

Synovial Chondromatosis of the Elbow Causing a Mechanical Block to Range of Motion: A Case Report and Review of the Literature

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ABSTRACT

We report a unique case of elbow synovial chondromatosis with sudden onset of severe loss of elbow extension and flexion range of motion caused by mechanical block from deposition of chondral fragments in the olecranon and coronoid fossae, respectively. We performed successful arthroscopic surgical treatment of synovial chondromatosis of the elbow. Arthroscopy examination revealed an acutely evolving synovial chondromatosis. Three-year follow-up indicated that arthroscopic removal of loose bodies and partial synovectomy can yield lasting improvement in motion without disease recurrence.

Synovial chondromatosis is an uncommon benign proliferation of hyaline cartilaginous bodies within the synovium of joints, bursae, or

tendon sheaths.¹ Although its exact etiology is unknown, it is thought to be caused by synovial metaplasia.²⁻⁴ The resultant cartilaginous bodies are nourished by synovial fluid and can break free from the capsule to form loose bodies. In later stages of disease, the loose bodies have the

ically damage articular cartilage, which may lead to degenerative osteoarthritis. Therefore, the standard of care consists of surgically removing loose bodies to minimize late joint degeneration and performing partial synovectomy to prevent disease recurrence.^{19,31}

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potential to grow and eventually calcify or even ossify.²

Most often affected are large joints, including knee, hip, elbow, and shoulder, with the knee accounting for most reported cases.⁵⁻¹³ Elbow joint involvement is relatively rare,^{2,6,14-27} and the bulk of the literature consists of case reports. However, Mueller and colleagues²⁸ reported surgically treating 42 patients for synovial chondromatosis, with 20 of these cases involving the elbow. Patients typically present with insidious-onset pain, pain, swelling, locking or catching, and stiffness. Because of these nonspecific patient reports, the diagnosis of synovial chondromatosis is commonly delayed for several months to years. In fact, initial radiographs and magnetic resonance imaging (MRI) studies may be negative.^{29,30} Multiple intra-articular loose bodies can mechan-

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CASE REPORT

A 51-year-old, right-hand-dominant man presented to our clinic with a 4-year history of intermittent, activity-related right elbow pain and swell-

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Figure 1. Lateral radiograph of elbow shows calcifications anterior and posterior to distal humerus. Also evident are anterior and posterior fat-pad signs.

ing that resolved with rest. He denied a traumatic inciting event. Eight months before consultation at our institution, he noticed increased pain, swelling, and stiffness. These symptoms eventually became constant. At an outside institution, the patient had been given a corticosteroid injection into the elbow joint, but he reported minimal relief. Rheumatologic and infectious workup was negative. Just before his visit, he experienced an acute and significant loss of motion. After failure of conservative treatment, consisting of activity modification, use of nonsteroidal anti-inflammatory drugs, and physical therapy, the patient was referred to our institution for further evaluation.

Examination of the right elbow revealed a large joint effusion without tenderness to palpation. The skin was warm and dry without erythema. ROM was limited to 40° to 100° of flexion with pain at the endpoints of motion. Pronation ROM and supination ROM were preserved. There was mildly painful crepitation with ROM, and instability testing was negative. Gross neurovascular examination was normal.

Radiographs showed mild osteoarthritic changes. Loose bodies were visualized anterior and posterior to the distal humerus on the lateral radiograph (Figure 1). MRI showed a large joint effusion, synovial thickening, and loose bodies in the elbow joint (Figures 2A–2C). The multiple chondral fragments seemed to coalesce into larger masses, and these space-occupying loose bodies filled the olecranon and coronoid fossae. These larger fragments blocked elbow extension and flexion, respectively. Presence of a mechanical block with associated pain warranted arthroscopic elbow examination with complete synovectomy and removal of multiple loose bodies.

Arthroscopic examination of the elbow was performed with the patient under regional anesthesia. With placement of the standard anteromedial portal, multiple small cartilaginous loose bodies poured out of the arthroscopic cannula

(Figure 3A). On average, the loose bodies had the size, color, and consistency of cooked rice (Figure 3B). Numerous loose bodies remained intra-articularly, and these were removed with an oscillating shaver (some loose bodies adhered to the synovium, and a partial synovectomy was performed to remove them). On inspection and probe palpation, the articular surfaces were completely intact, without softening or any evidence of degenerative changes. The normal synovium was almost completely replaced with a chondral layer, and it had hardened such that it could be peeled off the joint capsule in a single layer. This was likely the result of the acuteness of presentation and the evolving nature of the case (synovium still undergoing metaplasia). Of particular interest, many of the cartilaginous bodies coalesced into masses to completely fill the olecranon and coronoid fossae. The masses were found to impinge and create a mechanical block to ROM. A probe was easily used to lift the masses from their fossae. The masses were friable and were excised piecemeal, without need for an arthrotomy. There was no sign of osseous integration, and loose body removal essentially reestablished the normal bony anatomy of the distal humerus. ROM at end of procedure increased to 0° to 130° of flexion.



Figure 2. (A) T₂-weighted sagittal magnetic resonance imaging (MRI) of elbow shows large joint effusion with loose bodies anterior and posterior that coalesced to form large masses in the coronoid and olecranon fossae. (B) T₂-weighted coronal MRI of elbow shows effusion and loose bodies in coronoid fossa. (C) T₂-weighted axial MRI shows elbow joint effusion with loose bodies anterior and posterior that coalesced and formed large space-occupying masses that blocked motion in the coronoid and olecranon fossae, respectively.

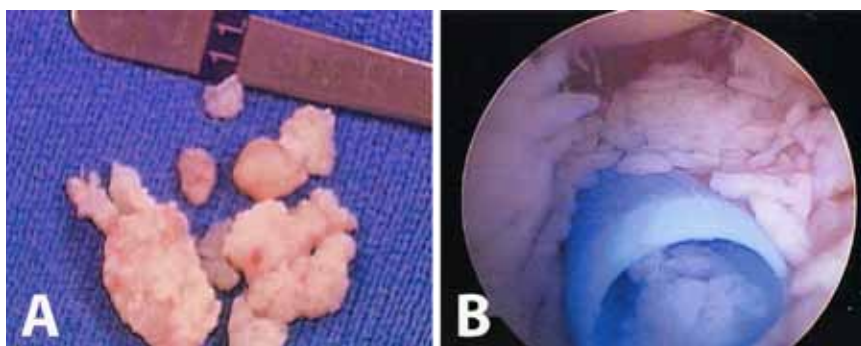


Figure 3. (A) Multiple hyaline cartilaginous loose bodies poured from arthroscopic cannula on entering elbow joint. (B) Remaining intra-articular loose bodies and those already removed had size, color, and consistency of cooked rice.

The synovial fluid and multiple loose body pathologic analysis revealed no evidence of malignancy or infection. The loose bodies were all composed of benign osteocartilaginous tissue, consistent with synovial chondromatosis.

After surgery, the patient attended formal physical therapy for joint mobilization. By the 1-week postoperative checkup, ROM was 15° to 100°, joint swelling was mild, and he had already noticed improvement in pain and ROM compared with preoperative examination levels. By 2

mechanical block to ROM secondary to the coronoid and olecranon fossae being filled with cartilaginous bodies.³² The first reported case³² evolved over 1 year, whereas our case developed rather suddenly, with presentation of pain and motion block. We arthroscopically removed the masses and reestablished the normal bony anatomy of the distal humerus. The result was that intraoperative flexion and extension of the elbow joint improved dramatically. At 3-year follow-up, the patient was asymp-

old karateist with a 1-year history of pain and stiffness. They treated this patient with arthroscopic loose body removal. At final follow-up, the patient had no pain or swelling, and ROM was improved.

Imaging studies are an integral part of the synovial chondromatosis workup, but are not always diagnostic. Radiographs may be normal early in the disease, before the cartilaginous bodies have undergone calcific changes.²⁹ Loose bodies were apparent on the lateral radiograph of our patient's elbow, but on arthroscopy it became evident that the vast majority of them was purely cartilaginous. MRI often improves the preoperative positive predictive value of the diagnosis of synovial chondromatosis by showing multiple intra-articular loose bodies.^{20,34} Nevertheless, in 2 separate case reports, preoperative MRI failed to show multiple loose bodies that were found on subsequent arthroscopic examination.^{30,32}

The goal of surgical treatment of elbow synovial chondromatosis is prevention of disease recurrence

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weeks after surgery, ROM was 5° to 130°, and he had returned to work pain free. Eight weeks after surgery, ROM was from full extension to 140° of flexion, and he remained pain free. By 3 months after surgery, he had begun to have intermittent mild aching of the elbow with occasional catching episodes, but he continued to have full ROM and was able to work. At that point, he was asked to return to us if his symptoms or pain worsened. Three years later, he was fully functional and lacked mechanical symptoms.

DISCUSSION

To our knowledge, this is the second report of a case of elbow synovial chondromatosis that created a

tomatic, and ROM was still at its improved level.

We encountered multiple cartilaginous bodies on initial placement of the arthroscopic cannula into the elbow joint and on initial arthroscopic visualization of the joint. Our findings are similar to those of Kay and colleagues,³³ who described the “snowstorm knee.” In a series of 4 knees in patients 16 to 33 years of age with a short history of pain and crepitus, they found hundreds of loose cartilaginous bodies on arthroscopy, which they described as having the “appearance of a snowstorm” and treated with loose body removal. Osada and colleagues³² later described the “snowstorm elbow” in a 47-year-

and delay of secondary osteoarthritis. This goal is generally accomplished by removal of loose bodies and partial synovectomy. The surgical approach can be either open or arthroscopic. For arthroscopic treatment to be successful, all compartments of the joint must be adequately visualized, as is possible with elbow arthroscopy.

Some authors have reported that removal of loose bodies by itself was successful in treating synovial chondromatosis,^{2,19} but others have found that adding a partial synovectomy is important to prevent recurrent loose bodies caused by continued synovial metaplasia.^{31,34} In a retrospective study of 13 patients with knee synovial chondromato-

sis, Ogilvie-Harris and Saleh³¹ noted recurrence in 3 of 5 patients treated with removal of loose bodies alone, whereas none of the 8 patients treated with removal of loose bodies combined with arthroscopic synovectomy had a recurrence.

Secondary osteoarthritis is not uncommon in patients with elbow synovial chondromatosis. At presentation, our patient showed evidence of early radiographic degenerative changes without arthroscopic evidence of cartilage degenerative changes. There were no signs of progression at 3-year follow-up. Mueller and colleagues²⁸ reported that, out of a series of 12 patients with elbow synovial chondromatosis, 5 had preoperative moderate to severe osteoarthritis. All 12 patients were treated arthroscopically with loose body removal and partial synovectomy. Although they had no recurrence of loose bodies, they showed evidence of secondary osteoarthritis that had deteriorated over time.

CONCLUSION

Our patient had a unique case of severe, evolving elbow synovial chondromatosis with an acute mechanical block to ROM secondary to the coronoid and olecranon fossae being filled with cartilaginous, nonossified loose bodies. Three-year follow-up indicated that arthroscopic removal of loose bodies and partial synovectomy can yield lasting improvement in motion without disease recurrence. However, long-term follow-up of a larger number of cases will be necessary to determine a true symptomatic recurrence rate.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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