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Case Study

Arthroscopic Management of Chronic Posterior Shoulder Dislocation. Surgical Technique and Presentation of Three Cases

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Abstract

Posterior dislocations of shoulder represent less than 5% of all shoulder dislocations, and may include significant bone loss of the anterior humeral head (a reverse Hill-Sachs lesion) requiring surgical treatment. Often, the orthopedic surgeon diagnose this injury in chronic phase, due to a wrong primary diagnosis. Traditionally these lesions were treated with open reduction and transfer of the subscapularis tendon or the lesser tuberosity to the bone defect. We present a surgical technique for the arthroscopic management of these lesions and the application and result in three clinical cases. The technique is based on the filling of the bone defect of the humeral head with the subscapularis tendon.

Keywords: Arthroscopic Management; Shoulder Dislocation; Surgical Technique

Introduction

Posterior shoulder dislocations account for less than 5% of the total dislocations of the shoulder [1], and on many occasions, besides the labral and ligament injury, they include a fracture of the anterior part of the humeral head (reverse Hill-Sachs lesion) that can be connected with the posterior part of the glenoid, producing a locked posterior shoulder dislocation.

It is not uncommon to find this injury in the chronic phase, due to a lack of a primary diagnosis [2]. Classically the locked posterior shoulder dislocations with a fracture that may involve 20-40% of the humeral head has been treated with open reduction using an anterior approach with the transfer of the subscapularis or the lesser tuberosity tendon to the bone defect [3,4], basically looking to fill the reverse Hill-Sachs lesion, which could be called "reverse remplissage". There are few cases published on the arthroscopic management of this lesion [5-8], repairing the posterior labrum, filling the bone defect with the subscapularis tendon, or filling the bone defect with the middle glenohumeral ligament.

The cases are presented on three patients with chronic locked posterior shoulder dislocation as well as on the arthroscopic technique with which they were treated.

Case 1

A 31-year-old patient who suffered a motorcycle accident received a direct impact on his right shoulder against a road safety crash barrier. He suffered no other injury of interest.

He was transferred to the nearest hospital and assessed by an emergency doctor. X-rays were performed that were considered normal, and he was diagnosed with a shoulder contusion and referred to his primary care doctor for follow-up. After 6 weeks, the patient had not progressed well and was referred to the Trauma Outpatient Clinic. The patient had pain and severe functional limitation, with a flexion of 80º, an abduction of 70º and 0º external rotation, with atrophy of the deltoids and the infraspinatus, and with a guarding posture on internal rotation. In the simple X-ray it was diagnosed as a posterior shoulder dislocation, and an urgent NMR scan was requested. This showed a locked posterior dislocation of the right shoulder, with an anterior bone defect in the humeral head and a lesion of the posterior labrum (Figure 1A). The patient was intervened at two days from the visit to the Trauma Outpatient Clinic.

Figure 1a: Image of the preoperative magnetic resonance image where we can see the posterior dislocation of the blocked shoulder, the reverse Hill Sachs lesion and the reverse Bankart lesion.

Figure 1b: Image of MRI after 5 months of arthroscopic surgery. We can see the subscapular tendon filling the bone defect of the head of the humerus, the scarred posterior labrum and the humeral head centered in the glenoid cavity.

Figure 2a: View from the Antero Supero Lateral (ASL) portal of the posterior labrum lesion

Figures 2b: Image after repair with 2 anchors.

Figures 3a: View from the ASL portal of the reverse Hill-Sachs lesion with the anchor in the middle third of the bone defect.

Figures 3b: Image after making the knots; We can see the subscapularis tendon filling the defect of the humeral head, with the head centered in the glenoid cavity.

Case 2

A 28-year-old patient, who suffered from a bicycle fall, had various contusions and pain, and functional limitation in the left shoulder. An x-ray was performed on the shoulder, which showed no abnormal findings, and was referred to the Traumatology Outpatient Clinic for follow-up at 3 months. The patient did not arrive for the appointment, but at 8 weeks he appeared in this trauma clinic with a functional limitation that had not improved with time, with locked external rotation, antepulsion of 80º and abduction of 60º. After assessing the patient and the initial x-ray, an urgent CT scan was requested that confirmed a posterior chronic dislocation, with a bone lesion of 30-35% of the humeral head. Surgical intervention was decided at 3 days from his visit to the clinic.

Figures 4a: Vision from the ASL portal of the reverse Hill-Sachs lesion (affects 35% of the head).

Figures 4b: Image after preparation of the bony bed of the lesion, and the relationship with the subscapularis tendon.

Figures 5a: Vision from the ASL portal of the posterior labrum lesion.

Figures 5b: Same image after insertion of the anchor with two sutures and use of indirect suttle device for the repair of the lesion.

Figures 6a: Vision from the portal ASL of the insertion of the most inferior anchor in the bone defect, from the anterior portal.

Figures 6b: Image of the anterior face of the subscapular, with the use of a penetrating device to suture the subscapularis tendon.

Figures 6c: Image of the posterior face of the subscapular, with the penetrating device recovering one of the sutures.

Figures 7a: Vision from the ASL portal of the posterior face of the subscapular with the two anchors in the lower and upper part of the bone defect.

Figures 7b: Vision of the anterior face of the subscapular with the 4 sutures (2 mattress stitches, one superior and the other inferior) going through the subscapularis tendon.

Figures 7c: Image after knotting the lowest stitch.

Figures 7d: Image of the anterior face of the subscapular after knotting the second stitch.

Figures 8a: Vision from the ASL portal of the final result, on the anterior side of the subscapular.

Figures 8b: Final panoramic image of the glenohumeral joint.

Case 3

A 60-year-old male patient who suffered a fall at home after losing consciousness with a posterior shoulder dislocation episode. He was referred to the Emergency Department where the study focused on the loss of consciousness (the patient had no medical history of interest, no epilepsy or previous episodes of loss of consciousness). A shoulder x-ray was performed in the Emergency Department and was considered "normal". A sling was fitted and he was referred to his primary care doctor. After the pain and the functional limitation persisted, the primary care doctor referred him to Traumatology, where an NMR scan was requested, and he was referred to the clinic of a specialist in shoulder surgery. Surgical intervention was decided, and was performed at 11 weeks after the dislocation episode.

Surgical technique (Video 1)

Video 1: Arthroscopic treatment of a posterior chronic shoulder dislocation. We can see the reverse hill Sachs lesión, the bone deffect in the anterior part of the humeral head. First we treat the lesion of the posterior labrum, using a doble loaded anchor. Later we treat the humeral head deffect, with the reverse remplissage technique; this technique is based on the filling of the bone defect of the humeral head with the subscapularis tendón, using two anchors.

A closed reduction of the shoulder is attempted under general and locoregional anaesthesia (interscalene block). If this is not achieved, the patient is placed in the lateral decubitus with 5 kg of traction and, following the technique described by Verma [5], a wissinger rod is introduced through the standard posterior portal,

which is used for shoulder arthroscopy. With the wissinger through the portal, traction is carried out on the humeral head towards the lateral, being supported in the capsule and in the posterior part of the cuff, not in the bone. This manoeuvre usually manages to introduce the humeral head into the glenoid and the arthroscopy of the shoulder can then be performed. If a reduction is not achieved, an open reduction is then performed with the patient in a deckchair position and with an anterior approach route to the shoulder. With shoulder reduced, the shoulder arthroscopy is performed. The posterior, anterosuperolateral (ASL), anterior, the Wilmington and the posteroinferior portals are used. The reverse Hill-Sachs lesion is studied, the relationship with the subscapularis tendon and the posterior labrum lesion (Figures 2,4,5), the rest of the labrum and the rotator cuffs. The joint has to be cleaned well, all the fibrosed tissue extirpated, free the posterior labrum of the glenoid adherences, prepare the bone bed of the glenoid before inserting the implants (in case 1, two LUPINE® BR implants (DePuy Mitek, Raynham, MA), and in case 2, with 1 GRYPHON® BR (DePuy Mitek, Raynham, MA) fitted with a double suture), perform the capsule-labral reconstruction with a direct or indirect pin, tie and cut the sutures. Once the lesions are repaired, the arm is released from traction and then a check is made between the relationship of the humeral head, of the anterior bone defect with the glenoid, on making rotations of the shoulder (particularly if there is a risk of "engaging" with the internal rotation). And it is decided whether to fix the subscapularis tendon into the anterior humeral defect, as described by Krackhardt [6].

It is not strictly necessary to reproduce an engagement of the reverse Hill-Sachs lesion in order to decide to perform a reverse remplissage. With optics in the ASL portal, the anterior and posterior side of the subscapularis tendon is freed. The osseous bed of the humeral head is prepared, extirpating all the fibrosed tissue of the reverse Hill-Sachs lesion, with synoviotome, the circular bone mill or periosteal elevators, until obtaining bleeding bone. Then, from the anterior portal, the implant is inserted in the bone defect (in Case 1, a 5.5 HEALIX BR™ (DePuy Mitek, Raynham, MA), with two UHMWPE sutures (ORTHOCORD®, DePuy Mitek), in the upper third and in the medial area of the defect (Figure 3), and in case 2, two GRYPHON® BR, HEALIX BR™ (DePuy Mitek, Raynham, MA), with two UHMWPE sutures (ORTHOCORD®, DePuy Mitek), one inferior and another superior in the most medial area of the bone defect. The sutures are recovered from an accessory anterosuperior portal and with a device in order to penetrate the tendon (Penetratror, DePuy Mitek, Raynham, MA) through the anterior portal, we penetrate the subscapularis tendon and recover the sutures. Mattress sutures are added, one inferior and one superior, to obtain good contact of the tendon with the bone, the stitches being separated between 1 and 2 cm (Figure 6). A stitch cutter through the accessory anterosuperior portal would be of help for the handling and recovery of the sutures, bringing them nearer to the mouth of the penetrator retriever, trying not to move the retriever too much once the tendon is penetrated, to avoid injuring the tendon and the cartilage. With the arm in 35-40º of internal rotation, the lower stitch is knotted first and then the upper one (Figures 7 and 8).

Post-operative management

The shoulder is immobilised with a sling for 6 weeks, which can be removed for meals and personal hygiene. At 3 weeks, the patient starts with passive and self-assisted exercises; at 6 weeks with active exercises; and at 3 months with stretching and muscle strengthening.

In the follow-up NMR scan at 5 months, the humeral head can be seen centred in the glenoid, the maintaining of the glenohumeral space and the subscapularis filling the bone defect (Figure 1B).

Results

In case 1, the follow-up is 4 years, it is very satisfactory with a good outcome. The patient has almost complete mobility: antepulsion 170, abduction (ABD) 170, hand interior rotation (IR) at T12, ER (exterior rotation) with the hand over the head with the elbows behind. The strength of the intervened arm is equal to the contralateral arm. The Napoleon and bear-hug tests, which evaluate the function and strength of the subscapularis, are negative. In the examination, there are no signs of posterior instability. It has a score of 96 on the Constant-Murley scale, with the contralateral arm being 100.

In case 2, the follow-up is 2 years. The outcome is very satisfactory. The mobility results are: antepulsion 170, ABD 160, IR hand at T12, ER with the hand over the head with the elbows forward. The strength of the intervened arm is equal to the contralateral arm, and the Napoleon and bear-hug tests are negative. The score on the Constant-Murley scale is 94, with the contralateral arm being 100.

In case 3, the follow-up is 9 months. The outcome is also satisfactory. The mobility is: antepulsion 160, ABD 150, IR hand at L1, ER with the hand over the head with the elbows forward. The strength of the intervened arm is equal to the contralateral arm,

and the Napoleon and bear-hug tests are negative. The score on the Constant-Murley scale is 92, with the contralateral arm being 100.

The three patients are very satisfied, with a complete return to their work and sport activities.

Discussion

A patient with a posterior dislocation of the shoulder is capable of flexing the shoulder, even more than 90º and the x-ray taken in the Emergency room can often be a false negative. For this reason, the clinical suspicion is essential. The loss of external rotation must lead to requesting an axillary projection or a computed tomography in order to rule out a posterior dislocation. A chronic dislocation has to be reduced under general anaesthesia, as a scheduled intervention, and being prepared to perform an open reduction if it is not possible to obtain a closed one.

The filling of the bone defect in the anterior part of the humeral head after a deep-rooted posterior shoulder dislocation is a technique that allows a complete functional recovery of the shoulder and can be performed arthroscopically.

Depending on the size of the humeral head bone defect, the traditional treatments have been closed reduction and immobilisation in small defects; transfer of the lesser tuberosity or the subscapularis tendon in medium-sized defects; or shoulder arthroplasty or bone allograft for defects of more than 50% of the humeral head. Verma [5] was the first to describe the used of arthroscopy to reduce and stabilise chronic posterior dislocation. Arthroscopy has also been used in similar cases, to extract loose bodies [7]. Krackhardt [6] described the technique for the arthroscopic fixation of the subscapularis tendon in the bone defect.

With this technique, after repairing the posterior labrum and testing the engagement of the reverse Hill-Sachs lesion, the bone defect is filled using an implant with a double suture, taking into account the possibility of using more superior anchor in the case of maintaining an engaging lesion.

In the two cases that are presented, after the repair of the posterior labrum the engagement of the humeral head with the posterior part of the glenoid was produced. But, it is believed that due to considerable bone defect (more than 15-20% of the humeral head), despite that the engagement of the humeral head was not reproduced, it is advisable to perform this technique in order to increase the stability of the repair, in the same way as with a pure Hill-Sachs lesion, in the posterior part of the humeral head.

Burkhart [8] fills the defect with the middle glenohumeral ligament (although he recommends using the subscapularis in the case that this ligament may be insufficient, considering the great anatomical variety at this level), with which there is theoretically less risk of limiting and weakening the internal rotation.

Conclusion

The arthroscopic management of these problems also enables all these lesions that can occur with the dislocation to be diagnosed and treated (posterior labrum, superior labrum, a large portion of the biceps, chondral lesions, rotator cuff). It is a less invasive surgery, with less damage to the soft tissue injuries, with a more rapid recovery and the possibility of achieving the same or even better results than traditional open surgery.

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