Arthroscopic Treatment of Metacarpophalangeal Synovial Chondromatosis: A Case Report

Enrico Carità*, Alberto Donadelli, Mara Laterza, Piergiuseppe Perazzini and Landino Cugola

Clinica San Francesco, Via Monte Ortigara, Verona, Italy

*Corresponding Author: Enrico Carità, Clinica San Francesco, Via Monte Ortigara, Verona, Italy.

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Abstract

Introduction: Synovial chondromatosis is a rare, benign metaplasia affecting the synovial membrane of articular joints. Numerous cartilaginous nodules proliferate into the sinovium and, in time, detach from the synovial membrane becoming loose bodies. The disease can involve any joint and presentation in metacarpophalangeal joint is uncommon.

Case Presentation: A 18-year-old man presented with a history of painful swelling on the dorsum of the metacarpophalangeal joint of the right medium finger. Patient’s symptoms began after a trauma. The patient first noticed swelling and reduction in range of motion over the dorsal of metacarpophalangeal joint, which were accompanied by pain and progressive deformity. X-rays demonstrated no osseous abnormality, but MRI illustrated an intra-articular synovitis. The patient underwent an arthroscopic shaving and many cartilaginous loose bodies were found and taken off. No calcification masses were found. After one year, the patient is free of pain and regained full range of movement. He returned to his original sport activities soon after surgery and he was well satisfied with the clinical outcome.

Conclusion: Arthroscopic removal of synovial chondromatosis of the metacarpophalangeal joints is a successful and safe therapeutic method when calcified masses are not present. After the surgery, immediate pain relief and improvement of finger function can be expected.

Keywords: Synovial Chondromatosis; Metacarpophalangeal Chondromatosis; Arthroscopic Loose Body Removal; Arthroscopic Synoveceomy; Metacarpophalangeal Arthroscopy

Abbreviations

SC: Synovial Chondromatosis; MRI: Magnetic Resonance Images; MP: Metacarpophalangeal; CT: Computed Tomography; ROM: Range of Movement

Introduction

Synovial chondromatosis (SC) is a rare, monoarticular arthropathy of unknown etiology, characterized by focal proliferation of multiple cartilaginous or osteocartilaginous nodules in the connective tissue in the synovial membrane of joints, tendon sheaths or bursae [1].

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The lesion is infrequent and it tends to involve large joints, such as knee and hip [2]. It has also been described in the shoulder, elbow and wrist [3-6], however it can develop also in small joints, like metacarpophalangeals (MP) [7]. SC affects patients over a wide age range, from childhood to late adult life, but it is more common in young adults aged 30-50 years and it is twice more common in males than in females [8]. This condition can be diagnosed using plain radiographs, computed tomography (CT), or magnetic resonance imaging (MRI). Diagnosis can often be delayed due to the rarity of the disease and its nonspecific symptoms of pain, swelling and decreased range of motion of the involved joint. Occasionally it can lead to compressive neuropathy [3,9]. The disease is commonly self-limiting, but it may recur, and rarely malignant change has been reported [10,11].

In the present report, we have described a case of post-traumatic chondromatosis involving MC joints of right medium finger treated by arthroscopic technique.

Case Presentation

An 18-year-old athletic man presented with a history of post-traumatic painful swelling on the dorsal side of MC joint of medium finger. He was otherwise healthy, and no other joints were involved. Patient’s symptoms occurred after a blunt trauma. Physical examination showed mild local tenderness on the dorsum of the MP joint with no signs of inflammation or infection. The joint had a significant reduction of the range of movement, and there was no sensory loss.

Plain radiographs demonstrated no osseous abnormality and no presence of fracture or dislocation. Magnetic Resonance Imaging (MRI) showed arthrosynovitis of the metacarpophalangeal joint extended anteriorly and posteriorly without bone erosion. Compared to skeletal muscle, the tissue demonstrated isointense T1-weighted signal and heterogeneously increased T2-weighted signal with thin peripheral and septal enhancement (Figure 1 and 2).

Figure 1: Arthrosynovitis in third metacarpophalangeal joint is hyperintense than muscle on T2-weighted image.

During arthroscopy many loose bodies were removed (Figure 3) and washed out and histologic examination was carried out. An evaluation of intra-articular cartilage and ligaments condition showed a stable and not degenerated metacarpophalangeal joint. The patient was informed about pathology and risk of recurrence.

**Figure 2:** T2-weighted sagittal image demonstrate hypertrophic synovial tissue centered within the metacarpophalangeal joint.

**Figure 3:** An arthroscopic view of metacarpophalangeal joint with chondral loose bodies.
The patient returns to his previous activities in 4-weeks postoperatively. Histology confirmed synovial chondromatosis. At final follow-up at 12 months, he had no post-operative complications no signs of recurrence and all of his symptoms had resolved with full range of movement and normal finger function (Figure 4).

Discussion

Synovial chondromatosis is an uncommon monoarticular arthropathy with metaplastic focal formation of cartilage in the intimal layer of the synovial membrane [1]. The condition is typically unilateral, but bilateral involvement has also been seen. The presentation is most common in large joints such as knee, hip, elbow, ankle, shoulder and wrist [2,6], but articular synovial chondromatosis can also develop in the digital joints [12].

Milgram divided progression of SC into three stages. Stage I (early phase) refers to cases where there is active synovitis and absence of loose bodies in the joint. Stage II (transitional phase) consists of cases where there is active synovial disease and formation of loose bodies simultaneously in the synovial tissue. Stage III (late phase) consists of cases in which there are multiple osteochondral loose bodies which tend to calcify to bigger mass with the resolution of active synovitis [13].

This disorder tends to progress or may be self-limiting and is classified as either primary or secondary. Primary synovial chondromatosis results from chondrocytes metaplasia in the synovial membrane with cytological atypia. This proliferation can lead to the formation of cartilaginous loose bodies. This type of SC may have the capacity to transform into malignant chondrosarcoma. Due to the risk for malignant transformation, it is important to provide a long-term follow-up in patients with primary SC. Secondary synovial chondromatosis is characterized by the growth of chondral bodies separated from the articular cartilage or osteophytes in joint diseases. Histologically, there is no cytological atypia, and it is a result of osteoarthritis, osteochondral fracture, or osteochondritis dissecans [14]. The histology result showed primary SC without atypia in the case described here.

Imaging studies for SC should include x-rays, CT scanning and MRI. Plain radiographs and CT imaging can demonstrate the presence of multiple ossified loose bodies in and around the joints that tend to be of uniform size [15]. The pattern of calcification can vary from...
small calcification spots and large calcified bodies with radiolucent centers. CT scans will often demonstrate bone erosion with sclerotic margins in the adjacent articular surfaces. In as many as one-third of cases, however, no calcification or ossification were demonstrated in patient with SC [16]. MRI can better show soft tissue contrast at several levels and the characteristic depend on the pulse sequence used and, on the presence, and extent of calcification and/or ossification. On MRI, SC is described as having one of 3 patterns [17]. Pattern A (14%) consists of lobulated homogeneous intra-articular signal that was isointense on T1-weighted and hyperintense T2-weighted compared to skeletal muscle. In addition, hypointense septations were described. On x-ray, these patients showed no calcification. Pattern B is the most common (77%) and it is similar to pattern A. However, it is characterized by intra-articular focal areas of empty signal on all sequences. These areas corresponded to calcification on the radiograph or CT and are useful to distinguish pattern B from pattern A. Pattern C (9%) had features of both A and B but the intra-articular focal areas of peripheral low signal surrounded central areas with characteristics of fat signal, corresponding to ossification.

Our patient’s appearance most closely resembles that of pattern A given by the lack of intra-articular foci of calcification or ossification, intra-articular material higher in signal on T2-weighted imaging compared to skeletal muscle.

According to Muramatsu and Milgram we described a case of Primary SC Stage II. Because of magnification and continuous wash, arthroscopy is the most accurate way to investigate also small joints and can lead to a complete inspection and drainage of the articular space in a more accurate way than open surgery. The use of small probes (1.9 mm) makes this technique possible also in small joints reducing risks of iatrogenic lesions. Arthroscopy of metacarpophalangeal joint cannot investigate completely the volar aspect of metacarpal head because of dorsal access and conformation of the joint but is a good way to wash and remove loose bodies avoiding extensor tendon morbidities, arthrotomy, capsular scars and post-operative stiffness frequently present after open surgery.

Early results and medium term of 12 months follow-up with good clinical outcome, full ROM and no clinical signs of recurrence confirm complete removal of loose bodies by arthroscopic treatment and show advantages of this technique.

The importance of having a long-term follow-up is also due to the fact that SC can recur. In literature, recurrence rate after surgical treatment varies from 0 [18] to 15% [19]. Recurrence may most commonly follow incomplete surgical synoviectomy. Longer follow-up would have shown more frequent recurrences.

Malignant transformation of primary SC to a synovial chondrosarcoma is thought to occur rarely. However, a recent retrospective review reports the incidence of chondrosarcomatous change in SC to be 2.5% and that this complication occurs most commonly in the hip joint (approximately 11% of cases) [20].

Conclusion

Open synoviectomy and loose bodies removal is the traditional treatment of SC. We showed how arthroscopic synoviectomy can work as well also in small joints in case of stage II SC and it’s a safe and effective treatment. The diagnosis may be difficult and in addition to x-rays, MRI helps the surgeon for detecting cartilaginous loose bodies. After surgery, immediate pain relief and durable improvement of articular function can be expected. If complete resection is made at the time of surgery, risk for local recurrence is minimal, but long-term follow-up is required to exclude the possibility of recurrence and malignant transformation.

Conflict of Interest

The authors declare that they have no competing interests.
Bibliography


