

Arthroscopic Treatment of Synovial Subacromial Chondromatosis: A Case Report

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Introduction

Synovial chondromatosis is a rare condition in which cartilage is formed in the synovial membranes of joints, tendon sheaths, or bursae by metaplasia of the connective tissue under the surface of the synovial membrane. It is of monoarticular presentation, and poliarticular forms represent 10% of cases [1].

Takes place in the knee (70%), hip (20%), shoulder (19%) elbow and wrist, and in less proportion in small joints (metacarpophalangeal and temporomandibular) [1,2]. In the shoulder, the glenohumeral joint has the most cases reported [1,3-18]. It is said that extrarticular presentation is not frequent. There are a few reported cases involving the subacromial space [9,19,20] and the bicipital groove [4,9,11,12,17,18]. Synovial chondromatosis in the subacromial space can produce rotator cuff tears, which may be partial or total, and must be treated surgically in addition to the loose bodies extraction and synovial resection. Cases of synovial chondromatosis of the subacromial space associated to rotator cuff tears have been reported. Nevertheless, only two of them were treated arthroscopically [20].

Case Report

Involves a 48 year old, female patient, with no associated illnesses. She stated chronic pain in her left shoulder after suffering trauma 5 years before. First managed with rehabilitation, showing no pain relief neither motility improvement. She persisted with anterolateral pain, with limitation in active range of motion for flexion and abduction over 90°. She complaint of weakness, crepitation and occasional sense of articular blocking. Neer, Hawkins and Jobe tests were positive, suggesting subacromial impingement and a probable rotator cuff tear. She had a forward flexion of 70°, extension of 20°, abduction of 75° and internal rotation of 25°. Preoperative Constant score was 34, UCLA 25. AP and true AP plain radiographs of the left shoulder revealed the presence of multiple loose bodies (Figure 1).

CT-scan was also requested to determine the location of loose bodies. (Figures 2 and 3), and magnetic resonance to rule out associated soft tissue injuries. Axial and coronal sections in T2 sequence showed the presence of loose bodies in the subacromial bursa, hyperintensity due to inflammation and a partial tear of the supraspinatus tendon. (Figure 4).

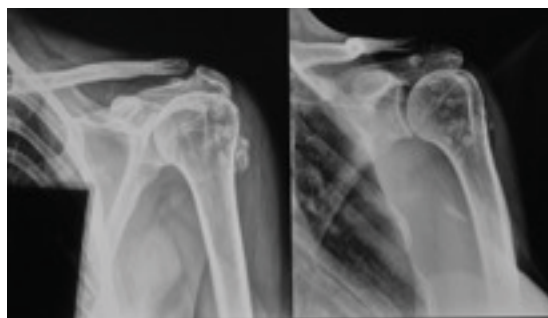


Figure 1: AP and True AP radiograph showing multiple calcified nodules.



Figure 2: CT Scan demonstrate the presence of calcified nodules in the subacromial space.



Figure 3: 3D reconstruction showing the characteristic nest of calcified loose bodies.

Surgical Technique

Under regional anaesthesia with an interscalenic blockage and sedation, the patient was placed in beach-chair position. Traction of the left shoulder was performed. The arthroscope was inserted through a classic posterior portal to evaluate the glenohumeral joint, finding no abnormalities. The synovial membrane showed normal characteristics.

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The rotator cuff insertion was examined and revealed no rupture. We proceeded to check the sub-acromial space. Multiple pedicled loose bodies, attached to the synovial membrane were found, simulating a "nest". Synovial hypertrophic tissue was found as well. Also, multiple loose bodies in the surface of the rotator cuff were observed. Removal of loose bodies through an 8 mm canulla was performed. ; additionally bursectomy and synovectomy were carried out. We documented a partial rotator cuff tear, corresponding to less than 25% of the supraspinatus tendon, which only required debridement. Samples for histopathologic study were taken (Figure 5). Portals were closed and the

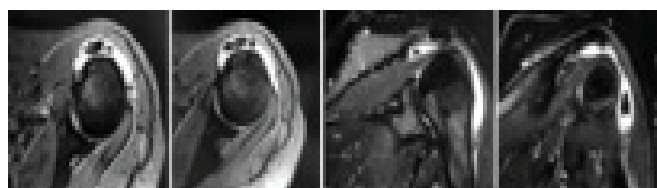


Figure 4: Axial and coronal sections in T2 phase. Calcified loose bodies can be seen in the subacromial space. Joint effusion is evident. Also, a supraspinatus tendon tear is observed.



Figure 5: Multiple chondromas obtained from the subacromial space.



Figure 6: Postoperative AP radiograph. Loose bodies were removed. There is no evidence of nodules left in the shoulder.

surgical procedure was over. Control X-ray was taken after surgery that demonstrated the absence of chondromas (Figure 6).

Discussion

Described by Reichel in 1900. Synovial Chondromatosis has been reported in 33 different body parts [3]. Most frequently presented between 30-50 years of age and affects men 3 times more than women [2,3,15,16,19-21]. It affects 1 in 100000 individuals [16]. It is characterized by the formation of intrarticular and periarticular nodules as a result of a cartilaginous metaplasia in the synovial membrane [4,7]. Some metaplastic nuclei on the surface of the synovial membrane become sessile, then pedunculated and finally they are detached generating cartilaginous and osteocartilaginous loose bodies [2]. These loose bodies can grow bigger as they are nourished by synovial fluid [1,16]. The nodules can suffer endochondral ossification and can damage the articular surface [12,20]. According to Small and Jaffe, only 25 cases of synovial chondromatosis of the shoulder have been reported in world literature [3]. It has been an important progress in the etiology of the disease as it was discovered the existence of chromosomal changes. In cellular cultures of 4 published cases of synovial chondromatosis, chromosomal clonal anomalies were observed (the same anomalies in more than 3 metaphases). The fact that recurrence and clonal anomalies exist allows thinking of a neoplastic process and not of a reactive one. The observed alterations are not the same as in all the published cases, but they share anomalies in chromosome 6, and in one case the chromosome 12q13 [1].

The presence of chondromas has been associated to the repetitive efforts of lifting [8]. Clinical manifestations can be related with the secondary lesions associated to chondromatosis, more than the presence of intra or extrarticular loose bodies. The patient could have present symptoms several years before diagnosis was established.

The clinical presentation is characterized by mild pain, articular effusion, and mechanic symptoms such as intermittent articular blockage and joint stiffness [7,22]. In the shoulder the most frequent presentation is in the glenohumeral joint [1,3-18]. However, lesions in the bicipital tendon sheath have been reported [4,9,11,12,17,18] and exceptionally in the subacromial space [9,19,20].

The radiographic evaluation is of imperative in the initial assessment. The typical findings on a plain radiograph are multiple calcified, smooth and oval masses inside the articular space or in the extra articular space. They have the characteristic "popcorn" shape of the calcified cartilage [7]. Even though, normal radiographs have been found in 50% of cases [12,14]. According to Covall and Fowble, MRI is the study of election for detection of not calcified chondral tissue [11,12]. Magnetic resonance is not specific to detect mineralization. However, is an instrument for detection of intra articular loose bodies? The calcified nodules appear as areas of low intensity in T1 and T2. The not calcified nodules appear as areas of high signal intensity in T2 because of the high amount of water contained in the hyaline cartilage, with areas of low intensity interposed due to the fibrous cartilage between nodules [6]. Likewise, magnetic resonance allows an integral assessment of the tendinous and cartilaginous structures determining the degree of the secondary condition.

In consonance with the moment in which the disease was detected, Milgram classified the disease in 3 phases: 1) Intra synovial active disease without the presence of loose bodies, 2) A transitional phase with nodules in the synovial membrane and the presence of loose osteochondral bodies within the joint, and 3) Multiple osteochondral loose bodies without active intrasynovial activity [1,2,4,7,12-16,23,24].

The number of loose bodies is not significant and do not have relevance at the moment of the diagnosis. The case we report was in stage 2.

On the other hand, Jaffe classified as primary chondromatosis, that is defined as cartilaginous tissue deriving directly from metaplastic synovial tissue, tenosynovial or bursa; and secondary, which are loose bodies implanted in the articular space due to degenerative process, trauma or neuropathic arthropathy.

It can be subdivided into synovial (intra articular) or tenosynovial (extra articular) [25].

Although the natural history of the disease is slow progression with tendency for eventual resolution, bone erosion in the joint and tendinous lesions can occur [19]. As well as our case that present secondary rotator cuff lesions. The definitive diagnosis is determined histologically. Macroscopically, multiple cartilaginous nodules of different size, rounded or oval, white, with a synovial lining are found. Microscopically, the nodules are composed of hyaline cartilage. The chondrocytes show their characteristic clustering. Calcification is common. The most ancient lesions demonstrate endochondral ossification. The cells can show atypia (nucleus enlargement, hyperchromasia or binucleation), which is common and has not clinical importance,¹³ although can lead to misdiagnose with chondrosarcoma [25]. It is necessary to maintain a follow up in the patients with this disease since it can recidivate in 0%-30% of the cases, through the formation of new loose bodies [14,26].

Also, the disease can progress to arthrosis [23]. The malignization to chondrosarcoma is rare, but described [27]. In a serie of 53 cases Davis et al. described the malignization of chondromatosis to chondrosarcoma in 5% of cases [25,28]. This situation has to be considered if multiple recurrences, rapid enlargement, extra articular extension or bone marrow invasion is observed [29].

Differential diagnosis include other causes of loose bodies such as degenerative joint disease, osteochondritis dissecans neurotrophic arthritis, tuberculous arthritis and osteochondral fractures [18,21,28]. Also, secondary chondromatosis, soft tissue chondroma, periosteal chondroma, tenosynovial giant cell tumor, calcifying aponeurotic fibroma, tumoral calcinosis, hydroxyapatite deposition disease, foreign body and inflammatory arthritis [25].

Traditionally, the treatment is open arthrotomy, with removal of loose bodies [11-13,15]. Although Milgram recommended only the loose bodies excision, other authors have stressed the need for synovectomy to prevent recurrence of the cartilagenous metaplasia, especially in phase 1 and 2 [4].

Some authors have reported the arthroscopic management with good results. The arthroscopic technique have been published for glenohumeral affection. They suggest the use of multiple portals, a large caliber cannula and high flow for the complete withdrawal of loose bodies [10,13].

Arthroscopy has advantages that include an excellent visualization of the articular space and less morbidity than arthrotomy [11], reduces postoperative pain and allows early rehabilitation and functional improvement [1,14]. It is a technically demanding procedure and has a steep learning curve, but is a very safe, effective and reproducible method for management of this disorder [7].

We report a case of synovial chondromatosis of subacromial space in a female patient who underwent synovectomy and loose bodies excision. We were capable of retrieve all of them, perform synovectomy and treat the rotator cuff lesion. Postoperatively, the patient has no pain,

the range of motion improved, the shoulder flexion is 160°, extensión 40°, abduction 170°, external rotation of 50°, internal rotation the back of the hand reaches T12. The Constant score is 91, UCLA 34 and ASES 100. No loose bodies were found in the postoperative radiograph.

Conclusion

Arthroscopy has advantages over open surgery in the treatment of synovial chondromatosis. Excision of loose bodies and synovectomy can be done. We can avoid tendons and, in case of a rotator cuff tear is present, it can be repaired. Besides, deltoid is not compromised, there is less pain, cosmesis is respected and early rehabilitation can be granted.

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