Technical Note

All Arthroscopic Osteochondral Autograft Transplantation for Medial Talar Dome Lesions Talus With Burring of the Anterior Lip of the Distal Tibia

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Abstract: Osteochondral lesions of the talus are chondral lesions affecting the subchondral bone mostly due to acute ankle trauma, including either sprains or fractures. After failure of conservative treatment, operative treatment is necessary, with different surgical techniques described in the literature. We describe a single-step osteochondral autograft transfer to access the medial talar dome lesion that avoids the need for a medial malleolar osteotomy and therefore eliminates morbidity while reducing operative time.

Symptomatic osteochondral lesions of the talus (OLTs) are not uncommon and have been described in up to 50% of ankle sprains and fractures.[1,2] The osteochondral defects are most located posteromedially (57%) or anterolaterally (43%), whereas centrally located lesions are uncommon.[3,4]

Conservative treatment for symptomatic lesions partially alleviates symptoms due to limited natural cartilage repair because of the avascular nature of articular cartilages.[5]

Current surgical options for treating OLTs include bone marrow stimulation with microfracture or autologous chondrocyte implantation and osteochondral replacement techniques through either the osteochondral autologous transplantation system (OATS) or osteochondral allograft transplantation.[1]

For the central or posterior lesion of the talus, access through the medial malleolar or fibular osteotomy traditionally has been prescribed.[6] The purpose of this Technical Note is to describe an arthroscopic OATS procedure for the medial dome lesion that avoids the need for medial malleolar osteotomy by burring the anterior lip of the distal tibia and using a 4.0-mm 70° scope. This technique reduces operative time and avoids complications and morbidity of the malleolar osteotomy and its fixation while providing viable chondrocytes through autologous graft transfer.

Surgical Technique

Preoperative Assessment

The preoperative evaluation included history and physical examination, weightbearing radiographs (anteroposterior, and lateral views) (Fig 1), and magnetic resonance imaging (MRI) (Fig 2). Radiographs were used to evaluate the lesion and exclude ankle malalignment or degenerative changes, whereas MRI was used to define the location and size of the lesion, as well as stage the OLTs based on the MRI Hepple classification (Table 1).[2]

Patient Positioning and Preparation

The patient is placed supine on a standard operative table with a nonsterile padded tourniquet proximal to the knee of the operative extremity. The surgical site is then draped and prepared to the above the knee. The tourniquet, set at 350 mm Hg of pressure, is inflated.

Diagnostic Arthroscopy

In this technique, a 4.0-mm 70° arthroscope is used through the anteromedial portal, which is

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Received March 29, 2024; accepted May 5, 2024.

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2212-6287/24525
http://dx.doi.org/10.1016/j.eats.2024.103109

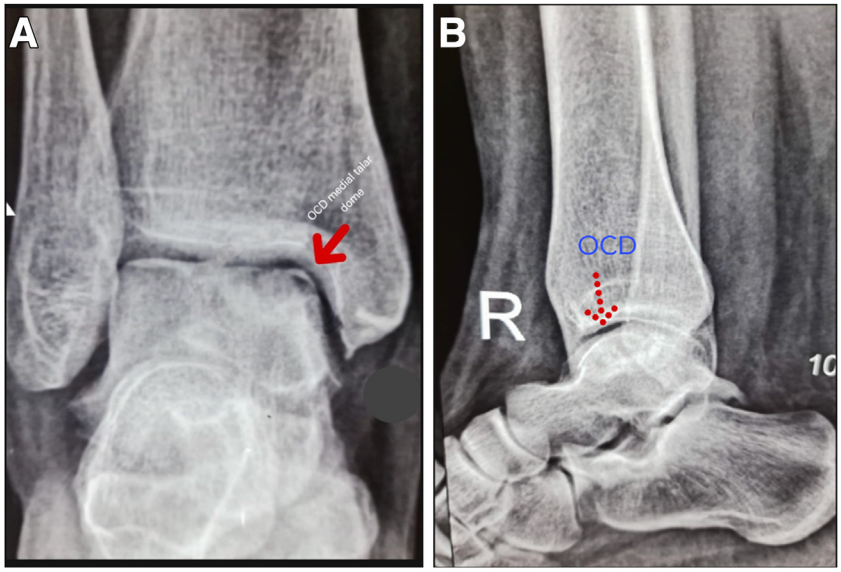

Fig 1. Anteroposterior and lateral views of the right ankle showing the radiolucent lesion (red arrow) on the medial talar dome (A) and the same lesion (red arrow) on the anterior half of the talus in the lateral view (B).

created medial to the tibialis anterior and lateral to the medial malleolus. An anterolateral portal is then made by needle localization, just medial to the lateral malleolus, with attention paid to avoid the peroneus tertius muscle and superficial peroneal nerve. Diagnostic arthroscopy is started with a shaver in the anterolateral portal to allow debridement of the synovial tissues for better visualization. The chondral lesion is probed, and any concomitant pathology of the joint is checked (Fig 3).

Arthroscopic Preparation and Refreshment of the Crater of the Lesion

The scope is switched to the anterolateral portal, and a curette and shaver in the anteromedial portal are used to debride the lesion to allow refreshment and remove the loose chondral fragment (Fig 4). The posterior half of the lesion can be visualized with adequate plantar flexion stress.

Burring of the Distal Tibia and Arthroscopic Recipient Site Drilling

An accessory superomedial portal is established to allow direct drilling and grafting of the lesion. We used the cylindrical sizer to assess the direction of the drill to allow congruent grafting of the lesion. For better exposure and accessibility of the lesion by instrumentation in addition to plantar flexion stress, controlled burring of the anterior lip of the distal tibia is obtained by a depth of 5 to 10 mm according to the site of the anteroposterior lesion (Fig 5). A calibrated coring reamer (Arthrex) is then used to ream to a depth of 12 mm.

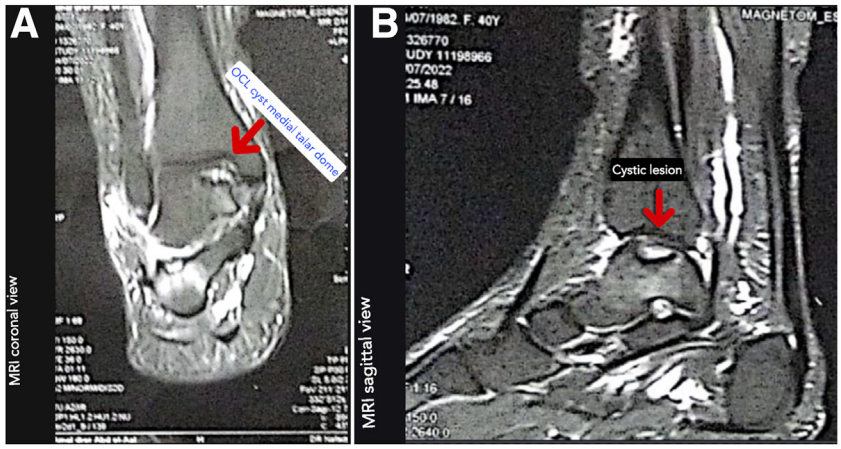

Fig 2. Magnetic resonance imaging coronal (A) and sagittal (B) views of the right ankle showing high signal of the subchondral cysts (red arrows).

Table 1. Hepple Magnetic Resonance Imaging Staging System for Osteochondral Lesions of the Talus

Stage	Description
Stage 1	Articular cartilage damage only
Stage 2a	Cartilage injury with underlying fracture and surrounding bony edema
Stage 2b	Stage 2a without surrounding bony edema
Stage 3	Detached but undisplaced fragment
Stage 4	Detached and displaced fragment
Stage 5	Subchondral cyst formation

Donor Site Harvest and Insertion

Through a 3-cm arthrotomy over the lateral femoral condyle of the ipsilateral extended knee, the coring recipient reamer the same size as the donor previously used for the recipient harvest is carefully placed on top of the lateral femoral condyle chondral surface, and two 15-mm osteochondral grafts are harvested. The donor plug is then inserted and gently tapped in until flush circumferentially (Fig 6). Range of motion is checked to confirm there is no impingement of the OATS on the distal tibia. These forementioned steps are shown in Video 1.

Postoperative Care

For the first 2 weeks, the patient is placed in a nonweightbearing splint until wound healing occurs and sutures are removed. The patient then remain nonweightbearing for 6 weeks. Six weeks after the procedure, radiographic evaluations should be conducted (Fig 7). At this point, physical therapy with gentle range-of-motion exercises, as well as light strengthening, should begin. At 6 weeks, the patients are allowed partial weightbearing with 2 crutches.

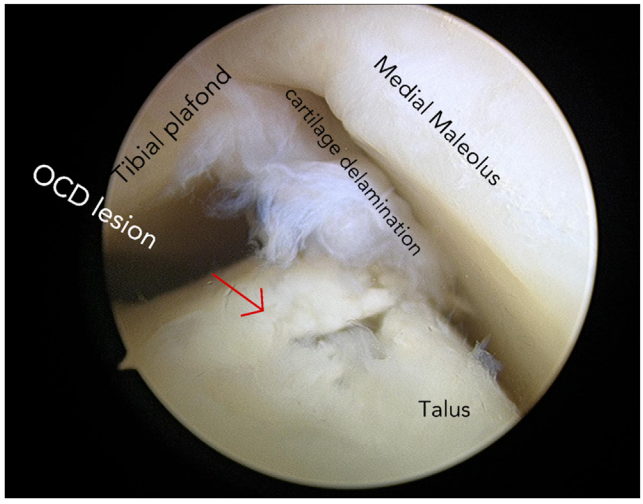

Fig 3. Arthroscopic photo of the patient in a supine position, with the scope on the anterolateral portal of the right ankle showing an osteochondral lesion on the anteromedial talar dome (red arrow) with cartilage delamination of the adjacent distal articular surface of the tibia.

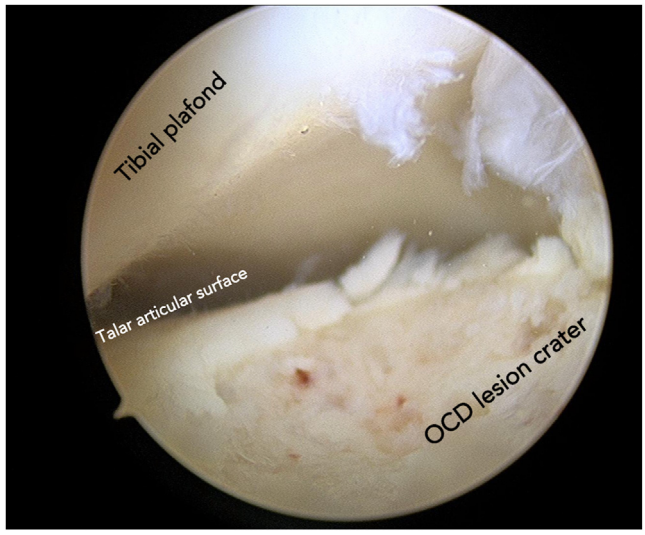

Fig 4. Arthroscopic photo of the patient in a supine position, with the scope on the anterolateral portal of the right ankle showing the crater of the lesion after debridement of unhealthy tissues until fresh bleeding from the subchondral bone to enhance healing.

Full weightbearing is allowed 8 weeks postoperatively, and the patient can resume activities as tolerated. An additional 4 weeks are needed for strenuous activity such as running. Range-of-motion exercises and strengthening should be continued for 6 weeks after full weightbearing.

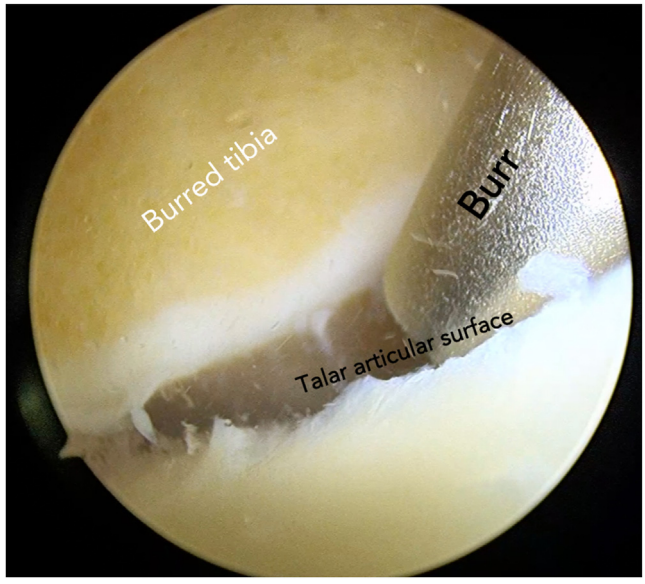

Fig 5. Arthroscopic photo of the patient in a supine position, with the scope on the anterolateral portal of the right ankle and burr through the anteromedial portal, with burring of the distal lip of the anterior tibia opposite the osteochondral lesion of the talus, which allows easy access to the lesion and better orientation of the grafts to be congruent with the adjacent articular surface of the talus.

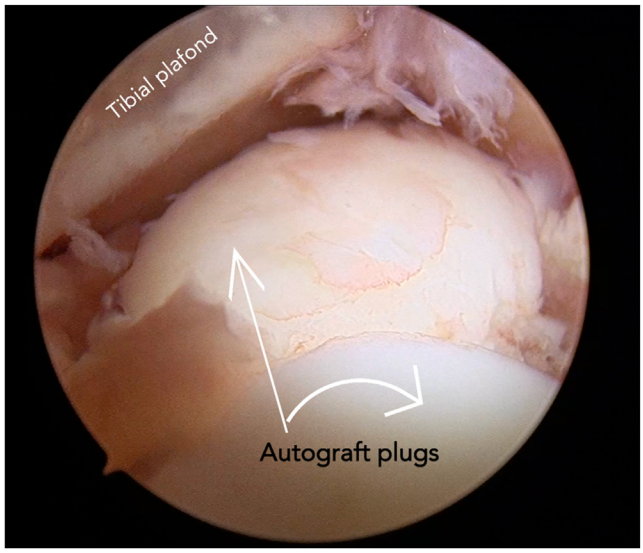

Fig 6. Arthroscopic photo of the patient in a supine position, with the scope on the anterolateral portal of the right ankle showing 2 osteochondral autografts each 8 mm in size press-fitted in the recipient site and congruent with the adjacent talar articular surface.

Discussion

Indications of surgery for OLTs vary significantly among studies. In general, failure of conservative management is an indication for surgical intervention.[3]

Lesions less than 1.5 cm^2, debridement, curettage, microfractures, or retrograde drilling are known surgical options used to create fibrocartilage at the affected site.[6] Although these procedures have short-term patient satisfaction and good outcomes, unfavorable long-term follow-up with increased pain and decreased function has been reported by Ahmad and Jones.[7]

To restore hyaline cartilage in recurrent symptoms after marrow stimulation procedures and/or lesions larger than 1.5 cm^2, articular cartilage replacement procedures with either OATS or osteochondral allograft have been performed to provide a valuable solution.[8]

Although the advantages of allograft transplantation include restoring the articular surface and eliminating the risk of donor site morbidity, a few authors have discouraged the use of this procedure due to the long duration of recovery and associated complications such as immunogenicity challenges, limited viability of chondrocytes, and cost in low socioeconomic countries.[9]

Several authors have favored the use of OATS due to the reported good outcomes regarding pain and functional scores, as well as MRI and arthroscopic evaluation, with no reported problems associated with donor site availability and morbidity.[10-12]

The open OATS procedure for medial talar lesions mostly requires a medial malleolar osteotomy to enable better visualization and increase access of the lesion.[6] According to Kim et al.,[13] significantly worse pain and lower functional outcomes are associated with complications if the articular surface of the tibial plafond at the malleolar osteotomy site is incongruent due to failure of anatomic reduction of the malleolus.[14]

Although most OLTs are accessible with plantar flexion stress, according to Muir et al.,[15] around 20% of the talar dome lesions are inaccessible without an osteotomy.[16] This technique avoids these risks by burring the anterior lip of the tibia to reach a lesion at the medial and central aspects of the talus. A potential disadvantage of our technique is donor site morbidity associated with autografts. In addition, the use of autografts from the ipsilateral knee allows for a less anatomic reconstruction of the talus because

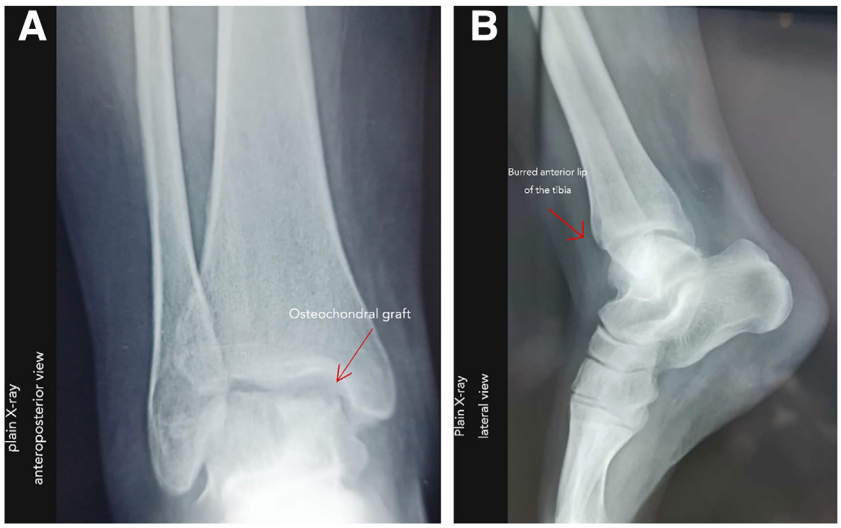

Fig 7. Postoperative plain x-ray anteroposterior (A) and lateral (B) views of the right ankle showing a healed lesion with a congruent surface.

Table 2. Advantages and Disadvantages of the Technique

Advantages	Disadvantages
Less invasive	Technically demanding
No need for malleolar osteotomy	Donor site morbidity
Reduced postoperative pain, allowing early rehabilitation	Not applicable for more posterior lesions
Rapid recovery and return to normal activities	Not suitable for lesions larger than 2 cm

harvesting of autografts is spatially constrained by the pre-existing anatomy of the femoral condyle of the knee (Table 2).

Disclosures

All authors (M.B., M.M.M., A.S.E., H.E., A.M.A.) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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