

Original Article

MR arthrography evaluation in patients with traumatic anterior shoulder instability

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ABSTRACT

Introduction: To evaluate retrospectively the diagnostic accuracy of MR arthrography, compared with arthroscopy, in research of the glenoid labrum tear in patients with a first episode of traumatic anterior shoulder instability (TUBS).

Material and methods: We retrospectively reviewed the MR arthrography shoulder images of 118 patients with a first episode of TUBS, between June 2014 and May 2016.

Results: The overall accuracy of MR arthrography compared with arthroscopy of the glenoid labrum lesions was 94%, sensitivity 93%, and specificity 96%. The sensitivity of MR arthrography for Perthes lesion was 71.4%, and for ALPSA lesion, it was 91%. Slap lesion occurred in 11 out of 77 cases (9.3% of 118 cases). The Hill-Sachs lesion occurred in 48 out of 118 cases (40.7%), while the Hill-Sachs reverse lesion in 4 cases (3.4%).

Conclusions: The MR arthrography is accurate in detecting labral injuries. However, other studies are needed to assess the less frequent tear, as Perthes lesion. The presence of the Hill-Sachs lesion could provide useful information about the level of the shoulder instability.

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1. Introduction

The Traumatic Anterior Shoulder Instability (TUBS) is the most frequent cause of glenoid labrum tears, which can be associated to the glenoid bone lesions. The glenoid labrum lesions of TUBS are a common problem and often occur in young subjects who practice sport activity.^{1–3}

The correct diagnosis of the glenoid labrum lesions is useful to improve the multi-disciplinary approach and the outcomes of the patient during everyday life but above all during sports, where such lesions are present with highest risk of recurrence.⁴

The purpose of our study was to retrospectively evaluate the diagnostic accuracy of the MR arthrography, compared with arthroscopy, in the glenoid labrum lesions in patients with a first episode of TUBS.

2. Material and methods

Informed consent was obtained from research subjects. One hundred and eighteen patients (92 males and 26 females, range 16–66) with at least a single episode of TUBS over 12 months, with or without bone involvement were retrospectively evaluated. All patients were contacted after 12 months of the MR arthrography to evaluate the course. The images were obtained from the database of our hospital between June 2014 and May 2016. All images were acquired with MR magnetic field 1.5 T “Faced” Array coil (Philips, Best, Netherlands), matrix of 224 × 256 and foveal of 16–18 cm; for each patient were performed four standardized sequences: spin echo (SE) T1-weighted (W) fat-sat in axial, coronal, and sagittal section a weighted proton density (DP) fat-sat in coronal section.⁵

A few minutes before the examination, the patient was placed on a bed in a supine position. The affected shoulder was kept in slight abduction and slight external rotation and disinfected with Iodopovidone; with an anterior manual approach and without utilization of the radiological guidance (fluoroscopy) or ultrasound, a needle (20–23 Gauge) was introduced into the articulation for the gadolinium chelates injection (Dotarem; Guerbet,

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Roissy, France) (10 ml; dilution: 0.25 ml of 0.1 M paramagnetic contrast diluted in 100 ml of saline).⁶ In 2 cases, the paramagnetic contrast agent introduced is found to be outside the joint cavity that has resulted in the repetition of the procedure.

The MR examination was carried out about five minutes after the intra-articular injection of the contrast medium. The patient was positioned in a supine position with his arm along the body in a neutral position; a coil type “Flax-M” inserted in the shoulder was used.

Two radiologists, with at least 5 and 15 years of experience in musculoskeletal radiology, retrospectively analyzed the MR arthroscopy images; the results were compared with arthroscopy (diagnostic or therapeutic), which is currently the diagnostic goal, carried out at the orthopedic service of our center.

Operators have analyzed the following parameters:

Glenoid labrum anterior-inferior tear was classified into:

- Bankart lesion, defined as complete avulsion of the labrum from the glenoid associated with fibrocartilage and periosteal tear (Fig. 1).
- “Bony Bankart” lesion, when anterior inferior glenoid bone loss was present.

Main variants of the Bankart lesion are:

- Perthes lesion: glenoid labrum detachment with an intact periosteum (Fig. 2).
- ALPSA lesion (anterior labrum periosteal sleeve avulsion): scarring of the anterior inferior glenoid labrum with periosteum not interrupted.
- GLAD (glenolabrum articular disruption) lesion: anterior-inferior lesion of the glenoid labrum associated with cartilage erosion.
- Presence/absence of Hill-Sachs lesion (posterolateral humeral head compression fracture) and Hill-Sachs reverse lesion (impaction fracture of antero-medial aspect of humeral head following posterior dislocation).
- SLAP lesion (superior labrum anterior to posterior), with or without involvement of the long head biceps tendon.

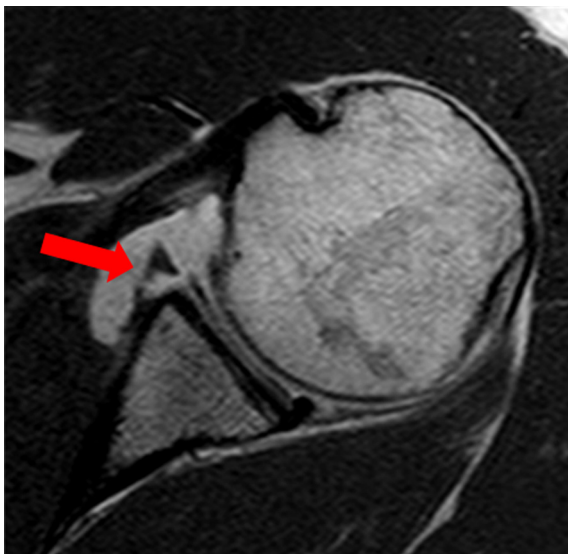


Fig. 1. A 26-year-old male patient with shoulder anterior instability type TUBS. MR arthrography of the right shoulder, axial section, sequence spin echo T1 W. Bankart lesion (arrow) characterized by complete avulsion of the labrum from the glenoid labrum anterior inferior associated with periosteal detachment.

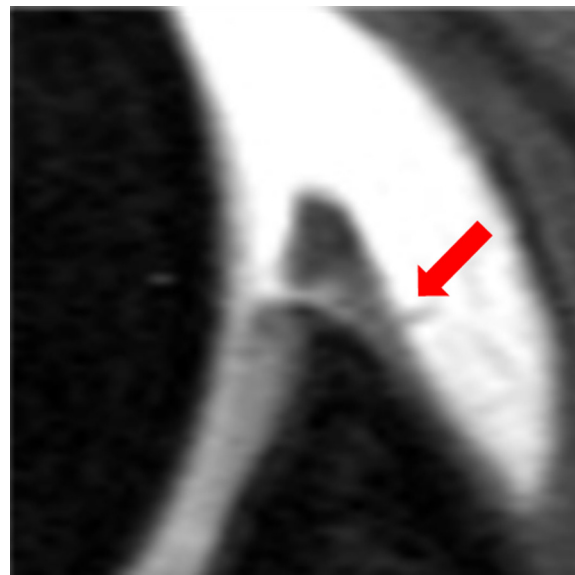


Fig. 2. A 31-year-old male patient with anterior instability type TUBS. MR arthrography of the right shoulder, axial section, sequence spin echo T1 W with fat suppression. Perthes lesion (arrow) characterized by glenoid labrum detachment with an intact periosteum.

2.1. Statistical analysis

The parameters were age and sex of the patient; glenoid labrum anterior-inferior lesions (Bankart/Bony Bankart and variants, as Perthes and ALPSA lesions); GLAD lesions; Hill-Sachs lesion; SLAP lesions; and posterior labrum lesions.

Result of MR arthrography, compared with arthroscopy, about overall diagnostic accuracy, sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV).⁷ Statistical analysis was performed using SPSS Statistics “19.0.0.1 FixPack” (IBM, United States) using the “Chi square Pearson” test.

3. Result

Overall, the glenoid labrum tears occurred in 77 out of 118 cases (65.2%). Among the 41 remaining cases, 11 out of 41 cases showed a Hill-Sachs isolated lesion (26.8%); the remaining 30 out of 41 cases were considered true negative (TN) (73.2%, 25.4% of the total).

By comparing the MR arthrography results with arthroscopy, the following were obtained: 77 cases of glenoid labrum tears (65.2%), 71 true positives (TP), 1 false positive (FP) and 5 false negatives (FN); of these, a false positive case concerns a SLAP lesion type II, the 5 false-negative cases concern 2 Perthes lesions, 1 ALPSA lesion, and 2 posterior glenoid labrum lesions (Table 1).

The anterior-inferior glenoid labrum lesions occurred in 55 out of 77 cases (71%, 46.6% of 118). The most results are evaluated in Table 2.

The SLAP lesion occurred in 17 out of 77 cases (22% excluding 1 FP case); of these, 13 SLAP lesions were type II (16.8%), 4 type III (5.2%), and 0 type IV.

Type II SLAP lesion was associated in one case with a Bankart lesion (9%), in 2 cases with Bony Bankart lesions (18%), and in 2 cases with ALPSA lesion (18%); no case of SLAP lesions was associated with Perthes lesion.

The posterior glenoid labrum lesions occurred in 5 out of 77 cases (6.5%, excluding the two cases evaluated as FN).

The Hill-Sachs lesion occurred in 48 out of 118 cases (41%), while the Hill-Sachs reverse lesion in 4 out of 118 cases (3.4%).

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