Arthroscopic Treatment of Primary Synovial Chondromatosis of the Ankle: A Case Report and Review of Literature

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Learning Point of the Article:
Arthroscopic approach is a good alternative to open arthrotomy for the treatment of synovial chondromatosis of the ankle.

Abstract

Background: Primary synovial chondromatosis is a rare disease characterized by the presence of metaplastic cartilaginous nodules arising from the synovia. Synovial chondromatosis has been widely described in the large joints, including elbow, hip, and knee joints, but very rarely in the foot or ankle. Data on the arthroscopic management of this condition in the ankle are also limited.

Case Report: A 50-year-old woman of Asian-Indian origin presented with the right lateral ankle pain of 1-month duration, associated with swelling and numbness of the joint. Magnetic resonance imaging revealed multiple loose bodies (at least 8) within the anterior ankle joint recess intracapsularly. She subsequently underwent right ankle arthroscopic debridement, synovectomy, removal of loose bodies, and microfracture with good post-operative recovery.

Conclusion: We report a rare case of ankle synovial chondromatosis with multiple loose bodies managed arthroscopically. Arthroscopic approach is a good alternative to open arthrotomy for the treatment of synovial chondromatosis of the ankle.

Keywords: Primary synovial chondromatosis, Ankle joint, Arthroscopy, Tumor, Case report

Introduction

Synovial chondromatosis is a disease of unknown etiology, originating from synovia and characterized by the presence of metaplastic cartilaginous nodules in the synovial cavities, bursa, or tendon sheaths [1]. The disease is commonly seen in middle-aged men between 30 and 50 years of age and the number of loose bodies can vary from 1 to 2 in the temporomandibular joint to more than 30 in the ankle joint [2].

Previous reports of synovial chondromatosis mostly involve large joints, including elbow, hip, and knee joints [1, 3, 4, 5, 6]. Synovial chondromatosis is very rarely found in the foot or ankle, although there have been previous reports of primary synovial chondromatosis in the subtalar, calcaneocuboid, naviculocuneiform, and metatarsophalangeal joints [7, 8]. The rarity of this diagnosis in the literature spurred us to report our case of synovial chondromatosis of the ankle joint.

Recently, the arthroscopic approach has gained popularity and preference in the treatment of ankle pathologies. The main advantages of the arthroscopic approach are decreased morbidity and the synchronous visualization and treatment of other articular pathologies [9]. However, data on the arthroscopic management of synovial chondromatosis of the ankle are limited.

Herein, we present the case of an adult patient with primary synovial chondromatosis of the right ankle who was managed arthroscopically and discuss the potential benefits of such arthroscopic management.

Case Report

We present a 50-year-old woman of Asian-Indian origin with no...
significant medical history who developed right lateral ankle pain of 1-month duration, associated with swelling and numbness of the joint. There was no direct trauma or twisting injury of note, and no other joints were involved. On clinical examination, lumps were noted over the medial aspect of the midfoot and tenderness was elicited over the calcaneofibular ligament, anterior talofibular ligament (ATFL), and joint line of the right ankle. The remainder of the foot and ankle examination was unremarkable with good range of motion of the ankles bilaterally and negative anterior impingement.

Preoperatively, her ankle-hindfoot American Orthopedic Foot and Ankle Score (AOFAS) was 38 (out of a maximum score of 100), and physical function score of Short Form 36 (SF-36) was 25 (out of a maximum score of 100), indicating a relatively poor pre-operative functional level.

Weight-bearing ankle radiographs demonstrated loose bodies at the anterior ankle joint line, with normal alignment and preserved joint spaces noted (Fig. 1).

Magnetic resonance imaging revealed multiple loose bodies (at least 8) within the anterior ankle joint recess intracapsularly but superficial to the ATFL and AITFL, suggestive of synovial chondromatosis (Fig. 2). A 3 mm full-thickness chondral defect on medial talar shoulder and thickened and frayed ATFL was also noted.

The patient initially declined surgery and was thus managed conservatively with ankle brace and symptomatic treatment. However, on follow-up 3 months later, there was no improvement in her ankle pain and the patient was keen to undergo surgery.

She subsequently underwent right ankle arthroscopic debridement, synovectomy, removal of loose bodies, and microfracture, with intraoperative fluoroscopy (Fig. 3). This was performed through standard anteromedial and anterolateral arthroscopic portals under spinal anesthesia and tourniquet application. Intraoperatively, the right ankle synovial chondromatosis with multiple loose bodies in anterior ankle joint was confirmed. In addition, significant synovitis and osteoarthritis of tibiotalar joint with generalized cartilage thinning were noted.

Postoperatively, a below-knee Backslab was applied and the patient was not allowed weight-bearing for 2 weeks. On follow-up 2 weeks after surgery, wounds were well healed, and stitches were removed. Thereafter, the patient was on an Aircast ankle brace and she was allowed partial weight-bearing with crutches for 4 weeks. Subsequently, the Aircast ankle brace was removed and she was allowed full weight-bearing as tolerated. Her ankle was stable, and she was able to return to activities within 5 months after surgery without pain or limitations.

At 6 months after surgery, both her AOFAS ankle-hindfoot score and physical function score had also improved to 71 and 55, respectively, indicating a significant improvement in functional level after the procedure. She was followed-up at 8 months postoperatively, with no complications or recurrence of signs and symptoms.

**Discussion**

Synovial chondromatosis is a disease composed of benign synovial metaplasia and multiple loose bodies [3]. Primary synovial chondromatosis is characterized by idiopathic stem cell proliferation of the stratum synoviale [10], while secondary synovial chondromatosis is often caused by trauma, degenerating joint diseases, osteochondritis dissecans, rheumatoid arthritis, and tuberculosis arthritis [11]. Our case presented here was evaluated as primary synovial chondromatosis due to the absence of previous trauma or history of inflammatory pathologies.

Patients commonly present with symptoms of pain, swelling, and limited motion of the joint [9, 12, 13, 14, 15, 16]. In addition, effusion, diffuse tenderness, and crepitus can be found on clinical examination [17]. In the early stage of the disease, only active synovitis is present, and radiographs appear normal, while in the late stage, loose bodies are present and can be detected on radiographs [18]. Grossly, these loose bodies are consistent with ossified nodules.

Milgram [12] classified the disease into three distinct stages:

1. Early stage with intrasynovial metaplasia (and islands of cartilage) without loose bodies
Table 1: Summary of prior reports of primary synovial chondromatosis involving the small joints of the feet and their surgical management

| Author                   | Year | Age | Sex | Joint                | Surgical management                                      |
|--------------------------|------|-----|-----|----------------------|----------------------------------------------------------|
| Milgram [12]             | 1977 | 57  | M   | 1st IP               |                                                          |
| Wittkop et al. [28]      | 2002 | -   | -   | Subtalar             |                                                          |
| Chen et al. [29]         | 2002 | 35  | M   | 1st MTP              | Synovial debulking                                       |
| Hocking and Negrine [30] | 2003 | 15  | M   | Subtalar             | Subtalar arthrodes                                       |
| Young-In Lee et al. [8]  | 2004 | 35  | M   | Calcaneocuboid       | Intralesional excision                                   |
| Wittkop et al. [28]      | 2002 | 58  | F   | Nav-med cuneiform    | Intralesional excision                                   |
| Chen et al. [29]         | 2002 | 48  | M   | Ankle                | Intralesional excision                                   |
| Hocking and Negrine [30] | 2003 | 26  | F   | 2nd MTP              | Wide excision                                           |
| Young-In Lee et al. [8]  | 2004 | 27  | M   | 4th MTP              | Intralesional excision                                   |
| Harish et al. [31]       | 2005 | 44  | F   | Lisfranc             | Subtotal excision                                       |
| Van et al. [32]          | 2006 | 56  | F   | Subtalar             |                                                          |
| Fujita et al. [19]       | 2006 | 69  | F   | 4th/5th TMT         | Open arthroscopy and excision                            |
| Doral et al. [9]         | 2007 | 22  | M   | Ankle                | Arthroscopic excision of loose bodies                   |
| Galat et al. [13]        | 2008 | 38  | F   | Ankle                | Open synovectomy/lose body removal                       |
|                          |      | 31  | M   | Ankle                | Intralesional excision and midfoot arthrodes            |
|                          |      | 60  | M   | 2/3 TMT joint        | Intralesional excision and midfoot arthrodes            |
|                          |      | 50  | F   | Ankle (extra-articular extension) | Subtotal excision of loose bones |
|                          |      | 46  | F   | Ankle (extra-articular extension) | Subtotal excision of loose bones |
|                          |      | 21  | M   | Ankle                | Open synovectomy/lose body removal                       |
|                          |      | 19  | M   | Ankle                | Open synovectomy/lose body removal                       |
|                          |      | 34  | F   | TMT unspecified      | Open excision (multiple)                                |
| Dawson-Bowling et al [33]| 2008 | 24  | M   | Talonavicular        | Arthroscopic debridement                                 |
|                          |      | 48  | M   | Talonavicular        | Surgical excision                                       |
| Kerimoglu et al. [34]   | 2008 | 35  | F   | Subtalar             |                                                          |
| Khan et al. [35]         | 2010 | 45  | M   | 1st MTP              | Open synovectomy/lose body removal                       |
| Bahari and McKenna [36]  | 2012 | 53  | F   | Subtalar             |                                                          |
| Brodky et al. [7]        | 2013 | 24  | F   | Subtalar             | Open synovectomy/lose body removal                       |
| Ozmeric et al. [22]      | 2014 | 28  | M   | Ankle                | Arthroscopic partial synovectomy and excision of loose bodies |
| Saibaba et al. [37]     | 2015 | 5   | M   | Subtalar             | Open excision                                           |
| Stensby et al. [38]      | 2016 | 28  | F   | Subtalar             | Arthroscopic subtalar debridement/synovectomy           |
| Karahan et al. [39]      | 2017 |     |     | Ankle                | Arthroscopic excision of loose bodies, microfracture, and synovectomy |
| Saxena and St Louis [2]  | 2017 | 37  | M   | Ankle                | Arthroscopic synovectomy                                 |
|                          |      | 43  | M   | Ankle                | Arthroscopic synovectomy                                 |
| Kunzleer et al. [40]     | 2017 | 54  | M   | Tibiotalar           | Arthroscopic extensive synovectomy and excision of loose bodies |
| Peixoto et al. [41]      | 2018 | 59  | M   | Ankle                | Arthroscopic partial synovectomy and excision of loose bodies |
| Monestier et al. [42]    | 2019 | 50  | M   | Ankle                | Open synovectomy and removal of lose bodies              |
|                          |      | 43  | F   | Subtalar             | Arthroscopy, debridement of lose bodies, and subtalar arthrodes |
| Dheer et al. [43]        | 2020 | 49  | F   | Extra-articular ankle | Surgical excision                                       |
| Sathe et al. [44]        | 2020 | 8   | M   | Ankle                | Surgical excision                                       |
2. Transitional stage with both active and intrasynovial proliferation of cartilaginous nodules with loose bodies (and calcification beginning in the center of these masses) and
3. Late stage with only multiple loose bodies and slight inflammation but no evidence of synovial metaplasia.

The aim of the treatment consists of decreasing pain and limiting the development of early osteoarthritis. While the treatment decision is made according to the patient’s age, symptoms, and the disease stage, surgery is often the treatment of choice. However, the surgical approach can vary based on the stage of disease – synovectomy for Stage 1, synovectomy and removal of intra-articular bodies for Stage 2, and removal of loose bodies for Stage 3 [12, 19]. Other authors report that the removal of loose bodies alone achieves similar results to synovectomy and removal of loose bodies [20, 21].

A summary of previous case reports of synovial chondromatosis of the foot and ankle is presented in Table 1. While extensive loose body removal and synovectomy have traditionally been achieved with open arthrotomy, the present case report demonstrates that minimally invasive arthroscopic procedures also provide excellent outcomes in the management of synovial chondromatosis [22]. Classically, the treatment of synovial chondromatosis of the ankle consists of arthrotomy with excision of the loose bodies and synovectomy. Post-operative immobilization in a cast for a varying period of time is usually necessary after such surgical treatment [23, 24, 25]. Up to 2006, it has been common to see surgeons managing ankle synovial chondromatosis through open synovectomy, intralesional excision, and even arthrodesis for the more severe cases (Table 1).

However, from 2007 onward, this has largely been replaced by arthroscopic synovectomy and excision of loose bodies (Table 1), with excellent post-operative outcomes on follow-up. Due to the recent advances in ankle arthroscopy, therapy can now be performed in this non-invasive manner, with low morbidity and early rehabilitation [7, 9]. Minimally invasive surgery offers a multitude of advantages, including less pain, swelling, infection, and increased patient satisfaction [9]. Recovery after arthroscopic debridement and loose body removal is also much shorter than with open techniques, and there is no need of immobilization postoperatively. The patient can walk without pain, and there have been no reports of recurrence or osteoarthritis of the ankle joint in the follow-up period. However, with arthroscopy, there is also the possibility of limited synovectomy and residual loose bodies, which can increase the risk of recurrence and malignant transformation [22].

While local recurrence may follow incomplete synovectomy, malignant transformation is also a rare possibility. A recent article suggested 5% risk of malignant transformation in patients with primary synovial chondromatosis, which is much higher than that of other well-recognized bone diseases [26]. A single case of malignant transformation has been reported in primary synovial chondromatosis presenting in the foot [13]. Multiple local recurrences, rapid increase in size, cortical destruction, and marrow invasion, may be features of malignant transformation [27] and patients should be followed up after surgery for extended periods of time to allow for early detection of such complications.

**Conclusion**

We report a rare case of ankle synovial chondromatosis managed with arthroscopic debridement, synovectomy, removal of loose bodies, and microfracture. This case demonstrates that an arthroscopic approach for managing ankle synovial chondromatosis can provide excellent outcomes while maintaining the superior risk profile inherent to arthroscopic procedures. Arthroscopic approach is a good alternative to open arthrotomy for the treatment of synovial chondromatosis of the ankle.

**Clinical Message**

This case demonstrates that an arthroscopic approach for managing ankle synovial chondromatosis can provide excellent outcomes while maintaining the superior risk profile inherent to arthroscopic procedures. Arthroscopic approach is a good alternative to open arthrotomy for the treatment of synovial chondromatosis of the ankle.

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