



Synovial Chondromatosis of the Foot: A Rare Case Report

Joseph A Cione, John Cozzarelli* and Beau Shay

Department of Podiatric Medicine, Podiatry Associates of Belleville, Belleville, New Jersey 07109, USA

Abstract

Synovial chondromatosis, a disorder that most commonly affects large joints, has recently been reported in joints such as the subtalar joint and other joints of the foot. The disease most commonly presents in a monoarticular pattern and is characterized by metaplastic cartilage development within the synovium. Definitive diagnosis must be made with histology and should be supported with radiographic examinations which should always include MRI. The lesions are usually associated with pain, swelling, crepitation and decreased range of motion at the affected joint. They may also cause erosive changes to the surrounding bone. The current treatment of synovial chondromatosis is surgical excision of the lesion or lesions. We describe a rare case of synovial chondromatosis in which the patient presented with a non-painful soft tissue lesion on the plantar aspect of her right foot.

Introduction

Synovial chondromatosis a condition in which islands of metaplastic cartilage develop within the synovium, is typically characterized as monoarticular in pattern, with large joints being most commonly involved [1,2]. Synovial chondromatosis has a variety of names that include synoviochondrometaplasia, synovial chondrosis, synovial osteochondromatosis, and articular chondrosis [3]. According to Warne et al the knee is the most common location for this lesion followed by the hip and elbow. Though, for lesions that arise from tendon sheaths, the feet and hands are common locations [4].

Synovial chondromatosis is a benign soft tissue lesion, but can be misdiagnosed as a soft tissue chondrosarcoma [5]. There have only been a few cases reported in the ankle joint and other joints in the foot [6]. There have been only four cases reported of subtalar joint involvement [6]. The following case is a rare presentation of synovial chondromatosis arising in the foot.

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*Correspondence:

John Cozzarelli, Department of Podiatric Medicine, Podiatry Associates of Belleville, Belleville, New Jersey 07109, USA. Tel: (973) 450-0878; Fax: (973) 450-1013;

E-mail: drjohncozzarelli@yahoo.com

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Case Presentation

A 74-year-old female presented complaining of a large mass on the plantar aspect of her right foot. She reported that during gait she could feel the soft tissue mass near the ball of her foot, but denied having any pain at the site of the mass. The patient had trouble fitting her right foot into her normal shoe gear. She noted that the mass had slowly grown larger over many years, but denied any rapid growth or recent changes of the soft tissue mass.

On examination, the plantar aspect of the right foot appeared normal with no easily identifiable soft tissue mass or changes in the plantar skin. Upon palpation the soft tissue mass was noted; multiple lobules noted from the medial arch extending to the lateral aspect of the foot and distally to just proximal to the metatarsal heads. There was no neurovascular deficit present and the mass was not causing any skeletal deformities.

On radiographic examination there were no fractures or dislocations noted. The soft tissue mass did not penetrate the bony cortex and was causing no skeletal abnormalities. Review of the MRI showed a large, multilobulated mass extending from the medial longitudinal arch to just proximal of the first, second, and third metatarsal heads. The soft tissue mass was shown to extend laterally to the third metatarsal. The lesion was shown to be intertwined with the flexor tendons, but did not penetrate deep into the intermetatarsal spaces. Again, there were no erosive changes or cortical disruptions in the metatarsals noted on the MRI.

Surgical excision of the soft tissue mass was then performed. A curvilinear incision was made in the medial longitudinal arch of the right foot. The soft tissue mass was identified and its appearance was that of fibrous tissue with multiple areas of hematoma and calcification noted throughout the lesion. During dissection it was visually confirmed that the soft tissue mass was adhered to the

flexor tendons. Through tedious dissection, excision of the mass was performed with care being taken to keep intact all flexor tendons. Prior to closure it was noted that all lobules of the soft tissue mass had been excised and the lesion was sent for gross and microscopic analysis.

Gross description of the specimen that was received was multiple fragments of brown soft tissue measuring $7.0 \times 7.0 \times 2.0$ cm in aggregate. The microscopic description revealed a vascular structure that looks like organizing thrombus hematoma rather than a vascular tumor since the interstitial tissue between the vascular channels looked like fibrin. A portion of the specimen looked completely dead and a large number of giant cells were noted, which may have been a response to the calcification or trauma. The final pathological diagnosis revealed a Synovial Chondrometaplasia with organizing thrombus with hematoma and large aggregates of calcification and giant cell reaction. As suspected there was no malignancy noted.

There were no complications in the patient's post-operative course. Immediately post-operatively she was placed in to a surgical shoe with instructions for partial weight-bearing. The patient's incision healed the without incident. After complete healing of the incision site the patient returned to full weight-bearing ambulation without pain. At the patient's six month follow-up appointment she did not demonstrate any signs of edema or recurrence of the soft tissue mass.

Discussion

Synovial chondromatosis is a rare, benign disease with unknown etiology that usually occurs between the ages of 30 and 50 years [7]. Although, the disease is usually benign there have been a few rare cases with documented chondrosarcoma arising from synovial chondromatosis [4,2]. There have only been three cases that have transformed into malignancy and only 20 cases that have transformed into chondrosarcoma [7]. One of the possible causes of synovial chondromatosis is irritation of the synovium secondary to trauma or inflammation [8]. Another etiology that has been reported is overactivity of embryonic cells at the synovio-cartilage junction [9].

The disease is usually associated with pain, but our patient did not have any pain associated with her lesion. Synovial chondromatosis can be differentiated into two forms: primary and secondary. Shearer et al describe the primary disease form as undifferentiated stem cell proliferation considered to be a cartilaginous metaplasia of extra-articular synovial cells with trauma as the inciting incident [2,3]. The secondary form is described as an irritation of the synovial tissue with cartilage fragments that detach from the articular surfaces and are embedded into the synovium. The case study that has been presented is the primary form of the disease state and likely caused by repetitive trauma over many years.

As reported multiple times in the literature, Milgram classified the disease into three phases [10,11]. Milgram described phase I as active intrasynovial disease only, with no loose bodies noted in the synovium. Phase I has no calcifications noted on plain radiographs, but upon surgical excision there usually is cartilaginous masses within the synovium. Phase II is reported to be both active synovial disease and loose bodies. Phase II is usually temporary and is called the transitional phase. Lastly, Milgram described phase III as multiple free loose osteochondral bodies, but there is no active intrasynovial disease present. The last phase is the only phase where plain radiographs will demonstrate the calcification that has formed

[3]. The case study that has been presented corresponds to Phase I of Milgrams classification of synovial chondromatosis. There is no visualization or evidence of calcified loose bodies noted on the plain films. Upon surgical resection there were no loose osteochondral bodies noted with the lobules of the lesion.

Diagnosis of synovial chondromatosis requires multiple diagnostic tools. Synovial chondromatosis can be very difficult to diagnosis and the following should be included in the differential diagnosis: osteochondritis dissecans, synovial vascular malformation, pigmented villonodular synovitis, chondrosarcoma, injury-related soft tissue calcification, and lipoma with osseous metaplasia [8].

First step in diagnosing synovial chondromatosis should be the use of plain radiographs, but as noted earlier, they may only be helpful in the third phase of the disease. Advanced imaging is much more helpful in helping to determine the correct diagnosis. Computed tomography is inferior to MRI as the advanced imaging modality of choice for diagnosing synovial chondromatosis [8]. MRI is such an important modality for the proper diagnosis due to its properties like multi planar scanning and superior evaluation of soft tissues [7]. MRI is an excellent tool to aid in the diagnosis of synovial chondromatosis, but the only definitive diagnostic tool is for histological examination. Histological examination can be obtained from surgical excision or from a CT guided needle biopsy [6]. Diagnosis was made in our case that is presented with the use of plain radiographs, MRI, and finally with histological examination after surgical excision.

Conservative treatment of this disease may alleviate the symptoms for some time, but it is likely that surgical excision will eventually be needed. Complete surgical excision of all cartilaginous tissue is required for complete relief of pain [8].

Conclusion

The rarity of this case is the reason it is being reported. There are many differential diagnoses that may be more likely, but this is a case to show that synovial chondromatosis should be on the list. It is difficult to diagnosis, but can be diagnosed with the combined use of physical examination, plain radiographs, MRI, and histological examination. Finally, as in our case, surgical excision of this disease is the most definitive and best treatment option.

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