

Shoulder Arthropaty in Athletes Following Metallic Suture Anchor. A 2-Year Follow-up Investigation after Removal of the Implants and Physiotherapy

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Abstract

In the last decade, the number of procedures to repair elements of the glenohumeral joint has risen. This rise can be explained by several factors including greater knowledge of diseases affecting the joint, improved diagnoses through radiographic imaging, the development of surgical instruments, and the evolution of arthroscopy.

Keywords: Condral lesion; Metallic suture anchors; Glenohumeral instability; Shoulder arthroscopy

Introduction

The advent of suture anchors has allowed for the replacement of transosseous tunnels, especially in cases of glenohumeral instability. Using suture anchors on the glenoid rim or in the humerus eases and diminishes the time required for surgical repair of the capsule ligament, regardless of whether these are treated through open or arthroscopic routes [1-8]. However, despite the advantages provided by suture anchors, complications can still develop.

The surgical technique used is critical for producing favorable outcomes in patients. The metallic suture anchors should be positioned deep inside the glenoid bone with none of the anchor eyelets projecting out of bone and into the articular cartilage.

Complications resulting from the use of metallic suture anchors are typically due to a malpositioning of the implant within the joint, but they can also result from implant loosening, breakage, or migration. These complications can cause friction at the articular cartilage of the humeral head or the glenoid cavity, which results in chondral lesions and loose bodies [9-13].

Unfortunately when the surgical clinical practice starts in some countries the new surgeons can have this complication. Rockwood et al. [14] described that after using 5 metallic suture anchors in shoulder instability surgery at least one anchor can be malpositioning and terrible condral lesion gone happen.

The importance and implications of metallic suture anchors and associated pathologies are most pronounced in poor countries with limited financial resources where public health programs rather than private health programs provide care for the majority of individuals. Alternatively, absorbable anchors are not associated with these complications; however, they have complications of their own, such as the induction of osteolysis. They are also more expensive and often not used in patients cared for by public health programs. Absorbable suture anchors are by-products of materials made with polylactic or polyglycolic acid. Complications, such as a reaction to the material, can result from the sterile suture placement and can induce secretion of cytokines. This can generate glenohumeral synovitis, local osteolysis, and articular cartilage lesions [15-18].

In these poor countries the learning curve for the use of metallic suture anchors to correct shoulder instability is high and the effects of associated complications are extensive.

The purpose of this prospective study is to present the outcome of rehabilitation of glenohumeral chondral injuries resulting from the

use of metallic suture anchors.

Material and Methods

We performed a prospective analysis of 20 patients who developed chondral injuries after metallic suture anchors were used to repair labral lesions during open or arthroscopic surgery of the shoulder. Our objective was to follow the patients after anchors were removed to record their range of motion and level of pain. Two patients underwent surgery for the first time at Federal University of São Paulo and 18 had surgeries performed at an external hospital. All revisions to remove metallic implants were performed at the university described. The index surgery was performed by arthroscopy in seventeen of the cases and open surgery in three of the cases. Individuals were diagnosed by complication. There were four patients with Superior Labral Anterior Posterior (SLAP) lesions, 13 with anterior shoulder instability, one with multidirectional instability, and two requiring rotator cuff repair.

During the postoperative period and for all of the cases, chondral injuries of the humeral head due to metallic suture anchors were confirmed by the presence of pain, crepitation, and limitations in all planes of motion. Radiographs revealed that in 100% of the cases, at least one of the suture anchors was malpositioned (Figure 1).

Patients included in this study were 20 to 54 years of age, with an average age of 34.3 years. There were 8 females and 12 males. All of the patients agreed to the arthroscopic removal of protruding metal suture anchors. One patient underwent surgery on the fifth week following the index surgery; the remaining 19 patients underwent surgery for anchor removal at a mean of 3 months following the index surgery.

Follow-up observations after suture anchor removal ranged from 7 months to 3 years in length with an average follow-up period of 18.6 months. Data analyses were performed after 1 year of prospective follow up. All of the patients were evaluated clinically by physical examination to assess flexion, extension, internal rotation, and active

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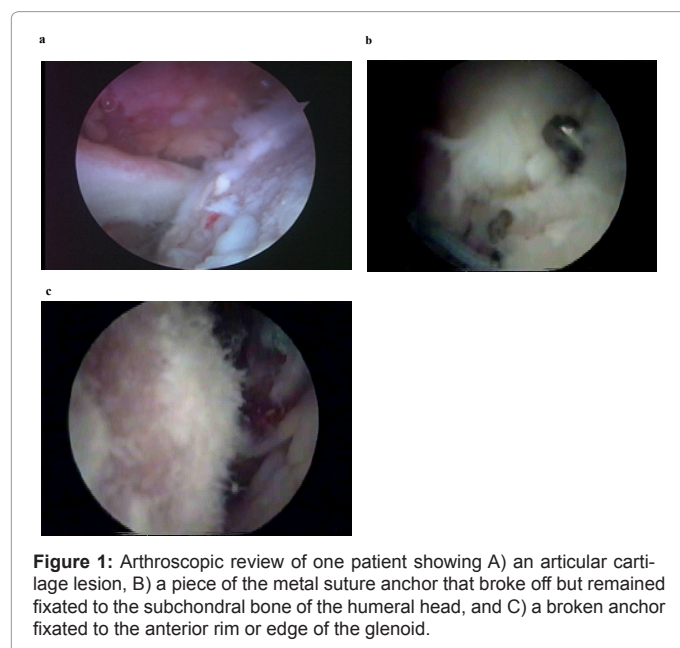


Figure 1: Arthroscopic review of one patient showing A) an articular cartilage lesion, B) a piece of the metal suture anchor that broke off but remained fixated to the subchondral bone of the humeral head, and C) a broken anchor fixated to the anterior rim or edge of the glenoid.

and passive range motion; by the American Shoulder and Elbow Surgeons (ASES) scoring system; and with anterior, posterior, and lateral plain film radiographs.

The basic procedure was to pull out the suture anchors and release the anterior glenohumeral capsule. We did not perform labrum or subacromial decompression re-repairs.

Following the surgical procedure, the patients participated in a rehabilitation protocol that was divided into two phases that involved 60 sessions of physical therapy three times a week.

The initial goal was to reduce symptoms of pain and improve movement. Myofascial release and trigger point inhibition were performed. Shoulder mobilization techniques were executed obeying Maitland's principles. A gradual improvement of movement was obtained using flexion, extension, adduction and abduction in horizontal plane, and internal and external rotation as tolerated by the subject.

Isometric strengthening of the rotator cuff and posterior depression of the scapula was performed. Strength increased according to the capacity of the subject to perform the exercise without pain. As criteria for patient progress in rehabilitation Phase II, the patients must have reported the absence of pain, complete functional range of movement (ROM) with pain only at the end of the range from flexion to abduction, and a score of 5 points on the visual-analogue pain scale.

In the second phase, exercises to increase strength, stability, and functional capacity were performed, following a gradual return to activities. Exercises for strengthening the dynamic stabilizers of the scapulothoracic and glenohumeral joints, stretching, core stability exercises, proprioception, and plyometric conditioning were emphasized. Stretching of the anterior and posterior capsule of the shoulder followed these exercises. Exercises to strengthen the musculature of the scapula, shoulder, and stabilizers of the hip and trunk were also performed, in addition to diagonal exercises of proprioceptive neuromuscular facilitation. When necessary, manual therapy techniques described above (Phase I) were employed to reduce pain symptoms, when the patient indicated pain.

Patients were allowed to return to activities if they exhibited complete ROM with an absence of pain in all shoulder movements and normal muscle strength for all movements (Grade 5/5). The rehabilitation program lasted 5 months, on average.

Results

At the time of arthroscopy all 20 cases demonstrated varying degrees of glenohumeral joint synovitis and had chondral lesions containing exposed subchondral bone on the humeral head. Of the cases, 90% possessed chondral lesions in the glenoid cavity (Figures 1 and 2). All patients presented grade IV Outer bridge lesions. In 16 of the cases, only one anchor appeared to have initiated the chondral lesion on the humeral head. In four of the cases, there were two suture anchors involved in initiating the lesion. In one case, a suture anchor was broken and had fragmented into the joint (Figures 1A-1C).

The range motions recorded were at a preoperative elevation mean of 91.5° and at a postoperative mean of 163.5°. Limited external rotation was observed preoperatively (7.7°) and postoperatively (35°) in the shoulder. However, it increased by about 30° after the removal of the metallic suture anchors at 1 year. X-rays determined that patients had arthrosis of the glenohumeral joint and spurs, and that these factors correlated to pain experienced by the patients. However, 2 years after the implants were removed, the patients complained of no pain while at rest and during most typical activities.

The ASES scale used provided a mean of 50 points at the preoperative phase and a mean of 82 points in postoperative phase. There were no complications following suture anchor removal surgeries.

Discussion

Chondral lesions of the humeral head or glenohumeral arthropathies that result from friction against a metal implant have been described previously [14,18]. Zuckerman and Matsen [19] describe the possible causes of complications resulting from metallic suture anchors. They detail the complications of 37 patients with problems resulting from implants after open shoulder surgery on the glenohumeral joint. These complications are thought to be due to 1) improper material placement, 2) migration of the material after fixation, 3) formation of free bodies, and 4) breakage or rupture of the material. Rhee et al. [18] describe 5 cases of glenohumeral arthroplasty resulting from the use of metallic implants to correct glenohumeral instability after 7 to 20 months after surgery. One of the patients in this study had a fragment or piece of the metal suture anchor fixated to the subchondral bone of the humeral head. Similarly, one of the patients in our study had a fragment of the metal suture anchor attached to the subchondral bone of the humeral head (Figure 1B). Rockwood et al. [14] also described 8 cases with complications resulting from the use of metal suture anchors. Of the 8 cases, 3 had chondral lesions in the humeral head, with 2 of the 3 cases resulting from mechanical friction against the anchors and 1 resulting from infection. The functional results of these patients were not described in the follow-up.

In the present study, there were grade IV lesions with exposure of the subchondral cartilage bone in 20 of the cases. Fortunately, removal of the metal suture anchors led to a relief from pain symptoms during typical activities with no pain while at rest. In all patients, crepitus was present during the physical exam in addition to a restriction in the expected increase of breadth or amplitude of normal movement (ADM). Functional results recorded from the 20 patients described here displayed improvement upon removal of the metal suture anchors

with a mean of 82 points on the ASES scale. Crepitus occurred in all patients and was associated with pain during the postoperative period after shoulder surgery; it was also associated with the metal suture anchor. This led to a restriction in ADM described by the evaluations after 1 year of follow up.

Muller et al. [11] associated osteolysis with the use of suture anchors on the glenoid rim occurring as rapidly as 4 months after surgery in patients treated for anterior instability. There may be migration from the initial position of the anchor over time if the reinserted labral tissue has not adhered to the bone. This lack of healing may cause increased tension on the suture anchor during the rehabilitation period resulting in loosening of the anchor and subsequent migration.

In most case studies [14,18] the surgical revision procedure was carried out months after the index surgery. In our case studies, one patient underwent revision surgery at 5 weeks post-index surgery. This patient complained of shoulder pain and grinding at the beginning of rehabilitation. Arthroscopic review of this patient indicated that there was a significant cartilage lesion in the humeral head but without synovium changes accompanying the lesion (Figure 2).

a. It is important understand that malpositioned anchors are problematic in order to avoid the associated complications. During surgery the metallic suture anchors should be inserted as deeply as possible into the glenoid bone. Surgery follow-ups that involve radiographs showing the relationship of the metal suture anchors to the anterior rim of the glenoid can identify potential complications early. Rockwood et al. [14] emphasize the importance of follow-up care of patients who undergo shoulder surgery and are given metal suture anchors. They emphasize that careful attention be paid to the radiographs of symptomatic patients with pain in the shoulder after the fixation of a Bankart lesion. Of the 20 patients presented in this study, only 1 patient with metal suture anchor-associated complications was recognized in the early postoperative period (5 weeks) while the remaining 19 patients were recognized after 3 months. This suggests that making the diagnosis of suture anchor failure is difficult. This is particularly important because delayed diagnosis may lead to development of more severe chondral lesions.

Knowledge of the correct location for placement of the suture and type of metal suture anchor will make it possible to use specific instruments during the removal procedure. This may avoid additional damage to the glenoid rim and surrounding articular cartilage. It is also important to document the characteristics and extent of the articular cartilage destruction before and after the removal

of hardware. Typically, the chondral lesions are extensive and accompanied by a significant synovial reaction. Future studies should concentrate on the importance of synovitis of the shoulder in the evolution the chondral lesions [18].

b. All of the patients studied demonstrated a gain in external rotation greater than 30° and that gain improved by a mean of 20° after the suture anchors were removed. In all patients, an arthroscopic anterior capsulotomy was performed without releasing the intra-articular subscapularis tendon. In the study performed by Rhee et al. [18], additional procedures after removal of the metal suture anchors were also carried out in most of the patients.

Some treatment options for chondral lesions associated with the shoulder and arising from a variety of causes have been suggested. Siebond et al. [20] used a microfracture technique that involved placement of humeral periosteum to treat a humeral head chondral defect associated with metal suture anchors. Passler [21] also used microfracture to treat chondral lesions and reported encouraging results. In this study, we used the microfracture technique in two of the patients. However, it is difficult to correlate the results of this procedure to the patients' clinical outcome. Scheibel et al. [22] described 8 cases of autologous osteochondral transplantation, all with a mean area of 120 mm². All of these patients underwent magnetic resonance imaging, which revealed osseointegration. Of the 8 patients, 2 of them displayed macroscopically normal articular cartilage during a second-look arthroscopy.

In this study, protruding metal suture anchors placed on the glenoid rim were the cause of chondral lesions observed on the humeral head. Synovitis was also noted in these cases and is an important topic of interest for future research.

Conclusion

Malpositioned metallic suture anchors must be avoided in shoulder surgeries. The consequences and long term outcomes of chondral lesions in the humeral head resulting from malpositioned suture anchors remain unknown. Early intervention procedures to remove the metallic suture anchors followed by rehabilitation significantly improve the range of motion and pain associated with shoulder articulation during low weight activities. However, all of these patients complain of pain during more intense sport activities.

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References

1. Bacilla P, Field LD, Savoie FH 3rd (1997) Arthroscopic Bankart repair in a high demand patient population. *Arthroscopy* 13: 51-60.
2. Barber FA, Herbert MA, Richards DP (2003) Sutures and suture anchors: update 2003. *Arthroscopy* 19: 985-990.
3. Cole BJ, Romeo AA (2001) Arthroscopic shoulder stabilization with suture anchors: technique, technology, and pitfalls. *Clin Orthop Relat Res* : 17-30.
4. Curtis R, Carter C (2002) Development and testing of a bioresorbable suture anchor. A preliminary report. *Injury*. 33 :B25-29.
5. Koss S, Richmond JC, Woodward JS Jr (1997) Two- to five-year followup of arthroscopic Bankart reconstruction using a suture anchor technique. *Am J Sports Med* 25: 809-812.
6. Pirhonen E, Kaikkonen A, Helevirta P, Pohjonen T, Tamminmäki M, et al. (1999) Development of a bioabsorbable suture anchor. *J Biomed Mater Res* 48: 875-880.
7. Valis P, Nydrle M (2003) [Arthroscopic stabilization of the shoulder using anchors]. *Acta Chir Orthop Traumatol Cech* 70: 233-236.

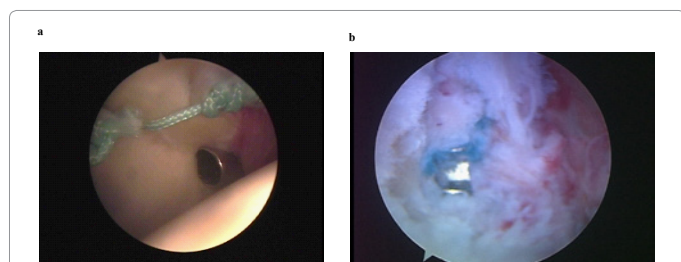


Figure 2: Glenohumeral arthroscopic images of one of the athletes showing A) an image obtained with the arthroscope introduced by the anterior portal showing the end result of the initial surgery after fixing the SLAP II lesion, B) a patient evaluation with a significant lesion in the humeral cartilage due to impact from a metal suture anchor 5 weeks after the first surgery, and a superior metal suture anchor, which remained unstable after suspension by probing the labrum lesion. The suture knot was reversed by the impact.

8. Warme WJ, Arciero RA, Savoie FH 3rd, Uhorchak JM, Walton M (1999) Nonabsorbable versus absorbable suture anchors for open Bankart repair. A prospective, randomized comparison. *Am J Sports Med* 27: 742-746.
9. Barber FA, Snyder SJ, Abrams JS, Fanelli GC, Savoie FH 3rd (2003) Arthroscopic Bankart reconstruction with a bioabsorbable anchor. *J Shoulder Elbow Surg* 12: 535-538.
10. Chow JC, Gu Y (2004) Material reaction to suture anchor. *Arthroscopy* 20: 314-316.
11. Müller M, Käab MJ, Villiger C, Holzach P (2002) Osteolysis after open shoulder stabilization using a new bio-resorbable bone anchor: a prospective, non-randomized clinical trial. *Injury* 33 Suppl 2: B30-36.
12. Wilkerson JP, Zvijac JE, Uribe JW, Schürhoff MR, Green JB (2003) Failure of polymerized lactic acid tacks in shoulder surgery. *J Shoulder Elbow Surg* 12: 117-121.
13. Barber FA, Cawley P, Prudich JF (1993) Suture anchor failure strength--an in vivo study. *Arthroscopy* 9: 647-652.
14. Kaar TK, Schenck RC Jr, Wirth MA, Rockwood CA Jr (2001) Complications of metallic suture anchors in shoulder surgery: A report of 8 cases. *Arthroscopy* 17: 31-37.
15. Snyder SJ, Banas MP, Belzer JP (1996) Arthroscopic treatment of anterior shoulder instability using threaded suture anchors and nonabsorbable suture. *Instr Course Lect* 45: 71-81.
16. Silver MD, Daigneault JP (2000) Symptomatic interarticular migration of glenoid suture anchors. *Arthroscopy* 16: 102-105.
17. Ticker JB, Lippe RJ, Barkin DE, Carroll MP (1996) Infected suture anchors in the shoulder. *Arthroscopy* 12: 613-615.
18. Rhee YG, Lee DH, Chun IH, Bae SC (2004) Glenohumeral arthropathy after arthroscopic anterior shoulder stabilization. *Arthroscopy* 20: 402-406.
19. Zuckerman JD, Matsen FA 3rd (1984) Complications about the glenohumeral joint related to the use of screws and staples. *J Bone Joint Surg Am* 66: 175-180.
20. Siebold R, Lichtenberg S, Habermeyer P (2003) Combination of microfracture and periosteal-flap for the treatment of focal full thickness articular cartilage lesions of the shoulder: a prospective study. *Knee Surg Sports Traumatol Arthrosc* 11: 183-189.
21. Pässler HH (2000) [Microfracture for treatment of cartilage defects]. *Zentralbl Chir* 125: 500-504.
22. Scheibel M, Bartl C, Magosch P, Lichtenberg S, Habermeyer P (2004) Osteochondral autologous transplantation for the treatment of full-thickness articular cartilage defects of the shoulder. *J Bone Joint Surg Br* 86: 991-997.

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