Arthroscopic Management of Calcific Tendinopathy of the Shoulder
Do We Need to Remove all the Deposit?

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Abstract

Results of arthroscopic management of chronic, recalcitrant calcific tendinopathy of the shoulder in 28 patients were evaluated. Twenty-six patients (average age, 44 years) were ultimately enrolled in the study. Postoperative radiographs were performed to determine the amount of calcium deposit removal. Radiographic examination 2 months after surgery was performed to evaluate further deposit changes. The Constant score showed a statistically significant improvement in all patients. Better results were obtained when complete removal of the calcifications was achieved. On radiographic examination, performed two months after surgery, no calcification deposit increased in size and no translucent deposit changed into a dense deposit. Most of the dense deposits, partially removed, changed into translucent deposits. In this series, we found arthroscopic management was effective in treating calcific tendinopathy.

Calcific tendinopathy is a common disorder of the rotator cuff and is probably linked to hypoxia of the tissues. The condition has been proposed to be the consequence of a cell-mediated reactive process, evolving though three different stages: precalcific, calcific, and postcalcific. In the first stage, a fibrocartilaginous metaplasia of the tendon occurs, and this acts as the starting point for calcific deposit in the rotator cuff tendons. In the calcific stage, an increasing calcification is observed during the formative phase, followed first by a period of quiescence and then by a resorpive phase. In the final stage, the regeneration of the tendon occurs. Conservative management, including antiinflammatory drugs and local injections of anesthetic, as well as needling, is frequently successful. Open or arthroscopic surgery is recommended only in chronic cases during the resting period of the calcific stage, which is associated with pain and discomfort.

We evaluated the clinical outcome of patients with chronic calcific tendinopathy of the rotator cuff. The aim of this paper was to evaluate whether it is important or not to achieve a complete removal of all the calcific deposits.

Materials and Methods

Patients were included in the study if they had a calcific tendinopathy diagnosed on clinical grounds, no episodes of shoulder instability, no radiographic signs of fracture of the glenoid or the greater or lesser tuberosity, magnetic resonance imaging (MRI) evidence of calcific tendinopathy, a duration of symptoms of at least 5 months, an inadequate response to nonoperative management (including nonsteroidal antiinflammatory drugs, physiotherapy, and rest), and calcific tendinopathy of the rotator cuff found at the time of surgery. Exclusion criteria included for the study included a history of inflammatory joint disease, prior surgery on the affected shoulder, and an inability to complete questionnaires due to language problem or cognitive disorder. Our institutional review board (IRB) approved the investigation, and all patients were given and returned written informed consent agreements to participate.

The study consisted of 28 patients (16 female, 12 male), with an average age of 44 years (range, 34 to 60). The time between onset of symptoms and indication for surgery was 5 to 38 months (average, 13). The chief complaint was chronic, aching pain, exacerbated by activity. All patients had significant night pain. Preoperative radiographs were taken in all patients. Films of the affected shoulder were...
taken in five positions: anteroposterior (AP) views in neutral, internal, and external rotation; a lateral view in the scapular plane; and an axillary view. In 20 patients, an MRI scan of the shoulder was performed. The calcific deposits were classified according to Patte and Goutallier in four groups: type I (sharp and dense), type II (blunt and dense), type III (sharp and translucent), and type IV (blunt and translucent).

Four portals were placed during surgery: posterior and anterosuperior for the glenohumeral arthroscopy, posterolateral and lateral for bursoscopy. The glenohumeral joint was initially explored through the posterior portal, to search for indirect signs of the calcific deposit, similar to the typical strawberry-like vascular blotch on the articular surface in the tendon area. A spinal needle was used to identify the location of the calcium deposit. When particles of calcium material were seen coming out from the needle into the glenohumeral joint (Figs. 1 and 2), a marker suture was placed for orientation in the subacromial space.

After glenohumeral joint evaluation, the arthroscope was placed into the subacromial space. If an inflammatory bursitis was present, a partial bursectomy was performed. When calcium deposition was not visualized from both the glenohumeral and subacromial sides, its location was obtained by needling the rotator cuff on the bursal surface and rotation of the arm. Location of the deposit was confirmed visually when a snowstorm-like effect appeared on the monitor reflecting the deposit was in the formation phase; in the resorptive phase, the removed material appeared differently, and was toothpaste-like. Once a calcific deposit was identified, a small longitudinal incision in the tendon, parallel to the tendon fibers, was made from the bursal side and used to remove the deposit with a synovial resector or a small curette; extensive washing followed. Patients with subacromial impingement were managed by a subacromial decompression, with partial resection of the coracohumeral ligament. Before the end of the procedure, the integrity of the articular side of the tendon was checked.

Postoperative radiographic analysis was performed to determine the amount of calcium removal by the surgery. Radiographic examination 2 months after surgery was performed to evaluate further deposit changes according to the Patte and Goutallier classification. Clinical evaluation at 2 months follow-up was performed with the Constant score, and the following parameters were recorded: range of motion (internal and external rotation, flexion, abduction), power, activities of daily living, work, athletic activities, sleep, and pain.

Results

The calcific deposit was localized in 14 patients in the supraspinatus tendon. Eight patients had deposits in the supraspinatus and infraspinatus tendon; four patients had deposits in the infraspinatus tendon; two had deposits in the subscapularis tendon. In 12 patients, the calcific deposit was detected with a spinal needle while looking through the articular side. In six cases, the deposit was visualized from the subacromial space; and in 10 patients, by needling the bursal surface of the rotator cuff. In eight patients, the cuff presented a lesion deeper than 75% of tendon thickness and a side-to-side repair was performed. Partial resection of the coracohumeral ligament and acromioplasty was done in nine patients, only in the presence of arthroscopic findings of subacromial impingement: two patients with a radiologically identified Bigliani type II acromion and seven patients with type III acromion.

The Constant score showed a statistically significant improvement from a preoperative average rating of 40% to an average of 85% postoperatively. All recorded parameters improved significantly (Fig. 3). Most substantial benefits were observed in pain (50%) and external rotation (52%). In decreasing order, the improvement in other parameters were as follows: sleep (45%), abduction (43%), flexion (38%), athletic activities (36%), internal rotation (34%), and strength (30%). When complete removal of the calcifications was achieved, the Constant score improved from
21% before surgery to 87% after surgery. In those patients with only reduction of the calcific deposit performed, we had, on average, a worst result and less improvement in the Constant’s score: from 35% before surgery to 69% after surgery (Fig. 4).

Based on postoperative radiographs, 14 had complete removal of all calcium deposits, 12 had partial removal (Fig. 5). On radiographic examination performed two months after surgery, no calcification increased in size, and no translucent deposit changed to a dense deposit. Most of the dense deposits, partially removed, changed into translucent deposits. Sixteen patients had type I calcification on preoperative radiographic evaluation, according to the classification of Patte and Goutallier. Two deposits remained the same, two changed into type II (blunt, dense), four changed into type IV (blunt, translucent), and eight deposits completely disappeared. Eight patients had preoperative type II calcific deposits. Three months after surgery they changed to two sharp and translucent, four blunt and translucent, and two completely removed. In four patients, type IV (blunt, translucent) deposits had completely disappeared after surgery (Fig. 6).

Discussion

This study shows that in patients with calcific tendinopathy of the rotator cuff, complete removal of the deposit produces better results than partial removal. Radiographic evaluation showed that in patients with partial removal, an evolution towards a more dense or bigger deposit never occurred. Moreover, the more dense deposits became radiotranslucent, as typically happens in the phase of reabsorption. In this study, we found that clinical results were better in cases of complete removal, and that after only partial arthroscopic removal, the radiographic aspects change into the typical pattern of the reabsorption phase.2,9-12

Preoperative radiographic evaluation with a series of five radiographs was invaluable in localizing the deposits. Particularly, the supraspinatus deposits were best visualized with AP views in neutral rotation, infraspinatus deposits with AP views in internal rotation, and subscapularis lesions with the axillary view. The most common location in our series was the supraspinatus tendon and that with the infraspinatus tendon represents 92.8% of the locations.

Tendon incisions sometimes demand removal of the calcific deposit and should be made in line with the orientation of the longitudinal fibres.13-15 In our experience, tendon repair is suggested when the depth of the lesion is more than two-thirds of the thickness.

Some investigators suggest acromioplasty as only a treatment for calcific tendinopathy, or as an important procedure for deposit removal. Tillander and Norlin16 showed that acromioplasty is able to resolve the pathology, and it is not necessary to remove the deposit. On the other hand, additional investigators17 have found that acromioplasty alone does not change the final result. Acromioplasty must be performed only when there are clinical or intraoperative impingement signs.

We are aware that in the current study even more accurate evaluation of the amount of calcium deposit removal could have been performed. However, we believe that this would
Conclusion

Our observations in this investigation support that arthroscopic treatment of calcific tendinopathy is a very effective procedure. Intraoperatively, all efforts should be made to remove as much calcium as possible, although there is no need to remove all deposits.

Disclosure Statement

None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

References