SYNOVIAL CHONDROMATOSIS OF THE SHOULDER AND BICEPS TENDON

Tal David, MD*  
David J. Drez, Jr, MD†

Synovial chondromatosis of the shoulder is rare. Maurice et al. reviewed 53 cases of this condition and found no patients with shoulder involvement. Milgram classified 30 cases of synovial chondromatosis and found only 6 with shoulder involvement. Bloom and Pattinson reviewed 191 cases of synovial chondromatosis in the literature and found only 10 cases involving the shoulder. Even fewer cases are documented when extra-articular shoulder involvement becomes an added variable.

Sim et al. differentiated between intra- and extra-articular involvement and were the first in the North American literature to report a case involving the biceps tendon. The authors stated this case had no evidence of glenohumeral involvement. Since then, only one other report of biceps tendon involvement has been published in the literature.

This article reports a case of synovial chondromatosis involving both the glenohumeral joint and biceps tendon sheath at initial presentation.

CASE REPORT

A 23-year-old right-hand dominant woman presented with right shoulder pain. There was no history of trauma. Pain began in her right shoulder 4 weeks prior to her clinic visit after playing in a softball game. Since then, she had increasing pain, stiffness, and limitation of motion. She had difficulty putting on clothes and reaching overhead. The pain was constant and often woke her from sleep. She denied swelling, popping, grinding, catching, or slipping of her shoulder. She denied recent fevers, chills, and weight loss.

Physical examination revealed no erythema, warmth, or drainage around the right shoulder. The biceps muscle was intact. There was no tenderness or prominence of the acromioclavicular or sternoclavicular joints. There was tenderness over the bicipital groove, the greater tuberosity of the humerus, and the posterior joint.

Active range of motion of the affected side measured 85° of abduction, 90° of forward flexion, internal rotation to the greater trochanter of the hip, and external rotation to 50°. Contralateral active range of motion was full. Passive external rotation supine at 90° of abduction was 85° on the affected side compared with 100° on the unaffected side. There was no crepitus with shoulder motion.

Supraspinatus strength was 4 of 5 with Jobe testing. The remainder of the motor examination was 5 of 5. Hawkins and Neer impingement signs were both positive. Speed and Yerges tests were negative. Function of the subscapularis was intact. Anterior apprehension test was negative. SLAP (superior labrum anterior-posterior) lesion tests were negative. Upper extremity reflexes and sensation were normal. The patient had full and painless range of motion of her neck.

Plain radiographs obtained included glenoid fossa, axillary lateral, outlet, and anteroposterior views in internal and external rotation of the right shoulder (Figure 1). These revealed multiple calcific nodules in the right glenohumeral joint, the subcoracoid recess, and anterior to the humeral head. There appeared to be mild degenerative changes in the glenohumeral joint.

Magnetic resonance imaging was obtained to assess the location of the loose bodies and evaluate intra-articular degenerative changes. Magnetic resonance imaging demonstrated multiple loose bodies within the glenohumeral joint, the proximal biceps tendon sheath, and also in the subscapularis bursa (Figure 2). There was irregularity involving the anterior aspect of the humeral head consistent with erosive changes.

Examination of the involved shoulder under anesthesia revealed no glenohumeral instability. The patient underwent arthroscopic loose body removal, arthroscopic partial synovectomy, and open decompression of the biceps tendon sheath with removal of multiple loose bodies. A standard posterior portal was established for arthroscopy. On entering the joint, a large number of cartilaginous loose bodies were noted. These were removed arthroscopically using an anterior operative portal. Multiple loose bodies emerged from within synovial tissue in the region of the rotator interval and the subscapularis bursa. These were removed arthroscopically as well. The articular side of the rotator cuff appeared normal as well as the long head of the biceps.

*From the *Kerlan-Jobe Orthopedic Clinic, Los Angeles, Calif; and the †Center for Orthopaedics, Luke Charles, Lu.
Reprint requests: Tal David, MD, Kerlan-Jobe Orthopedic Clinic, 6801 Park Terr, Los Angeles, CA 90045.

Figure 1: Preoperative AP (A), axillary (B), and glenoid fossa (C) radiographs of the shoulder showed multiple calcific nodules in the glenohumeral joint, subcoracoid recess, and anterior to humeral neck.
Degenerative changes of the humeral head were noted (Figure 3).

A partial synovectomy was done with a motorized suction-cutting device alternating between anterior and posterior portals. A fluoroscopic imager was used to evaluate the shoulder; no loose bodies were identified in the glenohumeral joint. The shoulder was then reprepped and redraped. The biceps tendon was identified through an anterior deltopectoral incision and multiple loose bodies were removed from within the tendon sheath (Figure 4). A resection of the biceps tendon synovium was then performed. The transverse humeral ligament was left intact.

Postoperatively, the patient was placed in a shoulder immobilizer for several days. She was then started on range-of-motion and strengthening exercises. At her 2-year follow-up examination, she remained asymptomatic and there was no clinical or radiographic evidence of recurrence.

**DISCUSSION**

Synovial chondromatosis may affect any anatomic structure lined with synovium, whether it be a ligament, tendon sheath, or joint capsule. The most common site of involvement is the knee, followed by the hip, ankle, and elbow. The diagnosis should not be confused with other disorders giving rise to loose bodies, which include degenerative joint disease, osteochondritis disseccans, neurotrophic arthritis, tuberculous arthritis, and osteochondral fractures.

Synovial chondromatosis involves the metaplasia of primitive mesenchymal cells in the joint capsule, which results in the differentiation of chondroblasts rather than fibroblasts in the loose areolar tissue of synovial lining. Foci of chondroblasts continue their growth and gradually protrude from the synovium. These nests of cartilage often break loose from their surrounding connective tissue of origin and form loose bodies composed of a cartilaginous core surrounded by a layer of synovium.

Frequently, a free loose body continues to grow as the peripheral chondrocytes survive and multiply due to nourishment from the surrounding synovial fluid. The central chondrocytes in the loose body may necrotize, leading to calcification of the core and resulting in the characteristic radiographic appearance of synovial chondromatosis (Figure 1A).

Other cases of extra-articular synovial chondromatosis of the shoulder exist. Ko et al. reported a case of synovial chondromatosis involving the subacromial bursa. The patient had an associated rotator cuff tear that the authors attributed to direct pressure and irritation by multiple loose bodies found in the subacromial space. Open acromioplasty and coracoacromial ligament excision along with excision of the loose bodies relieved the symptoms, and the patient remained asymptomatic at 2-year follow-up.

Ozaki et al. reported a case of synovial chondromatosis of the acromioclavicular joint associated with synovial cyst formation. Arthrography of the acromioclavicular joint revealed loose bodies within a synovial cyst that was in communication with the acromioclavicular joint. Following open synovectomy with removal of the cyst and its contents, the patient was free of pain and no recurrence was evident at 4-year follow-up.

Traditionally, synovial chondromatosis has been treated with open arthroscopy and synovectomy. Shpitzer et al. reviewed treatment of 31 patients with synovial chondromatosis and found that removal of loose bodies only did not differ from synovectomy and removal of loose bodies.

Ogilvie-Harris and Saleh compared the treatment of loose body removal alone with loose body removal followed
by arthroscopic synovectomy in 13 patients with generalized synovial chondromatosis of the knee. The authors found a significantly lower recurrence rate in the group treated by arthroscopic synovectomy. In three of the five cases treated with loose body removal alone, there were recurrences of the loose bodies at approximately 1 year after initial removal. There were no recurrences in the group treated with loose body removal in conjunction with arthroscopic synovectomy.

Richman and Rose\textsuperscript{13} were the first to report a case of arthroscopic synovectomy of the shoulder. Their patient was a 28-year-old man with long-standing shoulder pain after a remote episode of trauma. Treatment consisted of arthroscopic removal of multiple cartilaginous loose bodies and partial synovectomy. The patient returned to full activity 1 month postoperatively and was symptom free at 2-year follow-up.

Witwity et al\textsuperscript{14} treated a case of synovial chondromatosis in a rheumatoid shoulder with arthroscopic debridement and partial synovectomy and noted pain relief and improved range of motion the night after surgery. They suggested the use of continuous passive motion after surgery and suggested interchanging portals of the scope and suction cannula to remove loose bodies in different joint spaces.

Covall et al\textsuperscript{15} reported a recurrence of synovial chondromatosis of the shoulder 18 months after initial treatment with arthroscopic debridement and partial synovectomy. On recurrence, the patient had involvement of the glenohumeral joint as well as the biceps tendon sheath. The patient underwent a repeat arthroscopic debridement of the glenohumeral joint and an open debridement of the biceps tendon. At a 4-month follow-up examination, the patient had subsequently done well and resumed normal activity.

The detrimental effects of loose bodies due to synovial chondromatosis in the shoulder have been well documented.\textsuperscript{9,15,16} Ko et al\textsuperscript{9} attributed a rotator cuff tear to the persistent existence of loose bodies in the subacromial bursa. Several authors implicate degenerative changes in the articular cartilage of both the glenoid and humeral head to the impingement of intra-articular loose bodies.\textsuperscript{9,15,16} Patient morbidity is further adversely affected by the tendency of late diagnosis of this condition.\textsuperscript{9,13}

The advantages of arthroscopic debridement and synovectomy in the management of synovial chondromatosis have been well demonstrated.\textsuperscript{9,12,13} Our experience with synovial chondromatosis in the shoulder supports the evidence that arthroscopic treatment maintains a low recurrence rate, returns patients to normal activities faster, and is associated with a lower morbidity than the traditional open techniques.

**REFERENCES**