Novel Techniques in Arthritis & Bone Research
ISSN: 2575-8888

Juniper Publishers
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Case Report
Volume 3 Issue 5 - February 2022
DOI: 10.19080/NTAB.2022.03.555622

Nov Tech Arthritis Bone Res

Arthroscopic Removal of Anterior Ankle Joint Loose Bodies Synovial Chondromatosis

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Submission: February 08, 2022; **Published:** February 21, 2022

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Abstrcat

Synovial chondromatosis (SC) is a rare disorder that is characterized by the presence of metaplastic cartilage nodules originating from the synovial lining of joints, bursa, and tendon sheaths. It is usually benign condition; however, malignant transformations may occur. It usually involves knee, hip and elbow joints and rarely involve shoulder and ankle joints. The usual treatment option is open surgical excision of loose bodies in addition to synovectomy. Only few cases in literature were managed arthroscopically. We present a case of a 33-year-old male patient who was evaluated for pain, locking and limited range of motion of the right ankle joint. Both physical examination and radiographic investigations were suggestive of primary SC of the ankle joint and arthroscopic surgery was performed. Removal of loose bodies and synovectomy were successfully performed arthroscopically. Loose bodies were excised and sent to histopathology and the diagnosis of SC was confirmed. The treatment option of SC of the ankle whether open or arthroscopic depends on patient complaint, age, and the stage of the disease. This case report suggests that arthroscopic management can provide successful outcome in some cases. We present a case of synovial chondromatosis in which MRI showed three loose bodies anterior to ankle joint and patient underwent a two-port ankle scope in which 11 loose bodies were removed.

Keywords: Loose body; Synovial chondromatosis; Ankle; Arthroscopy

Abbreviation: SC: Synovial Chondromatosis; AOFAS: American Orthopedic Foot and Ankle Society; MRI: Magnetic Resonance Imaging; SPN: Superficial Peroneal Nerve

Introduction

Synovial chondromatosis (SC) is a rare condition manifests by the formation of intra-articular cartilaginous nodules in the synovial lining of the joint [1]. These nodules can be separated and become loose bodies and may undergo secondary calcification within the joint [2]. The exact etiology is still unknown; it could be related to genetic, traumatic or infectious cause [3]. SC originating from the hip, knee and elbow joints is frequently reported, however, it rarely found around the ankle joint [4-6]. The disease is commonly seen in males and more between third and fifth decades of life [3,7]. Progressive degeneration of articular structures secondary to loose neoplastic cartilaginous nodules in the joint space can occur if left untreated [8]. Open excision of loose bodies with synovectomy is the most common surgical intervention. Nowadays, the arthroscopic approach is frequently preferred for ankle pathologies as it has several advantages such as decreased morbidity, thorough visualization, and treatment [3,4].

Case Presentation

A 33-year-old male patient, smoker, healthy otherwise referred from primary health care to orthopedics outpatient clinics as a case of non-displaced right base of the fifth metatarsal bone fracture. He sustained twisting injury to his right ankle and was complaining of right ankle pain. He had X-ray done to his foot showed fifth metatarsal bone fracture. It was managed conservatively with casting only. Few weeks later, after removing the cast, he started complaining of gradual ankle pain on the medial side more than the lateral one and locking at the ankle joint. After full clinical assessment, he was booked for magnetic resonance imaging and continued conservative treatment.

There is a history of ankle joint injection in July 2018 done outside the hospital, with unknown medication and location of injection. Patient smokes cigarettes half a pack a day for the last few years and had no history of any comorbidities. He had no family history of malignancy or bone or joint diseases. He works as architecture engineer. On physical examination, the patient had mild swelling, mild tenderness around the anterior ankle joint line. The range of motion was 15° plantar flexion and 10° dorsiflexion. No signs of instability appeared in the ankle joint. Dorsalis pedis artery was well-felt and intact distal sensation with no neurovascular affection.

On plain radiography, multiple nodules about 2-5mm in diameter of calcifications were seen at the anterior aspect of the ankle joint (Figure 1). Magnetic resonance imaging revealed mild joint effusion with three loose bodies in the anterior aspect of the tibiotalar joint, largest was around 5mm with normal articular cortices and articular cartilage and no evidence of osteochondral injury. Medial and lateral supporting ligaments including talofibular and deltoid ligaments are normal. The surrounding muscles and tendons including the flexor halluces longus tendon are normal in morphology and signal intensity (Figures 2). Initial conservative measures including rest, physical therapy and nonsteroidal anti-inflammatory drugs failed to provide adequate relief of symptoms and radiograph taken in the follow up showed multiple calcifications were seen at the anterior aspect of the ankle joint (Figure 3).

Figure 1: Radiographs taken in 2018 showed healed right base of the 5th metatarsal fracture.

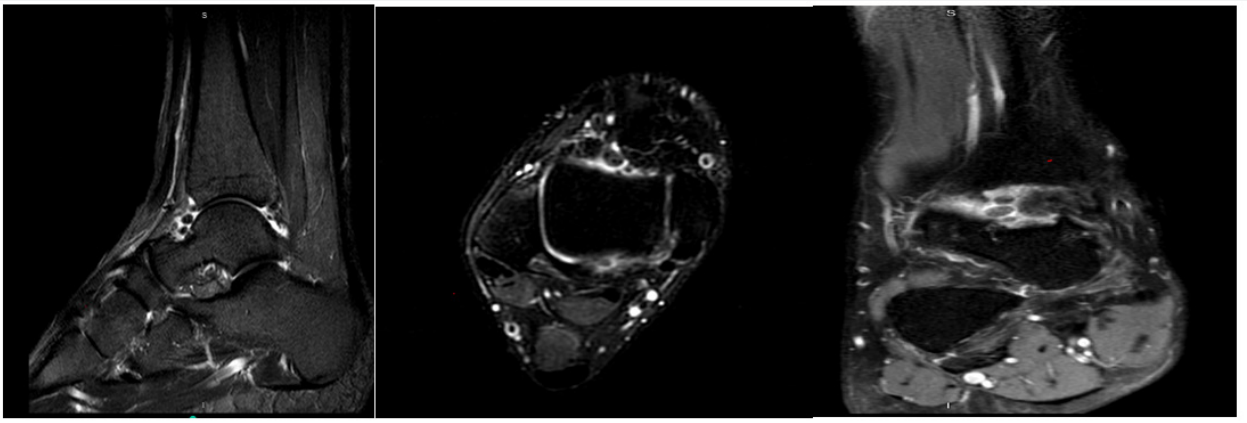

Figure 3: The Pre-Treatment (T1) and Post-Treatment (T2) Data of Patients were Registered. A: STL Registration with Cranial Base. B-C: Registration of Pre- (Green) and Post- (Red) Models. D-F: Pre- (Purple) and Post- (Yellow) Models of the Teeth. G-I. Changes in the Teeth, Cross-Sectional Areas of the Pharyngeal Airway and Displacements of the Hyoid Bone between the T1 And T2 Models were Measured.

Functional assessment was done using American Orthopedic Foot and Ankle Society (AOFAS)-Hind foot Scale. The preoperative score was 67 of 100 points. Benefits and risks including infection, bleeding, nerve injuries and persistent of pain, recurrence were explained to the patient and he accepted to undergo the surgical management.

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Figure 3: Calcifications in the anterior of the ankle joint.

Operative Technique

Preoperative Planning, Patient Positioning and Operative Intervention: The patient was subsequently informed of the preliminary diagnosis of synovial chondromatosis. Patient was offered multiple management options including continuation of conservative management, open loose body excision and arthroscopic option. He elected to undergo arthroscopic removal of the loose bodies with synovectomy.

Figure 4: 11 loose bodies sent to histopathology in Formalin.

Patient was admitted and brought to holding area where he was consented about the procedure and right leg was marked. Patient received prophylactic antibiotic, underwent spinal anesthesia, and was put on supine position with extend lower limbs. Right lower limb was washed with soap and water, tourniquet was applied to proximal right thigh and right lower leg was draped in the usual sterile fashion. The important landmarks and structures were marked on skin using a permanent marker pen including tibialis anterior tendon, peroneus tertius tendon, and superficial peroneal nerve (SPN). The tourniquet was inflated at 350mmhg. The anteromedial portal was created first by a vertical skin incision just medial to the tibialis anterior tendon at the level of joint line, and then a mosquito forceps was used to spread the skin. The anterolateral portal created under vision using spinal needle with transillumination to avoid injury to the branches of SPN. Routine arthroscopic examination and synovectomy of the ankle joint was made and adhesions shaved with the shaver. Identification and removal 11 loose bodies around 5 mm in diameter each inside tibiotalar joint anterior aspect done using arthroscopic grasper then were sent to histopathology in Formalin (Figure 4). Washing of the joint through the scope and reexamination done. Two skins portal incisions closed using 3/0 Prolene. Intra-articular injection

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xylocaine 2% and 40 mg depomadrol through anteromedial side of the joint. Sterile compression dressing was applied, and tourniquet was deflated at 85 min. The patient was shifted to recovery in stable condition.

Figure 5: Post-operative x ray.

Postoperatively x ray radiograph taken (Figure5), range-of-motion exercises with partial weight-bearing using crutches as tolerated was encouraged from the first day.

Histopathology result confirmed the diagnosis as Synovial Chondromatosis. Gross description: eleven separate loose pieces of rounded, well-circumscribed, firm-to-hard, pearl-like nodules of variable sizes measuring from 0.5 x 0.5 x 0.5cm up to 1 x 0.8 x 0.7cm each showing grayish-white, smooth outer contour. Specimen undergone additional fixation and later subjected to short and mild decalcification prior to processing. Representative sections taken from each piece and submitted in three blocks. Microscopic description: Sections reveal multiple nodules of hypocellular hyaline cartilage arranged in concentric layers undergoing ring calcification lined by proliferative chondrocytes showing mild atypia and occasional binucleation. However, no mitotic activity identified. The cartilage shows area of transition into lamellar bone with marrow space. The lesion is surrounded by fibrous connective tissue/ perichondral layer.

We followed up the patient at our outpatient clinic at 2-week intervals. Wounds healed and sutures were removed. Pain and limitation of motion improved within 2 weeks. Full weight-bearing started on the second week, while the active and passive range of motion and calf strengthening exercises continued for 6 weeks. Postoperative AOFAS score at 8 weeks was 91 of 100 points.

Discussion

Synovial Chondromatosis is a benign metaplasia of the synovium and multiple loose bodies formation. A review of the literature shows that only few cases of synovial chondromatosis were reported in the ankle. No clear cause or etiology is known, but classification of SC as described by Milgram [9] depends on the location of the loose bodies within a joint and the pathological findings of the synovium and loose bodies. Milgram described this condition with three stages: first stage, cartilaginous loose bodies within the synovial membrane, second stage, intrasynovial involvement with loose bodies, and third stage, multiple free bodies due to synovial osteochondromatosis with tendency to calcify.

The recurrence rate of SC has been reported to be from 11.5% to 37.5% postoperatively. A possible complication of SC is malignant transformation to chondrosarcoma, with a risk of about 5%. Malignant transformation is closely related to recurrence rate [8]. Main symptoms and signs are pain more with physical activity, joint swelling, decreased range of motion, joint clicking, locking, and palpable masses [7]. Imaging plays an important role to diagnose SC, in normal X-ray radiograph multiple intra-articular calcified loose bodies which are smooth and variable in size are usually seen in both anteroposterior and lateral views, while magnetic resonance imaging (MRI) could be useful if plain radiographs fail to demonstrate calcifications and are helpful in early stages to detect the exact location of the disease and the intrinsic property of the chondroid tissue [10].

The pathological confirmation of the disease allows to confirm the diagnosis from differential diagnosis of other conditions that gives same clinical and/or radiological picture of intra-articular loose bodies such as trauma, rheumatoid arthritis, tuberculosis arthritis, osteochondritis dissecans, and soft tissue chondrosarcoma [8]. In the early stages of the disease and in asymptomatic patients, an attempt of conservative treatment with regular follow-up can be an option [11].

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Symptomatic patients are better managed surgically either open or arthroscopic depending on surgeon preference and on the case itself [6]. Arthroscopic management of ankle SC is rarely discussed in the literature [11].Advantages of arthroscopic surgery are to decrease wound exposure, to decrease risk of infection, being a less invasive procedure than open surgery, and can help in early rehabilitation. Arthroscopy also allows evaluation of the entire articular surface for potential degeneration including gutters and allows almost complete synovectomy. Achieving the two goals via open surgery is almost impossible [4,12].

In our case, a young male who had clinical and radiological picture of SC ankle, underwent a trial of conservative management which failed to improve his symptoms including the pain and limitation of motion for 2 years. These were the indications for surgical intervention. Short-term follow-up showed satisfactory outcome regarding pain and range of motion in comparison to preoperative. Comparing these findings to open surgical procedures in the literature are of favorable values.

Conclusion

SC is considered a rare and usually a benign condition that is found involving a single joint of unknown etiology, with formation of multiple cartilaginous loose bodies. Excision of the loose bodies by the disease and synovectomy usually improve the symptoms of the condition. Synovial resection or synovectomy is the agreed-on treatment process for all joints, and arthroscopic approach is a valuable minimally invasive tool to achieve good outcome in these cases in the ankle joint.

We report this case of diffuse ankle synovial chondromatosis with 11 loose bodies. This case demonstrates that a two-portal arthroscopic approaches which provided adequate treatment while maintaining the superior risk profile inherent to arthroscopic intervention. In the future, we may consider arthroscopic approach to open arthrotomy for the treatment of SC of the ankle.

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