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Case Report

Massive ankle synovial chondromatosis with 81 loose bodies: A case report of arthroscopic management via controlled portal enlargement and suction-assisted clearance

Ahmet Ciğerli[1], **Zeynep Sude Tekin**[2]

1. Department of Orthopedics and Traumatology, Prof. Dr. Cemil Taşcıoğlu City Hospital, Istanbul, Turkey.
2. Torrey Pines High School, San Diego, CA, USA.

Abstract

Synovial chondromatosis (SC) of the ankle is a rare, benign monoarticular arthropathy characterized by synovial osteochondral metaplasia. Although arthroscopic removal is the standard of care, a massive loose body burden poses significant technical challenges, often forcing conversion to open arthrotomy. We present a 49-year-old male with chronic ankle pain and severe motion restriction due to extensive SC, failing conservative management. To maintain a minimally invasive approach, we utilized a controlled anteromedial portal enlargement to extract massive fragments (up to 15 mm) intact, simultaneous arthroscopic capsular and adhesion release, and final systematic wide-bore suction-assisted joint clearance. A total of 81 loose bodies were extracted. At the 1-year follow-up, the patient achieved substantial pain relief and significant functional improvement without clinical evidence of recurrence. Controlled portal modification combined with suction clearance safely expands the boundaries of arthroscopic management in high-burden SC.

Level of Evidence V; Case Report.

Keywords: Ankle; Arthroscopy; Chondromatosis, synovial; Joint loose bodies.

Introduction

Synovial chondromatosis (SC) is a rare, benign, idiopathic proliferative disorder of the synovium where mesenchymal cells undergo cartilaginous metaplasia. These metaplastic nodules can pedunculate, detach from the synovium, and become free-floating intra-articular loose bodies that undergo secondary calcification or ossification. While it most frequently affects large joints like the knee and hip, the ankle joint is exceptionally uncommon, accounting for less than 5% of all cases in large clinical case series and registry data[1,2,3].

Patients typically present with chronic pain, swelling, mechanical catching, and restricted range of motion (ROM). Left untreated, the mechanical crowding of loose bodies inevitably leads to accelerated joint degeneration and secondary osteoarthritis[2,4].

With advancements in minimally invasive surgery, arthroscopic debridement and synovectomy have become the preferred standard of care over open arthrotomy, offering faster rehabilitation and fewer wound complications. However, when the joint is packed with an extraordinary number of loose bodies, conventional arthroscopic extraction using standard graspers can be highly difficult, significantly prolonging the tourniquet time and risking iatrogenic chondral lesions due to repeated instrument manipulation. Furthermore, massive consolidated fragments exceeding portal sizes frequently

Study performed at the Department of Orthopedics and Traumatology, Prof. Dr. Cemil Taşcıoğlu City Hospital, Istanbul, Turkey.

Correspondence: Ahmet Ciğerli. Kaptan Paşa, Darülaceze Cd. No:27, 34384 Şişli, Istanbul, Turkey. **Email:** ahmet.cigerli1997@gmail.com. **Conflict of Interest:** none. **Source of Funding:** none. **Date submitted:** August 19, 2026. **Date accepted:** September 29, 2026.

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force conversion to open arthrotomy, discarding the benefits of minimal invasion.

This case report outlines a modified arthroscopic-assisted approach combining strategic portal enlargement with simultaneous capsular release and a final suction-assisted joint clearance mechanism to safely evacuate a massive burden of 81 loose bodies from the ankle joint, avoiding open conversion and reducing the risk of residual loose bodies. To our knowledge, this specific combination of techniques has not been previously described for high-burden ankle synovial chondromatosis.

Case description

A 49-year-old male patient (body mass index: 26.4 kg/m^2, non-smoker, manual laborer) presented to our orthopedic clinic with a 3-year history of chronic, progressive left ankle pain. The patient had no history of previous ankle trauma, instability, or surgical intervention. His medical history was negative for systemic comorbidities affecting microvascular perfusion or wound healing, such as diabetes mellitus, inflammatory arthritis, or peripheral vascular disease. The pain was aggravated by weight-bearing and ambulation, with temporary relief obtained only during rest. The patient had undergone extensive conservative management elsewhere, including various non-steroidal anti-inflammatory drugs (NSAIDs), physical therapy modalities, and activity modification, none of which provided satisfactory symptom alleviation.

On clinical evaluation, the patient exhibited mechanical restriction during ankle movements. The preoperative ankle range of motion (ROM) was limited to 15° dorsiflexion and 35° plantarflexion. The baseline pain level was severe, with a preoperative Visual Analog Scale (VAS) score of 7. Functional impairment was prominent, reflected by a baseline American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot score of 42.

Preoperative plain anteroposterior and lateral radiographs of the left ankle demonstrated multiple, well-defined, radiopaque calcified clusters overlapping the joint spaces Cross-sectional axial and sagittal CT views further confirmed extensive synovial crowding, highlighting the intimate proximity of the loose bodies to the talocrural articular cartilage (Figure 1). To comprehensively assess the three-dimensional spatial distribution, articular margin involvement, and overall burden of the osteochondral fragments, a computed tomography (CT) scan with three-dimensional (3D) surface reconstruction was performed (Figure 2). Based on clinical and radiological findings, a preliminary diagnosis of synovial chondromatosis was established, and the patient was scheduled for interventional ankle arthroscopy.

Surgical technique

Under spinal anesthesia and tourniquet control, standard anteromedial and anterolateral arthroscopic portals were



Figure 1. Preoperative imaging evaluation of the left ankle showing extensive intra-articular synovial chondromatosis. (A, B) Anteroposterior and lateral plain radiographs displaying multiple radiopaque, calcified loose body clusters around the joint space. (C, D) Axial and sagittal computed tomography (CT) slices confirming dense crowding, spatial distribution, and spatial proximity of the osteochondral nodules to the talocrural articular cartilage.

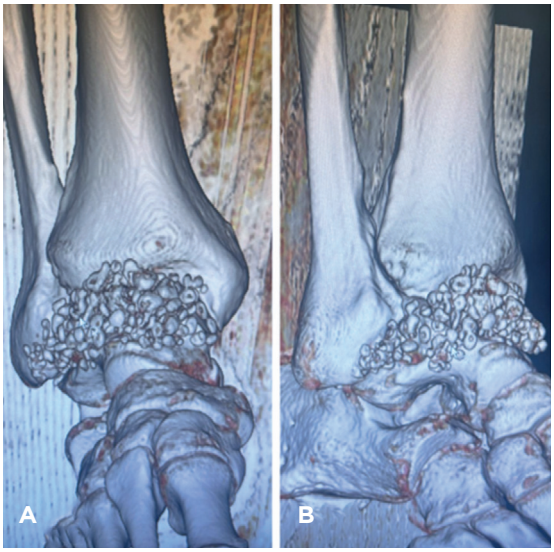


Figure 2. Preoperative three-dimensional computed tomography (3D-CT) reconstructions of the left ankle. (A) Anterior view illustrating the extensive spatial distribution and massive consolidation of osteochondral nodules packed within the anterior recess. (B) Lateral/posterior view showcasing the severe joint crowding and complete involvement of the articular margins.

established. Initial intra-articular inspection via diagnostic arthroscopy revealed a massive, dense consolidation of multinodular cartilaginous and osteochondral loose bodies completely packed within the joint recesses, severely occluding functional visualization.

To address the high-burden pathology without converting to a morbid open arthrotomy, a strict surgical protocol was executed:

1. Controlled anteromedial portal enlargement: Due to the long-standing nature of the disease, multiple consolidated osteochondral fragments exceeded 1.5 cm in size. To facilitate a safe path for extraction and prevent mechanical friction against the joint margins, the anteromedial portal was strategically and longitudinally extended to a 1.5-2 cm mini-incision.
2. Intact large-fragment extraction: Stryker arthroscopic graspers of varying diameters (approximately 2.5-3.4 mm; Stryker, Kalamazoo, MI, USA) were selected according to loose-body size. The large osteochondral fragments (> 1.5 cm) were grasped securely and delivered from the joint fully intact. This specialized instrumentation minimized the risk of iatrogenic chondral scoring, nodule slippage, and fragmentation that could otherwise occur when forcing large fragments through a standard, unenlarged portal.
3. Simultaneous arthroscopic release for chronic motion restriction: To treat the chronic joint stiffness and mechanical limitation caused by long-standing crowding, thorough arthroscopic capsular and anteromedial adhesion release was meticulously performed. This step cleared the anterior recess to directly restore physiological joint compliance and range of motion.
4. High-volume copious irrigation: Once all macroscopic loose bodies were addressed, a rigorous clearance routine was initiated. The joint was heavily irrigated with copious saline via the arthroscopic cannula to mobilize hidden debris from blind spots. Wide-bore suction-assisted aspiration: After controlled enlargement of the anteromedial portal, a wide-bore arthroscopic suction cannula (Stryker, Kalamazoo, MI, USA; approximately 5.0 mm) was introduced through the enlarged anteromedial portal to maximize high-flow aspiration and prevent clogging. The entire joint, including all hidden recesses, was thoroughly aspirated to evacuate remaining micro-fragments, cartilaginous seeds, and synovial debris.
5. Final joint verification: Lastly, an exhaustive final arthroscopic inspection was performed. The anterolateral, anteromedial, and central compartments were visualized directly through alternating portals. To inspect the posterior joint space and posterior capsular recess without establishing formal posterolateral or posteromedial portals, non-invasive joint distraction combined with maximal ankle plantarflexion was applied. The 30° arthroscope and wide-bore suction cannula were carefully advanced transarticularly from the enlarged anteromedial portal across the talocrural joint into the posterior compartment under direct visualization, confirming complete clearance of loose bodies and debris while avoiding the neurovascular risks of posterior portal placement.

A total of 81 loose bodies were successfully extracted, with the largest specimen measuring approximately 15 mm in its maximum diameter (Figure 3). A targeted subtotal synovectomy was performed using a motorized shaver and radiofrequency ablation to resect all macroscopically involved, hypertrophic, and nodule-bearing synovial tissue, followed by thorough joint irrigation. Total operative duration was 68 minutes, with an inflation tourniquet time of 55 minutes, avoiding excessive limb ischemia despite the high loose-body count. The specimens were sent for histopathological examination.

Postoperative course and pathological confirmation

Postoperatively, a standardized, criterion-based progressive rehabilitation protocol was initiated (Figure 4). Immediate non-weight-bearing active and passive ankle ROM exercises (plantarflexion, dorsiflexion, and circumduction; 15 minutes, 3-4 times daily) were started on postoperative day 1 to prevent intra-articular adhesion formation following capsular release. A removable pneumatic walking boot was utilized for soft-tissue protection during resting and ambulation. Protected partial weight-bearing (50% body weight) with bilateral axillary crutches was permitted during the first two weeks, advancing to full weight-bearing as tolerated by week 3. Supervised outpatient physical therapy (3 sessions per week, 45 minutes per session) commenced at postoperative week 2, focusing on calf muscle and Achilles tendon stretching, progressive isometric and isotonic ankle-strengthening

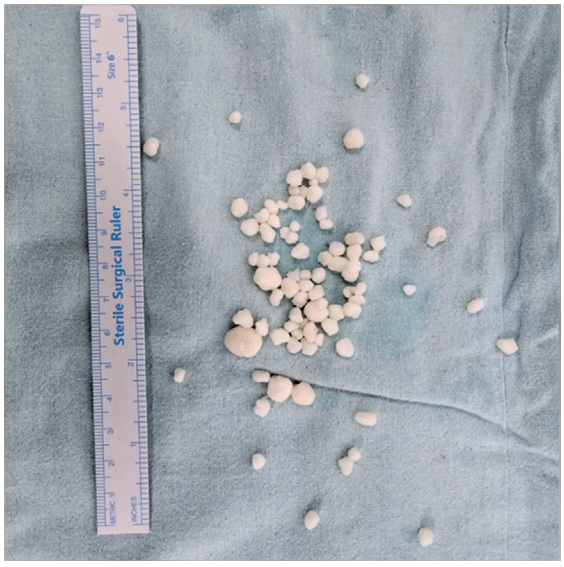


Figure 3. Macroscopic view of the 81 intra-articular loose bodies extracted during ankle arthroscopy, displayed alongside a sterile surgical ruler confirming the largest fragment size of approximately 15 mm.

exercises using resistance bands, proprioceptive training, and closed-chain neuromuscular retraining. Formal physical therapy continued for eight weeks until symmetric functional mobility and normal gait mechanics were reestablished. The postoperative course was entirely uneventful.

Histopathological evaluation confirmed the diagnosis of synovial osteochondromatosis, describing nodules of hyaline cartilage organized in clusters within the submesothelial connective tissue, displaying regular chondrocytes with focal areas of enchondral ossification, without cellular atypia.

By three months, following completion of formal physiotherapy, the patient transitioned to full unassisted ambulation with a VAS score of 3, an AOFAS score of 74, and an ankle ROM of 15° of dorsiflexion and 40° of plantarflexion. At six months, clinical examination revealed stable joint kinematics without swelling or mechanical catching; the VAS score was 2, and the AOFAS score reached 80. At the final 1-year follow-up, the patient maintained outstanding clinical and functional improvement. Active ankle ROM reached 20° of dorsiflexion and 40° of plantarflexion with supple, mature portal scars (Figure 5). The VAS pain score remained at 2, and the AOFAS score peaked at 84 points, reflecting sustained recovery. No early or late complications—including superficial or deep infection, sinus formation, neuroma, portal wound complications, or clinical recurrence—were observed throughout the follow-up period.

Discussion

The therapeutic cornerstone of ankle synovial chondromatosis is thorough eradication of osteochondral fragments combined with synovectomy. While standard arthroscopy is widely preferred, the presence of oversized fragments or significant joint stiffness traditionally shifts the surgical decision toward an open arthrotomy. The clinical success of this case highlights technical modifications that push the boundaries of minimally invasive arthroscopy[1,4,5].

The 1.5-2 cm anteromedial incision used here effectively represents a mini-open portal extension rather than a purely arthroscopic portal, making this an arthroscopic-assisted (mini-open-assisted) intervention. Arthroscopic and limited mini-open strategies have been described for management of oversized loose bodies in other joints, including the shoulder. This supports the broader principle that a limited accessory incision can facilitate management of fragments that exceed standard arthroscopic portal dimensions while preserving minimally invasive components of the procedure. Extending this concept to high-burden ankle synovial chondromatosis through a calibrated incision preserved capsular containment and allowed en bloc extraction without cartilage shearing, avoiding the morbidity of a formal open arthrotomy[6].

Managing chronic synovial chondromatosis also requires addressing the secondary soft-tissue changes caused by



Figure 4. Immediate postoperative plain radiographs of the left ankle obtained on the day of surgery. (A) Anteroposterior and (B) lateral views demonstrating complete intra-articular clearance of all loose bodies, restoration of the joint space, and no evidence of residual osteochondral fragments.



Figure 5. Clinical outcome and range of motion evaluation at 1-year postoperative follow-up. (A, B) Active plantarflexion and dorsiflexion demonstrating excellent functional recovery and significant improvement in joint mobility compared to baseline. (C, D) Anteromedial and anterolateral portal sites displaying well-healed, minimal postoperative scar formation with no surgical site complications.

years of restricted joint mechanics, including dense pericapsular scarring and intra-articular adhesions. Rather than limiting the procedure to loose-body excision, we performed a concurrent arthroscopic capsular and adhesion release, which was instrumental in restoring immediate postoperative joint mechanics and contributed directly to the marked gain in ROM (dorsiflexion increasing to 20° and plantarflexion to 40°)[4].

Enlarging an ankle arthroscopy portal to a mini incision raises legitimate concerns regarding neurovascular safety. The anteromedial corridor is bordered medially by the saphenous nerve and great saphenous vein, and laterally by the tibialis anterior tendon and branches of the superficial peroneal nerve, so extending the portal carries an amplified risk of nerve traction or laceration during fragment delivery. This was mitigated by performing strict superficial skin incisions followed by blunt subcutaneous spreading dissection parallel to the neurovascular bundles and capsulotomy under direct visualization; keeping the incision medial to the tibialis anterior tendon established a dependable safe corridor, and the patient retained intact cutaneous sensation without paresthesia or neuroma throughout follow-up[7].

Complete loose-body evacuation combined with a targeted subtotal synovectomy of grossly pathological synovium offers an optimal therapeutic balance—eliminating the primary metaplastic source and minimizing recurrence while avoiding the capsular fibrosis and joint stiffness associated with aggressive total synovectomy in a tight talocrural joint.

This report has limitations inherent to its design. As a single case report, it lacks an active comparator group (e.g., conventional open arthrotomy or purely arthroscopic clearance without portal extension), precluding definitive comparative conclusions regarding operative speed, safety, or functional superiority. It also reflects a single-surgeon, single-center experience, with an inherent learning curve for safe trans-articular maneuverability and precise, controlled portal extension without neurovascular injury. Finally, the 1-year follow-up is relatively short for a chronic proliferative disorder in which late recurrence may emerge postoperatively, and recurrence monitoring relied on clinical evaluation rather than routine surveillance imaging. Larger, multicenter prospective or comparative studies with longer radiographic follow-up are warranted to confirm the generalizability of this mini-open-assisted technique.

In conclusion, during the arthroscopic management of ankle synovial chondromatosis, controlled portal enlargement when necessary for safe extraction of large loose bodies, combined with systematic wide-bore suction-assisted aspiration at the end of the operation, can be considered a practical and highly applicable technical modification that potentially reduces the risk of residual loose bodies.

Authors' contributions: Each author contributed individually and significantly to the development of this article: AC *(https://orcid.org/0009-0000-2824-1103) Conceived and planned the activities that led to the study, performed the surgery, clinical examination, data collection, interpreted the results of the study, wrote the article, and participated in the review process; ZST *(https://orcid.org/0009-0002-1061-3639) Participated in review process, contributed to the bibliographical review, formatting of the article and wrote the article. All authors read and approved the final manuscript. *ORCID (Open Researcher and Contributor ID).

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