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Case Report

Arthroscopic Repair of Rotator Cuff Tear Associated with Grafting of a Bone Cyst of the Proximal Humerus Head: Technical Note

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Abstract

Introduction: Cystic bony defects of the humeral head are often encountered during rotator cuff arthroscopic repair. These defects may be idiopathic or secondary to suture anchor placement from previous repairs. Some cysts are visible on preoperative magnetic resonance imaging (MRI), but most of them are discovered during footprint preparation or implant removal during surgery. These osseous defects are fragility zones, which reduce biological healing capacity and may decrease repair fixation strength, which may lead to significant treatment problems and sometimes bone grafting is needed to address these defects.

Case presentation: In this article we present a case of a 53-year-old man, with left shoulder pain with 4 months of evolution. He reported no improvement with physical therapy and analgesia. There was no history of trauma. MRI showed that a transfixing tear of the supraspinatus that extended to the infraspinatus, and an expansive formation with a cystic appearance at the level of the head of the humerus. We present an arthroscopic technique to address these defects at the time of rotator cuff repair using a synthetic graft compaction technique with concomitant rotator cuff repair.

Discussion: Despite being relatively rare, we believe that the associated rotator cuff repair and correction of the bone defect, is an asset for the patient and presents good functional results.

Conclusion: Despite the good experience, in this case, more studies should be carried out to understand the benefit of this treatment.

Keywords: Bone Cyst; Rotator Cuff Tear; Bone Graft

Introduction

The number of active people has significantly increased over the last years. In this context, increasingly younger patients present with rotator cuff problems (RC) [1,2]. Direct radiographs and magnetic resonance imaging (MRI) are commonly used in the diagnosis of rotator cuff pathology [2-4]. Radiographic findings from patients with a documented rotator cuff tear have been found to include a substantial number of changes, including the presence of cysts [4-6].

Degenerative bone cysts of the proximal humerus can be associated with impingement syndrome and rotator cuff pathology [2-6]. Usually, these cysts are small and have no clinical significance. However, these cysts occasionally may be large enough to create an area of significant body deficiency within the proximal humerus.

The etiology of these cysts is not fully understood. It has been theorized that cyst formation occurs due to microavulsive cuff tears, which may incite an inflammatory reaction, resulting in synovial fluid entering the cysts through small communicating pores on their surface. They also may be secondary to the contact of the bone underlying the cuff tear with the coracoacromial arch. It is unclear whether these cysts are age-related, developmental, occur in asymptomatic patients or are specific to rotator cuff pathology [5-8]. A radiographic study of patients with symptomatic and surgically documented rotator cuff tears has shown a positive correlation with greater tuberosity cysts [7-10]. These radiographic abnormalities were not found in asymptomatic subjects without a rotator cuff tear. Cysts may also be related to anchor placement and the removal of an implant (suture anchor or screw) may leave a significant cavity in the bone.

Magnetic resonance imaging (MRI) and MR arthrography (MRA) are the techniques used for imaging cysts on the greater tuberosity.

When a symptomatic rotator cuff tear is associated with a large bone cyst, arthroscopic treatment of the rotator cuff tear is problematic. These cysts may encompass such a large area of the rotator cuff footprint that secure-suture anchor fixation of the rotator cuff cannot be achieved [10-12].

We describe our technique of arthroscopically bone grafting these degenerative cysts by a compaction technique to achieve secure suture anchor fixation into a densely packed bone bed.

Case Reports

A 53-year-old man, right-handed, factory worker, presents to the ortho department consultation with left shoulder pain with 4 months of evolution. He had a personal history of suberose and was medicated for high blood pressure.

He described pain radiance to his left upper arm, exacerbating of the pain at night and while working. He reported no improvement with physical therapy and analgesia, he had no history of infiltrations. There was no history of trauma. Physical examination showed preserved mobility, without pain on active or passive mobilization, but with pain on counter-resistance movement. Had a positive Jobe test.

In the radiograph study of the shoulder, only acromioclavicular arthrosis was objectified. The ultrasound showed tendinosis of the RC with a rupture of the supraspinatus tendinous interstitium measuring approximately 5 mm in the coronal plane and 9 mm in the sagittal plane, associated with subacromial-subdeltoid bursitis.

MRI showed that the LHB was on its gutter, with normal structure and signal intensity, without surrounding fluid, a slight thickening of the subscapularis tendon, with hyper signal, a transfixing tear of the supraspinatus that extended to the infraspinatus, with an anteroposterior extension of 31 mm and a stump retraction of 20 mm. A slight reduction in supraspinatus volume was shown, however without significant adipose involution. An expansive formation with a cystic appearance at the level of the head of the humerus was noted, with a bilobed appearance and a craniocaudal extension of at least 20 mm. (Figure 1).

The patient was then offered surgical treatment of the lesion.

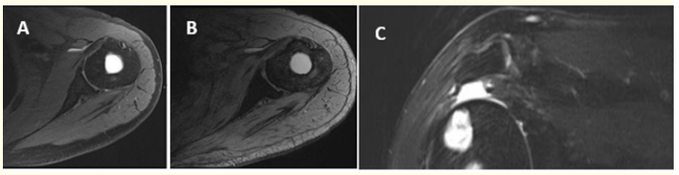

Figure 1: Humeral head cyst on MRI and a transfixing tear of the supraspinatus that extended to the infraspinatus, on T1 (A) an T2 (B) on axial and (C) coronal plane.

Surgical technique

Material

We present an arthroscopic technique to address these defects at the time of rotator cuff repair using a granulated bone substitute (Neobone from Ceramed, a Hydroxyapatite and Calcium phosphate Bone substitute) designed to address osteoarticular defects (Figure 2).

Position and Arthroscopy

Surgery was performed under general anesthesia and interscalene block with the patient being placed in a beach chair position. The arthroscope was introduced via a posterior portal, and lesions were assessed by a lateral portal. Type of tear confirmed on glenohumeral exploration. Tenodesis of the biceps was performed and the integrity of the subscapularis was confirmed. Subacromial bursectomy including debridement of devitalized tissue the insertion site of the supraspinatus tendon was prepared.

A fragility zone was identified in the greater tuberosity region. The viewing portal was set up superior and laterally, allowing perpendicular access to the cyst. (Figure 2) The cyst was thoroughly debrided with shavers and curettes introduced through a secondary portal (Figure 3). After the bony cyst and its content was completely debrided a clear cannula (Arthrex, Triple- Dam Twist-In™ Cannulas) was inserted through the portal that offered optimal access and trajectory in line with the cyst (in our case was the superior lateral portal), the cannula was then positioned directly over the cyst entry point.

A granulated bone substitute was then loaded into the cannula in a retrograde fashion, pressure of the arthro-pump must be carefully addressed during this period. The allograft was then delivered into the cyst through the cannula and impacted into the defect with the use of the dilator. Alternatively, an arthroscopic switching stick or bone tamp can be used to deliver the bone graft into the defect. The bone graft is impacted into the defect until no further bone graft can be inserted (Figure 4).

Finally, the rotator cuff was repaired with two side-to-side sutures and a medial tissue anchor system and lateral knotless anchor system (REELX STT from Stryker), both anchors were fixed outside the defect.

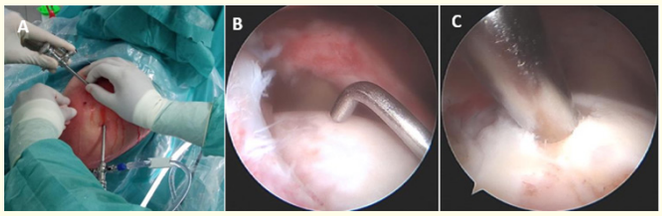

Figure 2: (A) Viewing portal set-up; (B-C) fragility zone identification and exploration.

Figure 3: (A-C) Cyst debridment with curettes.

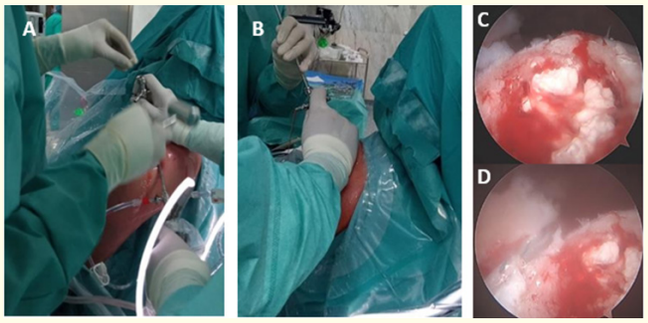

Figure 4: (A) Granulated bone substitute loaded into the cannula; (B) Granulated bone substitute impacted; (C-D) Bone graft impacted into the humeral head defect, arthroscopic view.

Postoperative course

At 15 days postoperatively the patient was without pain, operative wound was closed, and he started a rehabilitation program. At 6 months postoperatively presented residual pain in active motion. He presented full active amplitude, and a global strength 4/5.

Discussion

Humeral cyst's role in RC tears has not been completely elucidated. The presence or contribution of humeral cysts in rotator cuff pathology are not entirely clear but are known factor in increasing mechanical failure after rotator cuff repair. Any decision to perform surgical treatment must be weighed carefully [1-4].

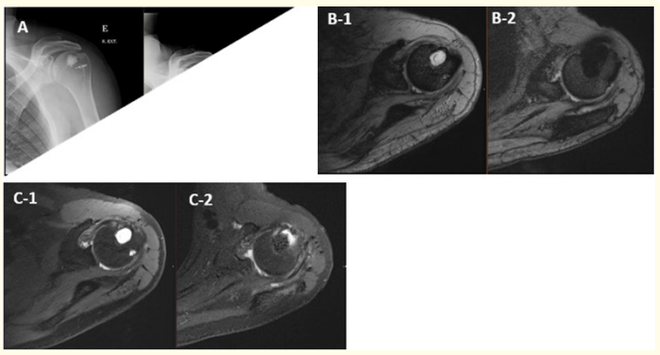

Figure 5: (A) Postoperative control radiograph (1 month after surgery); (B-1, C-1) MRI preoperative; (B-2, C-2) MRI 6 months after surgery.

Conclusion

Despite being relatively rare, we believe that the associated rotator cuff repair and correction of the bone defect, is an asset for the patient and presents good functional results, and to reduce additional risks beyond the already planned. Although arthroscopic approaches using autograft and allograft have been described previously, both have associated morbidity and risks that must be used accordingly.

Despite the good experience, in this case, more studies should be carried out to understand the benefit of this treatment.

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