

# Staged arthroscopic procedure for treating simultaneous shoulder and elbow synovial chondromatosis: A case report and literature review

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## Abstract

It is extremely rare for ipsilateral shoulder and elbow synovial chondromatosis to occur simultaneously. We report a very rare case of simultaneous shoulder and elbow synovial chondromatosis in a 53-year-old woman who was treated through staged surgeries. Shoulder arthroscopic synovectomy, debridement, biceps tenodesis, and subacromial decompression were conducted first, followed by elbow arthroscopy 2 months later. Post surgery, there was no recurrence either clinically or radiologically at 2 years follow-up. Despite some loss of the range of motion of the shoulder and muscle strength, the elbow functions recovered fully, and the patient was extremely satisfied with the clinical outcome. We recommend a staged arthroscopic procedure consisting of a thorough synovectomy and joint debridement for this condition.

## Keywords

Synovial chondromatosis, massive rotator cuff tear, shoulder, elbow, staged, arthroscopic procedure

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## Introduction

Synovial chondromatosis (SC) is a rare disease characterized by the formation of chondral bodies due to a benign metaplastic proliferation of the synovium in the joints or bursa, which can eventually form free bodies.<sup>1</sup>

SC affects the large joints, mostly the knee, followed by the hip, elbow, wrist, ankle, shoulder, and interphalangeal joint.<sup>2–6</sup> SC can also develop in some extra-articular bursae such as the subacromial and olecranon bursae.<sup>7,8</sup> Subacromial SC may result in rotator cuff tears (RCTs).<sup>9,10</sup>

Synovectomy and removal of loose bodies from the joint in these patients is the classic treatment and delays joint degeneration.<sup>3,6</sup> Recently, arthroscopic synovectomy and debridement have become popular due to the advantages of good visualization during surgery, low morbidity, less surgical trauma, early recovery, and rehabilitation.<sup>9,11,12</sup>

Isolated shoulder or elbow SC has been reported in the literature; however, to our knowledge, there is no report of shoulder and elbow SC occurring simultaneously in the same patient. We present an extremely rare case of ipsilateral shoulder and elbow SC treated via staged arthroscopic procedures.

## Case report

### Patient history and examination

A 53-year-old, right-handed woman presented at our clinics, with a 5-year history of worsening pain in the left shoulder of insidious onset and a 2-year history of similar symptoms in the left elbow. She had no history of shoulder or elbow trauma, surgery, or any systematic diseases. The pain worsened with shoulder extension, internal rotation and abduction, and elbow extension but subsided temporarily with rest.

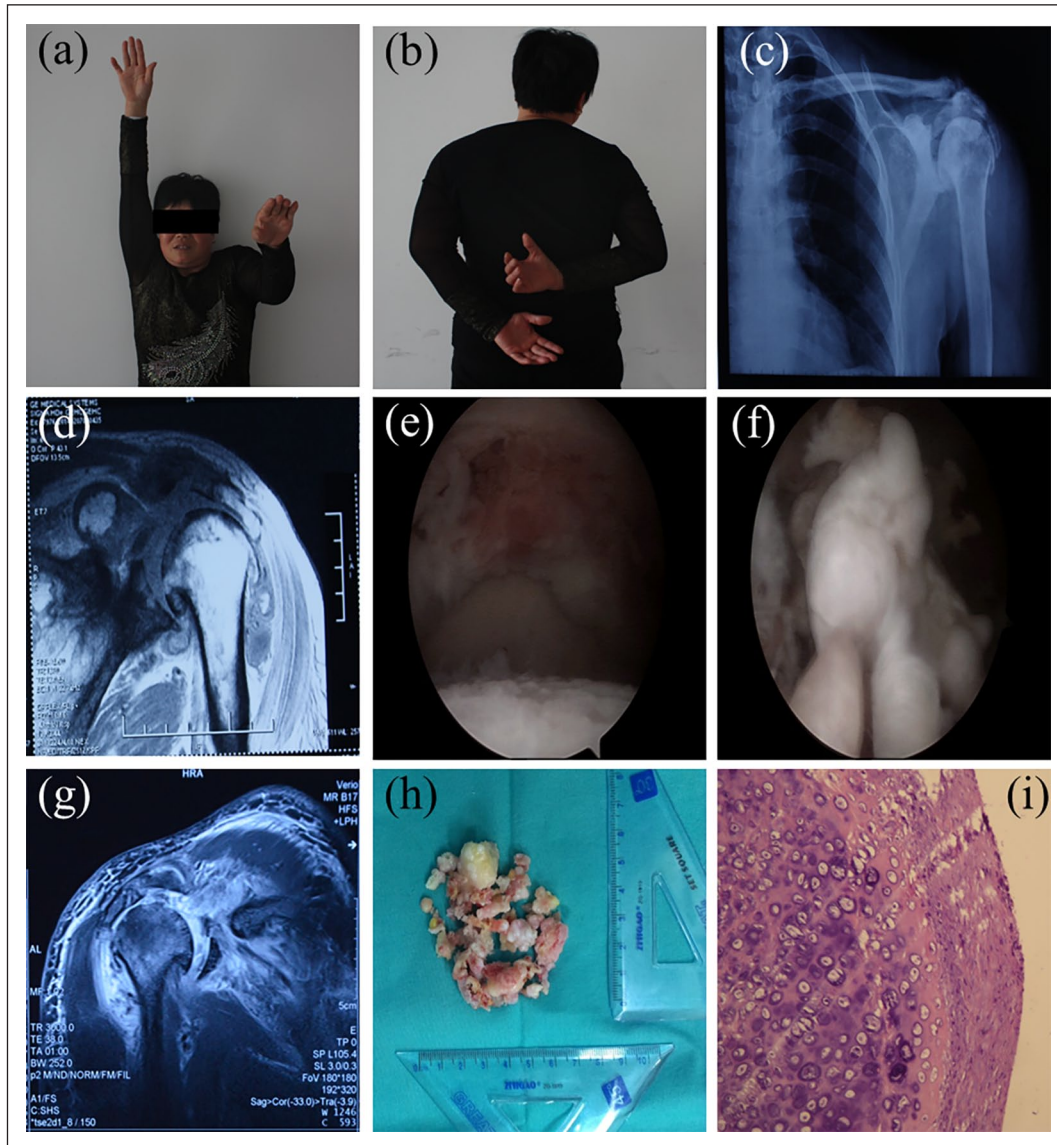
On physical examination, the affected shoulder and elbow showed no swelling, erythema, or muscle atrophy. The degrees of flexion, abduction, and external rotation of the shoulder were 80°, 50°, and 35°, respectively, and internal rotation was through the lumbosacral level (Figure 1(a) and

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**Figure 1.** Shoulder synovial chondromatosis. In shoulder physical examination, (a) forward elevation loss compared with contralateral shoulder, and (b) internal rotation to lumbosacral level. Radiograph showed (c) large amounts of loose bodies in subacromial space and severe degenerative changes of glenohumeral joint. MRI scans detected (d) a massive rotator cuff tear and cartilage erosion of glenohumeral joint. In shoulder arthroscopic inspection, (e) a massive RCT and proliferative synovium were observed, and (f) large-sized foci. After 24-month follow-up, (g) MRI scans showed no signs of recurrence. Pathohistological macroscopic (h) and microscopic examinations (i) were accomplished after surgery, and the results were consistent with synovial chondromatosis.

(b)). A positive Neer's sign, Hawkins's sign, and Jobe's test were noted. The degrees of elbow flexion and extension were  $10^{\circ}$  and  $100^{\circ}$ , respectively, and no varus or valgus was found. No difference was observed in pronation and supination of both forearms. No abnormalities were detected in the contralateral shoulder and elbow.

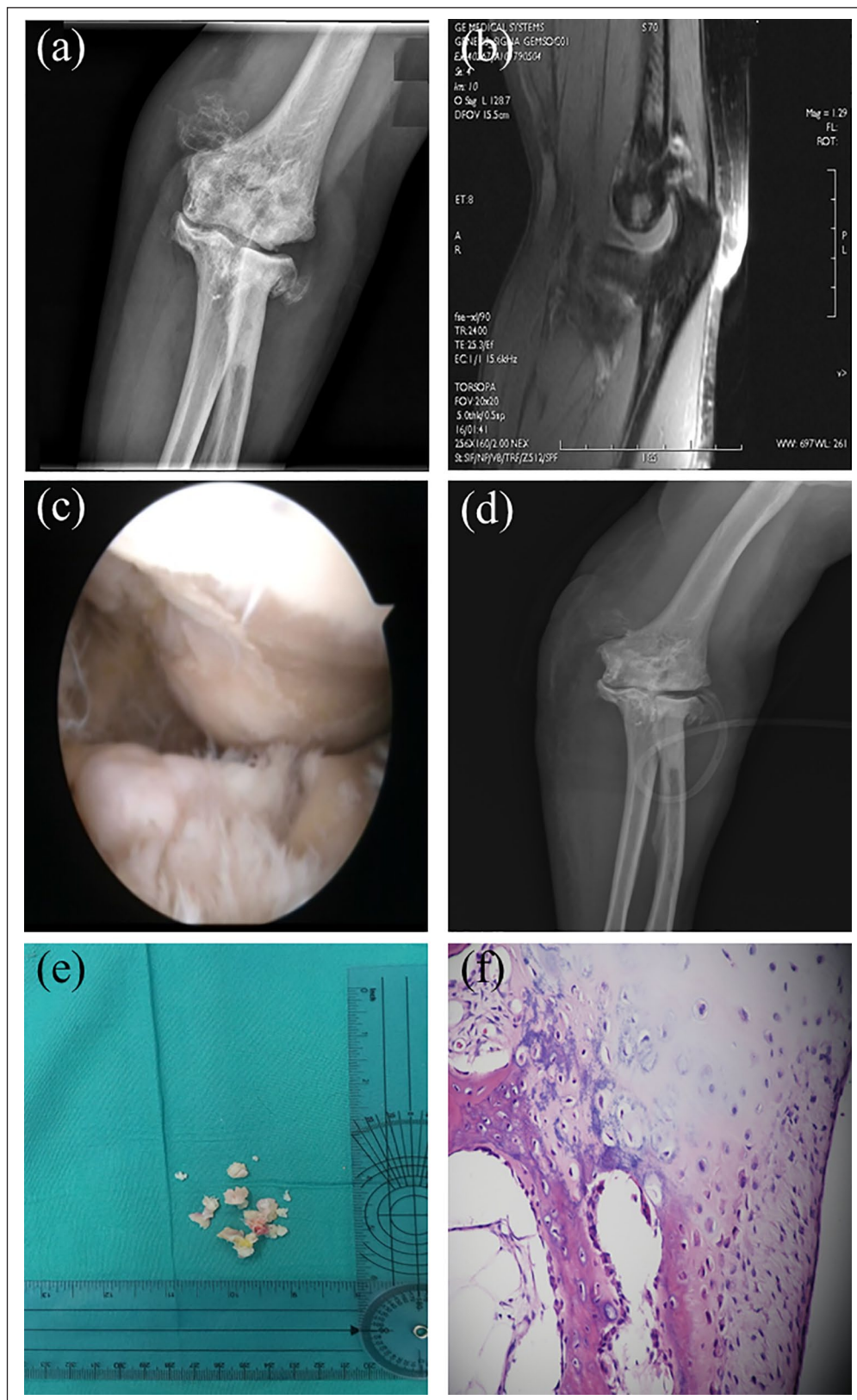
### Radiological findings

X-ray of the shoulder and elbow revealed massive oval-shaped calcifications in the subacromial space (Figure 1(c)) and humeroradial joint (Figure 2(a)). The acromial arch and

glenohumeral and humeroulnar joints were severely degenerated, revealing cartilage erosion and subacromial space reduction. Magnetic resonance imaging (MRI) revealed granular material in the subacromial area with the signal resembling skeletal bones (Figure 2(b)) as well as massive RCTs (Figure 1(d)).

### Surgical procedures and pathological findings

Due to the continuous pain, loss of range of motion (ROM), presence of loose bodies, and massive RCTs, a staged arthroscopic treatment plan was introduced to the patient. The



**Figure 2.** Elbow synovial chondromatosis. Preoperative radiology showed (a) several free bodies, mild degenerative changes of whole elbow joint, and (b) proliferative synovium in humeroulnar joint. In elbow arthroscopy, (c) several foci, proliferative synovium, and cartilage erosion were inspected. A plain X-ray was checked and showed (d) full relief of loose bodies. Macroscopic (e) and microscopic (f) characteristics were consistent with synovial chondromatosis.

patient was set in the lateral decubitus position for shoulder arthroscopy under general anesthesia. The standard posterior, anterior, anterosuperior, and lateral portals were used for inspection of the glenohumeral joint and subacromial area. On entering the subacromial space, we detected several free bodies together with massive posterosuperior RCTs (Figure 1(e)), a thickened bursal synovium (Figure 1(f)), dislocated long head of the biceps tendon, and an intact subscapularis tendon. The free bodies were removed through the anterosuperior and lateral portals. A thorough synovectomy with debridement was performed with an arthroscopic shaver followed by biceps tenodesis and subacromial decompression. The loose bodies measured 6 cm in diameter (Figure 1(h)).

After 2-month rehabilitation for the shoulder, the patient was readmitted for an elbow arthroscopic surgery. The anteromedial and anterolateral portals were introduced for the synovectomy, and an anterior capsulotomy was performed to gain extension, while the standard posterior and posterolateral portals were used to remove the loose bodies and perform a thorough debridement (Figure 2(c) and (d)). Several free bodies measured 3 cm in diameter (Figure 2(e)).

Cartilage proliferation with osseous tissue formation was seen via hematoxylin–eosin staining, indicating SC (Figures 1(i) and 2(f)).

### Rehabilitation and follow-up

A sling was used for 3 days after the shoulder arthroscopy, and only passive ROM exercises were permitted in the first 2 months. The patient was immobilized on the first day post elbow arthroscopy using compressive bandaging. Passive limb movement was allowed after drainage removal. Active ROM exercises were permitted in proportion to the pain tolerance. Physical therapy for both joints was initiated on the second day postoperatively.

At the 24-month follow-up, the patient was pain-free and had regained the full ROM in the elbow but had reduced ROM in the shoulder, especially for forward elevation, along with some loss of muscle strength, besides showing no radiological recurrence of SC (Figure 1(g)).

### Discussion

This report presents a very rare case of simultaneous shoulder and elbow SC in a 53-year-old woman who was treated through staged surgeries with excellent clinical outcomes. SC may be self-limiting and is classified as either primary or secondary.<sup>3,6</sup> Primary SC results from a proliferation of chondrocytes in the synovial membrane leading to the formation of cartilaginous loose bodies.<sup>13</sup> Secondary SC is a rare condition characterized by the growth of particles separated from the articular cartilage or osteophytes in joint diseases.<sup>5</sup> In few cases, it could progress to malignancy.<sup>14,15</sup> The differential diagnoses include synovial chondrosarcoma, osteochondritis dissecans, calcifying fibroma, pigmented villonodular synovitis, tuberculosis, and rheumatoid arthritis.<sup>3,16</sup>

The simultaneous occurrence of shoulder and elbow SC is extremely rare and difficult to treat with no consensus on its most suitable treatment option. Open or arthroscopic synovectomy with debridement for isolated joint involvement has been reported.<sup>16</sup> We believe arthroscopy is preferable because of the associated lower morbidity, early rehabilitation, better visualization, and convenient retrieval of free bodies during surgery.<sup>11,17,18</sup>

In this case, considering the patient's condition and risk of potential complications of shoulder and elbow arthroscopy,<sup>19,20</sup> such as joint stiffness, infection, and neurovascular injury, we performed a staged arthroscopy. Shoulder surgery was prioritized for the following reasons: first, the mechanical symptoms of shoulder involvement such as ROM, muscle strength loss, and snapping had started much earlier; second, a massive RCT was detected on the MRI; third, early accomplishment of shoulder rehabilitation could be beneficial to the exercise routine post elbow arthroscopy; and, finally, our experience in shoulder arthroscopic synovectomy, acromial debridement, and postoperative rehabilitation procedures in treating shoulder SC was great.<sup>9</sup>

Considering the patient's anticipation for pain relief, we performed arthroscopic subacromial decompression and biceps tenodesis. Failure to address the biceps tendon pathology has been associated with persistent pain and reduced satisfaction in patients with massive RCTs. Tenodesis offers some theoretical advantages, including improved cosmesis, maintenance of elbow flexion power, pain relief, and muscle atrophy prevention.<sup>19,21</sup> Subacromial decompression, rather than acromioplasty, can provide significant benefits in terms of pain relief, particularly in lower demand patients, and preserve the coracoacromial ligament.<sup>22</sup>

After early shoulder rehabilitation, we performed elbow arthroscopy for loose-body removal, followed by a synovectomy and debridement. The mechanical symptoms can be relieved by free-body removal,<sup>7</sup> and a thorough synovectomy and debridement can lower the recurrence rate.<sup>11</sup>

In this case, staged arthroscopic procedures, a thorough synovectomy, and debridement were performed to treat the shoulder and elbow SC. The patient resumed work shortly after the surgeries and became completely pain-free.

### Conclusion

In conclusion, simultaneous shoulder and elbow SC is an extremely rare disease of the synovium wherein the rotator cuff and cartilage are contaminated by synovial proliferation resulting in mechanical symptoms and ROM loss. With highly satisfactory clinical outcomes and a low recurrence rate, staged arthroscopy, thorough synovectomy, and debridement are recommended for treating this condition.

### Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.

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## Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

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