGNETOM ESSENZA Perspective MRI scanner machine with the patient in a supine and extended arm position.

Patients who were referred to the Department of Radiology and fulfilled the following criteria were included:

1. Patients complaining of shoulder dislocation after trauma
2. Patients complain of severe pain and restriction of movement in the shoulder.

RESULTS

The present study was carried out at the Department of Radiology at a Medical College Hospital and Tertiary Care Center. A total of 30 patients were examined, and their MRI imaging features were studied. The salient observations are as follows:

In our study, 95% of the 30 patients had anterior dislocations, while only 5% had posterior dislocations, with the majority of the patients being younger. These findings have been depicted in Tables 1 and 2.

Table 1: Types of Shoulder Dislocation

SERIAL NO.	TYPE OF DISLOCATION	NO. OF CASES	% OF CASES
1.	ANTERIOR DISLOCATION	29	95%
2.	POSTERIOR DISLOCATION	1	5 %

Table 2: Shoulder Dislocation According to Age Distribution

SERIAL NO.	AGE GROUP	NO. OF CASES	% OF CASES
1.	20-45 years	18	60%
2.	45 to 75 years	12	40%

Findings in anterior dislocation:

In a patient with anterior shoulder dislocation, findings on MRI revealed involvement of soft tissue and bony components of the joint which are

- Soft tissue and bony Bankart lesion.
- Hill-Sachs lesion.

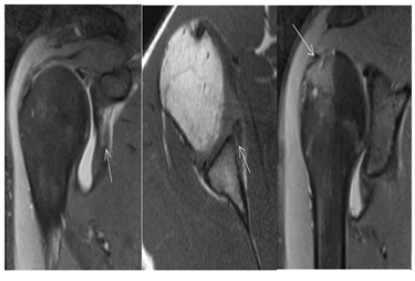

Figure 1

Figure 1 depicts a case of a 23year male referred for MRI with c/o pain & restriction of movement in right shoulder with H/o trauma while playing. The following findings were noted:

- Mild depression at postero-lateral aspect of right humeral head with associated marrow edema noted -- represents Hill Sachs lesion.
- Hyperintense signal noted in the antero-inferior labrum (Labral tear) with small fracture seen in underlying glenoid -- s/o soft tissue & bony Bankart's lesion. Bony glenoid bone loss is approx.18-20 % (calculated by PICO method)

Findings in posterior dislocation:
In a patient with Posterior shoulder dislocation, findings on MRI revealed involvement of soft tissue bony components of the joint which are

- Reverse Bankart lesion.
- Reverse Hill-Sachs lesion

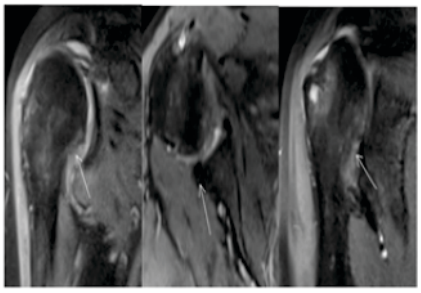

Figure 2

Figure 2 illustrates a case of 65 years female with h/o trauma followed by c/o severe pain in right shoulder & difficulty in abduction. The MRI revealed the following findings:

- Hyperintense signal noted in the postero-inferior labrum s/o Labral tear (Reverse Bankart's lesion). Underlying bony glenoid showing bone loss of approx. 7-8 %. (Calculated by PICO method)
- Depression seen at antero-medial aspect of humeral head -- consistent with Reverse Hill-Sachs lesion.

The Table 3 shows the presence and the absence of Hill–Sachs and Bankart lesions. Out of 30 patients, 21 patients had both Hill- Sach's and Bankart Lesion whereas 5 patients had Hill- Sach's lesion without Bankart Lesion.

Table 3: The presence and the absence of Hill–Sachs and Bankart lesions

LESIONS	BANKART LESION	NO BANKART LESION	TOTAL
Hill–Sachs lesion	21	5	26
No Hill–Sachs lesion	1	3	4
Total	22	8	30

DISCUSSION:
In our study majority of the patients belonged to age group between 20 to 45 years. These results are in concordance to a study by Robinson et al who concluded that anterior dislocation was more common in the age group above 18 years of age. [5]

The shoulder dislocation (also known as a glenohumeral joint dislocation) occurs when the humerus separates from the glenoid of the scapula at the glenohumeral joint. [1] The most common type of dislocation is anterior shoulder dislocation, which is caused by forceful abduction, external rotation, and extension. [6] Anterior shoulder dislocation was seen in about 95% of the patients followed by Posterior shoulder dislocation in 5 % of the patients. Itoi E, et al also stated that anterior dislocation was the most common type of dislocation. [7]

Soft tissue and bony Bankart lesion and Hill-Sachs lesions were noted on MRI in patients with anterior dislocation. Reverse Bankart and Reverse Hill-Sachs lesions are indicative of posterior dislocation.

Soft tissue and bony Bankart lesion:
Bankart lesion is an avulsion of the anterior-inferior glenohumeral ligament and labral complex from the glenoid rim, with rupture of the scapular periosteum results from injury to the anterior-inferior labro-ligamentous structures in anterior dislocations [8,9,10] It can either be purely cartilaginous or may involve the underlying bone also.

Hill-Sachs lesion:
Hill-Sachs lesion is posterolateral humeral head depression fracture resulting from the impaction with the anterior glenoid rim.

Reverse Hill-Sachs lesion:
It is an depression on anteromedial aspect of the humeral head following posterior dislocation of the humerus.

Reverse Bankart lesion:
It is nothing but detachment of posteroinferior labrum with avulsion of posterior capsular periosteum. This leads to laxity of the posterior band of the inferior glenohumeral ligament with posterior displacement of the humeral head.

PICO Method Of Glenoid Loss:
The original description of Pico Method involved determining the circumference of the contralateral, normal inferior glenoid circle based on the intact 3–9 o'clock margin, transferring the circle to the injured glenoid, and manually tracing out the glenoid defect and using software to calculate surface area bone loss. [11]

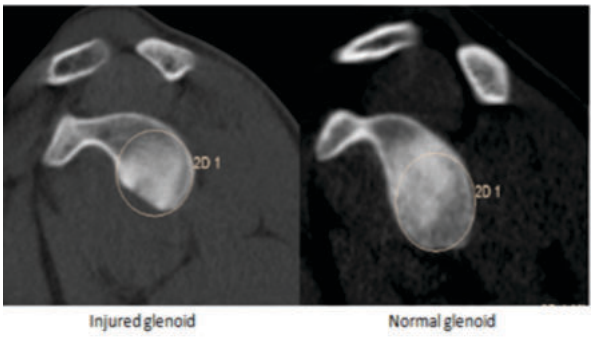

Figure 3
Figure 3 depicts the evaluation of bony glenoid loss by PICO method. The following equation is used: Percent bone loss = (Defect width/Diameter of inferior glenoid circle) × 100%

CONCLUSION:
The labral-ligamentous complex and rotator cuff are the primary muscles involved in shoulder dislocation. The anteroinferior labrum, surrounding glenoid cartilage, posterolateral humeral head, and glenoid rim can all be injured in an anterior shoulder dislocation. The labrum, along with the glenoid rim, is the most commonly injured joint. For identifying shoulder dislocation, MRI is an excellent diagnostic modality.

A CT scan of the shoulder joint is a useful adjunct tool for assessing the osseous status of Bankart and Hill-Sachs lesions. It is particularly sensitive in determining the extent and location of bone loss or bony defect. Recently, MR imaging has been demonstrated to have great accuracy in evaluating these injuries, reducing radiation exposure and time.

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