EXTENSIVE OSTEOLYSIS AFTER THE USE OF A BIOABSORBABLE SUTURE ANCHOR: CASE REPORT AND LITERATURE REVIEW

Fabio Farina Dal Molin

ABSTRACT

Bioabsorbable implants are very frequently used to treat rotator cuff and shoulder labrum injuries. Many researchers have observed small areas of osteolysis after treating pathological conditions of the shoulder using bioabsorbable anchors. Biological and mechanical theories have been put forward to account for the osteolysis caused by these materials. The case of a patient who was simultaneously treated for a rotator cuff lesion using the double-row technique and a Bankart lesion using bioabsorbable PLLA anchors and Fiber Wire®, and developed extensive osteolysis of the anatomical neck of the humerus, is described. Given that an anchor was used in the glenoid, and this did not present osteolysis, the hypothesis that mechanical factors are important in the etiology of this complication is raised.

Keywords – Osteolysis; Humerus; Bioabsorbable Implants; Shoulder

INTRODUCTION

Bioabsorbable implants are very frequently used to treat rotator cuff and shoulder labrum injuries. They were developed to enable temporary fixation of the tissue, thereby avoiding the complications of metallic implants[1,2], since the bioabsorbable material disintegrates after a period of time. The first generation of implants were made of polyglycolic acid (PGA). These presented a major reaction of foreign body type and very rapid absorption[3,4]. The next generation was made of poly-L-lactic acid (PLLA) and was developed to be degraded over a much longer time[5,6] and to present fewer adverse reactions[3]. Many researchers have observed small areas of osteolysis after treating pathological conditions of the shoulder using bioabsorbable anchors. Biological and mechanical theories have been put forward to account for the osteolysis caused by these materials[5,7-9].

We raise the hypothesis that the cause of the osteolysis is mechanical, since in our case, no lysis occurred in the glenoid, in which there was another bioabsorbable anchor made of PLLA, and there was also no osteolysis in the PLLA anchor that was placed laterally in the greater tubercle.

The aim of this study was to report on the case of a patient who was simultaneously treated for a rotator cuff lesion using the double-row technique and a Bankart lesion using bioabsorbable PLLA anchors, and developed extensive osteolysis of the proximal humerus.

CASE REPORT

The patient was a 60-year-old man who had presented a complaint of pain in his right shoulder for one year. Upon physical examination, he presented normal mobility, Neer +, Jobe + (with pain) and grade 5 strength. Radiographic examination showed a type II acromion,

MSc in Orthopedics and Traumatology from FCMSCSP; Specialist Orthopedist (Shoulder and Elbow) at Hospital Moinhos de Vento.

Work performed at Hospital Moinhos de Vento, Porto Alegre, RS.
Correspondence: Av. Mariland 1314, ap. 602, Mont Serrat, 90440-190 Porto Alegre, RS. E-mail: dalmolin@ombrocotovelo.com.br

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and magnetic resonance imaging (MRI) showed a lesion in the supraspinatus measuring 2 cm, with retraction of 1 cm. He underwent videoarthroscopy, and inspection showed a Bankart lesion that had partially healed, with absence of cartilage in the anteroinferior part of the glenoid, over a length of 5 mm. The tendon of the supraspinatus muscle presented a lesion of 2 cm in length, with retraction of 1 cm and good tendon quality. It was decided to cover the cartilage lesion by bringing the glenoid labrum over the erosion of the cartilaginous surface and fixing it using a PLLA anchor (Biofastak® Arthrex Napple) and one stitch using Ethibond® 2 thread. Acromioplasty was performed in the subacromial space, and the tendon of the supraspinatus was sutured with three PLLA anchors (Bio-Corkscrew® Arthrex Napple). Two of them were positioned at the anatomical neck of the humerus, with two Fiber Wire® 2 wires each, thus totaling four U-shaped stitches (mattress). The third anchor was placed laterally in the greater tubercle and the tendon was sutured with two simple stitches, in accordance with the double-row technique.

During the postoperative period, the patient was immobilized with Velpeau, such that the arm could only hang and rotate externally for six weeks. However, the patient was very active and ended up mobilizing the arm more than was recommended. In the fourth week after the operation, when he started to perform more aggressive movements, he started to present a significant condition of pain, which evolved to adhesive capsulitis. He was treated with ten blocks applied to the suprascapular nerve, which produced a partial but unsatisfactory improvement. Corticoid was used (Meticorten® 40 mg/day for 20 days), which produced an improvement while the medication was being used. The same occurred with amitriptyline (25 mg/day). In the tenth month after the operation, the patient was still complaining of a lot of pain after working using his arms, and of limitations to his range of motion (ROM). Upon physical examination, he presented diminished mobility (130, 0, L1); UCLA 21 $^{(6, 6, 4, 5, 0)}$ and a lot of pain on mobilization. A radiograph on the shoulder (Figure 1) presented an area of bone rarefaction at the anatomical neck and greater tubercle of the humerus that was compatible with a condition of adhesive capsulitis. It was decided to perform arthroscopic capsule release.

The patient underwent the arthroscopic surgical procedure and, on inspection, two orifices measuring 1 cm in diameter was observed in the medial anchors located

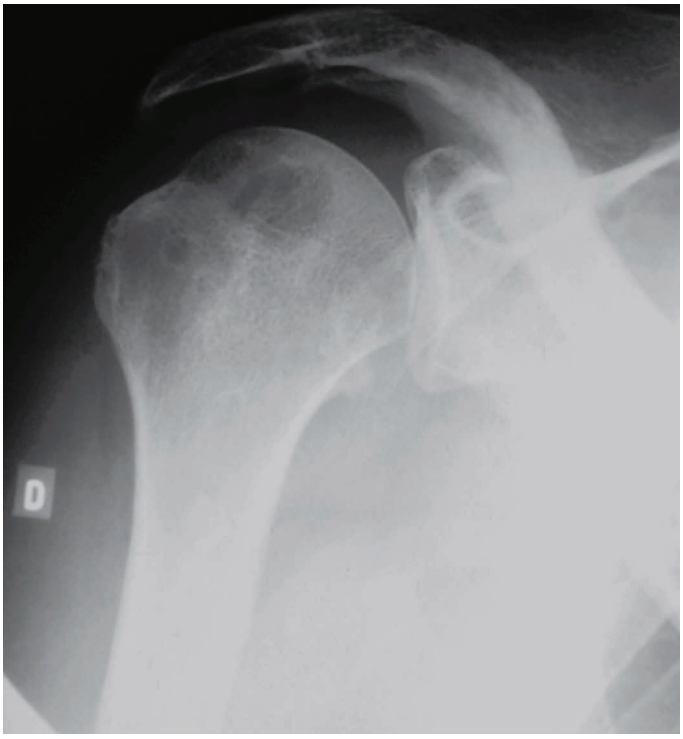

Figure 1 – Radiograph of the right shoulder with image of bone rarefaction in the anatomical neck of the humerus.

in the anatomical neck (Figure 2). The tendon of the supraspinatus had healed and the tendon of the biceps presented a degenerative lesion because of friction with the wires of the anterior anchor that had been used to suture the supraspinatus. The Fiber Wire® wires that were

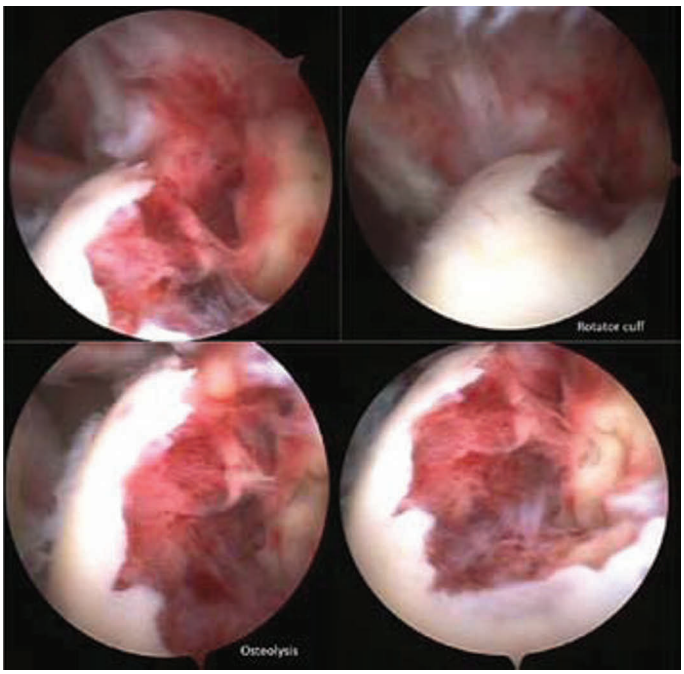

Figure 2 – Internal view of the insertion of the supraspinatus into the greater tubercle, showing extensive area of osteolysis at this site, with the rotator cuff reinserted laterally to the lesion.

found to be complete were removed. The same was done with the two anchors visible in the anatomical neck of the humerus, which were undergoing a degradation process. General capsulotomy was performed, with release of the frozen shoulder, and tenotomy was performed on the tendon of the biceps. The patient remained in hospital for three days, with continuous intra-articular analgesia using ropivacaine 2 mg/ml and physiotherapy three times a day. He was discharged from hospital with complete mobility of the shoulder and an indication for passive physiotherapy. The patient evolved well and today has a normal ROM, without pain on mobilization of the shoulder, and grade 5 muscle strength. Computed tomography was performed after the operation, which showed an extensive lytic lesion at the anatomical neck of the humerus (Figures 3, 4 and 5).

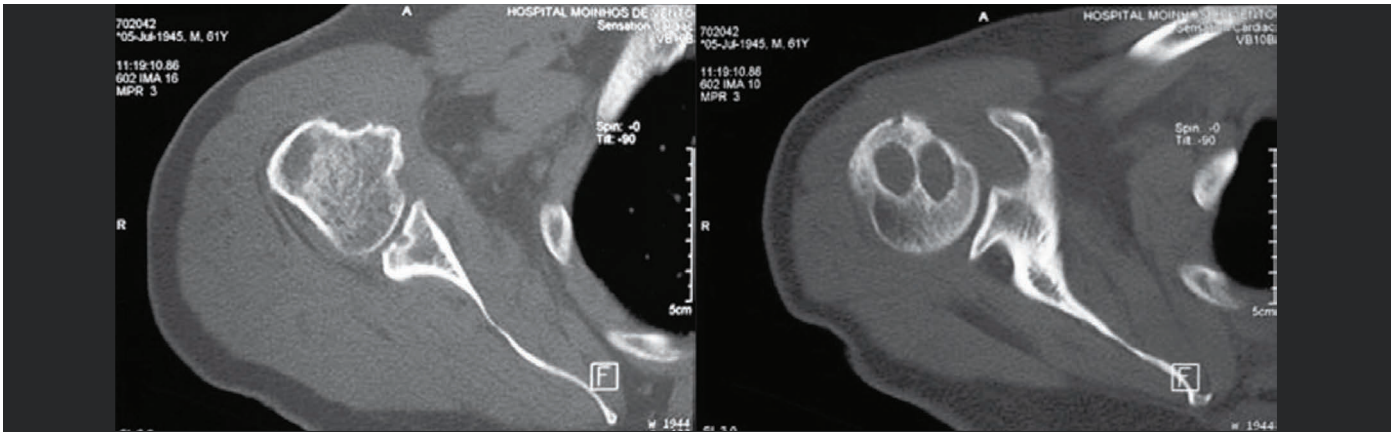

Figure 3 – Axial CT scan showing cysts in the head of the humerus.

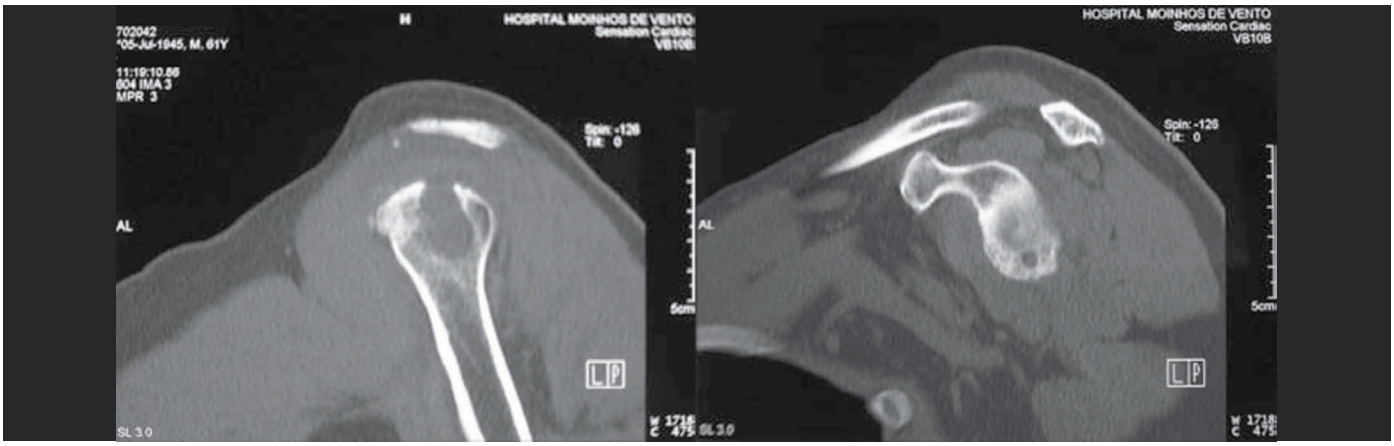

Figure 4 – Sagittal CT scan showing cyst in the head of the humerus, on the left, and orifice of the anchor on the lower edge of the glenoid, on the right.

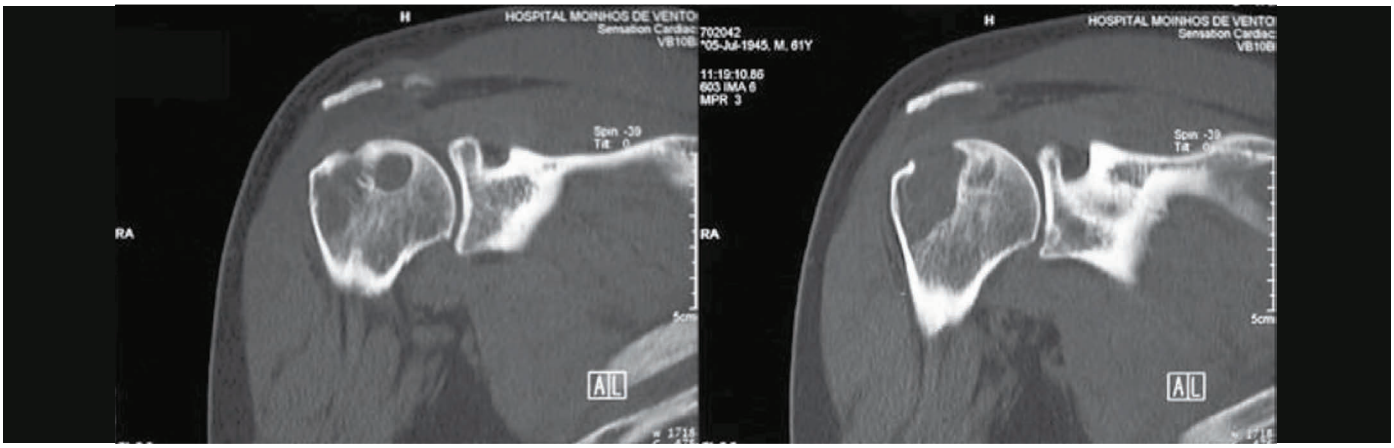

Figure 5 – Coronal CT scan showing cysts in the anatomical neck of the humerus.

DISCUSSION

Bioabsorbable materials for fixation of shoulder lesions were developed to avoid the complications caused by metallic implants: migration of the implant into the joint or secondary arthrosis[1,2]. Nevertheless, there are suspicions that bioabsorbable materials might have the potential to cause synovitis. PGA implants are associated with clinically significant inflammatory reactions[3]. On the other hand, PLLA implants have shown biocompatibility in many studies[10-12]. The same is found with bioabsorbable anchors made of copolymer: studies on this material have shown a histologically minimal inflammatory response, without inflammatory or cystic changes on MRI[13].

Although most of the cases of inflammatory reaction have been reported in cases that used PGA implants, Freehill *et al*[5] found a high percentage of synovitis after treating Bankart lesions with PLLA anchors. In a cohort of 52 patients evaluated on average eight months after surgery, 19% of the cases had developed symptomatic synovitis. In these cases, multiple small lytic lesions were found at the implant sites.

Our case describes a patient in whom three PLLA anchors were used to fix the rotator cuff using the double-row technique. Two of the anchors were placed medially, in the anatomical neck, and one was placed laterally, in the greater tubercle. Only the medial anchors caused lysis; on the other hand, it is known that the forces of the supraspinatus are absorbed by medial anchors. The anchor placed in the greater tubercle did not cause lysis, and this did not have a support function. We agree with Glueck *et al*[9] and believe that osteolysis is caused much more by mechanical factors than by biological factors.

This case reported here presents similarities with the case described by Glueck *et al*[9] in which a bioabsorbable anchor was used to suture a SLAP lesion. In our patient, we used an anchor in the glenoid to cover a chondral lesion with the inferior labrum, and to correct a Bankart lesion. This also contributes towards the evidence for mechanical factors as the cause of the osteolysis, since there was no lytic alteration in the glenoid.

We conclude that this presented here and the literature surveyed suggest that osteolysis encountered after using PLLA bioabsorbable anchors does not seem to have a biological cause. A mechanical cause may have been responsible for the bone lysis that occurred in these patients. Larger studies using bioabsorbable materials should be conducted to clarify the true cause of this complication.

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