Medial Transmalleolar Portal Technique for Ankle Arthroscopic Headless Screw Fixation of Talar Osteochondritis Dissecans Lesions

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Abstract: This article describes a technique for arthroscopic fixation of an osteochondritis dissecans (OCD) lesion of the medial talar dome with headless compression screws. This technique involves creation of a medial transmalleolar portal using a guide and drill. The medial transmalleolar portal grants perpendicular access for screw fixation of OCD lesions in addition to the potential for osteochondral autograft transplantation (OAT). Advantages include access to the medial talar dome without performing a medial malleolar osteotomy. After completion of OCD fixation, an inverted osteochondral plug can be used to backfill the portal.

Osteochondritis dissecans (OCD) is a condition of synovial joints and is defined as a defect of the articular cartilage and subchondral bone.1,2 OCD lesions affecting the ankle joint were first described in 1922 by Kappis and later classified by Berndt and Harty in 1959.2 Osteochondral lesions of the talus (OLTs) are frequently associated with traumatic events; however, other atraumatic etiologies include vascular or synovial insult, microtrauma, chronic ankle instability, genetic predisposition, and endocrine or metabolic abnormalities.2,3

Nondisplaced, stable OLTs are typically treated with a nonoperative protocol, but nonoperative treatment is typically more successful in pediatric populations.4 In a systematic review by Verhagen et al.,4 it was found that nonoperative treatment (consisting of a period of immobilization, progressive weightbearing with physical therapy emphasizing peroneal strengthening, range of motion, and proprioceptive training) has a success rate of only 45%. Displaced or unstable OLTs, or lesions that have failed conservative therapy, are amenable to various arthroscopic or open operative techniques including microfracture, drilling, osteochondral autologous transplantation, osteochondral allograft transplantation, juvenile allograft transplantation, biological adjuncts, bulk transplantation, or talar resurfacing.1-5

OCD lesions of the medial talus provide unique challenges owing to the highly congruent talocrural joint. Depending on lesion location and size, a clinician must decide if a medial malleolar osteotomy is required to grant sufficient access to the medial talar lesion. Medial malleolar ostomies are associated with complications including delayed union, nonunion, painful hardware, and posttraumatic arthritis.3 The ability to avoid a medial malleolar osteotomy has numerous benefits.

To avoid osteotomy-associated complications, additional techniques have been developed. In one study, Perera et al.6 showed that it is possible to view and work on tibial OCD lesions from a transtibial approach without the need for a malleolar osteotomy, with a
significant decrease in morbidity and a substantial increase in activity. They reported a case of a tibial OCD lesion that they treated with an osteochondral autologous graft. This lesion was approached in an antegrade direction through the medial tibia to gain perpendicular access to the tibiotalar joint. An Acuflex PCL jig was used to guide drilling and an autologous osteochondral graft was inserted cartilage side down via the transtibial portal in order to restore the tibio-talar articular surface. In the following technique, we present a medial transmalleolar technique for accessing the medial talus for screw fixation of OCD lesions (Fig 1).

**Surgical Technique**

The patient is prepared for a standard ankle arthroscopy and placed in the supine position. Standard ankle distraction is applied. Regional landmarks are palpated and outlined, followed by injection of 30 cc normal saline into the joint. Standard anteromedial and anterolateral portals are established. A standard diagnostic evaluation is performed, and the medial OLT is identified (Fig 2). The scope is then inserted through the anterolateral portal to allow the ACL guide to be inserted into the anteromedial portal (Video). The ACL guide is placed over the OLT (Fig 3). The location at which the guide sleeve contacts the skin overlying the medial malleolus is marked. A medial incision is made over this point, and dissection is carried down to bone. This incision is similar to the standard incision used for the approach to the medial malleolus.

The ACL guide is advanced onto the medial malleolus bone (Fig 4). A 2.4-mm guide pin is drilled through the ACL guide from the medial malleolus to the tibiotalar joint. The ACL guide is removed, and a hemostat is inserted through the anteromedial portal to clamp the end of the guide pin to protect the talus (Table 1). Next, a 6-mm reamer is used over the guide pin from the medial malleolus to the tibiotalar joint, creating the medial transmalleolar portal (Fig 5). An arthroscopic cannula can be inserted into the portal to prevent arthroscopy fluid extravasation.

A headless screw guide pin is then inserted through the medial transmalleolar portal (Fig 6) for the headless compression screw (Biomet, Warsaw, IN). A depth gauge is placed over the guide pin to determine screw length, and a drill is inserted over the guide pin. The headless compression screw is slowly inserted over the

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**Fig 1.** A computer-generated 3-dimensional illustration of a left ankle. The medial transmalleolar tunnel is depicted with a purple cylinder. The entrance to the portal is on the medial tibia (solid black arrow). The portal exits into the tibiotalar joint (hashed black arrow). The medial talus (blue arrow) dome accessed through this portal, without an osteotomy.

**Fig 2.** Left ankle medial malleolus (MM) and medial talar dome (MTD) viewed through the anteromedial portal. The medial malleolus articular surface is visualized.

**Fig 3.** Left ankle viewed from the surgeon’s point of view. The surgical setup is pictured with the arthroscope in the anterolateral (AL) portal and tip of the ACL guide in the anteromedial (AM) portal. The guide sleeve is positioned over the medial malleolus (MM), marking the trajectory of the medial transmalleolar portal.
guide pin into the OLT (Fig 7), taking care to prevent stripping. Additional screws can be placed more anterior or posterior if needed for larger OLTs by dorsiflexing and plantarflexing the ankle. Screw heads can be visualized through the medial transmalleolar portal (Fig 8).

An osteochondral plug is used to fill the medial transmalleolar hole. An autologous or allograft plug can be used. Before graft placement, a dilator is inserted medially through the transmalleolar hole. A 7-mm dilator is used for a 6-mm hole. The dilator is advanced in antegrade fashion down to the edge of the tibial cartilage. A 7-mm osteochondral graft is then inserted cartilage side down under direct visualization with the arthroscope (Fig 9). The osteochondral plug can be inserted at the time of the primary procedure, or the plug can be inserted at the later procedure if hardware removal is desired (Fig 10).

### Postoperative Rehabilitation

The main focus of the postoperative period is to maintain range of motion while limiting shear forces on the cartilage. The ankle is placed in a short leg splint for the first week and then transitioned into a removable controlled ankle motion (CAM) walking boot. For the first 6 weeks, rehabilitation consists of gentle range of motion with passive stretching. The ankle is non-weightbearing for the first 6 weeks. In the next 6 week, advancement to full weightbearing and proprioception exercises are performed. After 12 weeks, more aggressive strengthening and endurance training is permitted.

### Discussion

Medial OLTs present a challenge to clinicians owing to the highly congruent talocrural joint. Depending on the location and size of the lesion, both arthroscopic and open operative options exist. Currently, larger...
 (>187 mm², 1870 mm³) and more posteriorly located (zones 7 to 8) medial OLTs have required surgeons to perform a medial malleolar osteotomy to gain adequate access to the lesion.8-10 We report our technique for fixation of medial OLTs using a medial transmalleolar portal. There are many advantages to this portal, including access to difficult-to-reach regions of the talus and avoiding an osteotomy (Table 2). In an attempt to avoid malleolar osteotomies, other clinicians have explored new techniques to gain talar dome access without an osteotomy.

A study by Tosun11 described a posteromedial approach to posteromedial talar dome lesions. This approach gives access to lesions in this location without a medial malleolar osteotomy; however, it requires a 6-cm longitudinal incision and runs the risk of damaging the posterior tibial artery and tibial nerve.11

Combined posteromedial and posterolateral arthroscopic portals have also been described that give access to the posterior process of the talus, zones 7 to 9, and more posteriorly located lesions in zones 4 to 6.12,13 This technique offers the advantage of avoiding complications associated with posteromedial and posterolateral arthrotopes. However, use of these portals runs
the risk of damage to the tibial nerve and posterior tibial artery and vein medially and sural nerve laterally.12,13

The other standard portals include anteromedial and anterolateral, which reliably allow access to zones 1 to 3.12 The anteromedial portal has potential risks to the anterior tibialis and saphenous neurovascular bundle, and the anterolateral portal risks damage to the superficial peroneal nerve.14,15 Limitations to the 4 standard ankle arthroscopic portals include inadequate perpendicular access for internal fixation of centrally located talar dome lesions.16

Galla et al.17 successfully demonstrated treatment of OLT with autologous matrix-induced chondrogenesis (AMIC) without a malleolar osteotomy. Their approach required anterolateral and anteromedial arthrotomies to gain adequate access to the talar lesions. This technique avoids the complications of a malleolar osteotomy, but it risks damage to anterolateral and anteromedial neurovascular structures during dissection.

In regard to the technique described here, we believe that there is potential risk to the saphenous nerve, so a mini-open approach to the medial malleolus should be performed with identification of any neurovascular structures.18 This approach is similar to the standard technique for open medial malleolar fixation, likely with similar risks.19,20

Our proposed technique describes creating a medial transmalleolar portal, thereby granting access to these hard-to-reach areas of the talus without performing a medial osteotomy. This technique also circumvents the need for extensive soft tissue dissection and avoids potential complications associated with open techniques.11,17,19,20 Fixation of talus OCD with screws is ideal for nondisplaced or minimally displaced lesions with intact cartilage.21,22 Other techniques such osteochondral autograft may be possible through the medial transmalleolar portal. The ability to fix larger lesions of the talus in difficult-to-reach areas without the need for an osteotomy using a medial transmalleolar arthroscopic portal shows great promise, as it could potentially reduce the complications associated with malleolar osteotomies.

References
1. Hurley ET, Stewart SK, Kennedy JG, Strauss EJ, Calder J, Ramasamy A. Current management strategies for osteochondral lesions of the talus. Bone Joint J 2021;103-B:207-212.
2. Looze CA, Capo J, Ryan MK, et al. Evaluation and management of osteochondral lesions of the talus. Cartilage 2017;8:19-30.
3. O’Loughlin P, Heyworth B, Kennedy J. Current concepts in the diagnosis and treatment of osteochondral lesions of the ankle. Am J Sports Med 2009;38:392-404.
4. Verhagen R, Strujs P, Bossuyt P, Van Dijk CN. Systematic review of treatment strategies for osteochondral defects of the talar dome. Foot Ankle Clin 2003;8:233-242.
5. Nguyen A, Ramasamy A, Calder J. Autologous osteochondral transplantation for large osteochondral lesions of the talus is a viable option in an athletic population: Response. Am J Sports Med 2020;48:NP48.
6. Perera A, Beddard L, Curran S, Robertson A. Osteochondral grafting of the distal tibia without a malleolar osteotomy: An all-arthroscopic antegrade approach. Tech Foot Ankle Surg 2015;14:120-127.
7. Gianakos AL, Yasui Y, Hannon CP, Kennedy JG. Current management of talar osteochondral lesions. World J Orthop 2017;8:12.
8. Sadlik B, Kolodziej L, Puszkarz M, Laprus H, Mojzes M, Whyte GP. Surgical repair of osteochondral lesions of the talus using biologic inlay osteochondral reconstruction: Clinical outcomes after treatment using a medial malleolar osteotomy approach compared to an arthroscopically-assisted approach. Foot Ankle Surg 2019;25:449-456.
9. Raikin SM, Elias I, Zoga AC, Morrison WB, Besser MP, Schweitzer ME. Osteochondral lesions of the talus: localization and morphologic data from 424 patients using a
novel anatomical grid scheme. *Foot Ankle Int* 2007;28:154-161.

10. Diepen PR van, Dahmen J, Altink JN, Stukens SAS, Kerkhoffs GMMJ. Location distribution of 2,087 osteochondral lesions of the talus. *Cartilage* 2020;1947603520954510.

11. Tosun B. Posteromedial approach for osteochondral lesions of the talus. *Foot Ankle Int* 2021;42:17-22.

12. Verghese N, Morgan A, Perera A. Osteochondral lesions of the talus: Defining the surgical approach. *Foot Ankle Clin* 2013;18:49-65.

13. Phisitkul P, Junko JT, Femino JE, Saltzman CL, Amendola A. Technique of prone ankle and subtalar arthroscopy. *Tech Foot Ankle Surg* 2007;6:30-37.

14. Carlson M, Ferkel R. Complications in ankle and foot arthroscopy. *Sports Med Arthrosc* 2013;21:135-139.

15. Ögüt T, Akgün I, Kesmezacar H, et al. Navigation for ankle arthroscopy: Anatomical study of the anterolateral portal with reference to the superficial peroneal nerve. *Surg Radiol Anat* 2004;26:268-274.

16. Muir D, Saltzman C, Tochigi Y, Amendola N. Talar dome access for osteochondral lesions. *Am J Sports Med* 2006;34:1457-1463.

17. Galla M, Duensing I, Kahn TL, Barg A. Open reconstruction with autologous spongiosa grafts and matrix-induced chondrogenesis for osteochondral lesions of the talus can be performed without medial malleolar osteotomy. *Knee Surg Sport Traumatol Arthrosc* 2019;27:2789-2795.

18. Mercer D, Morrell NT, Fitzpatrick J, et al. The course of the distal saphenous nerve: A cadaveric investigation and clinical implications. *Iowa Orthop J* 2011;31:231.

19. Loveday DT, Arthur A, Tytherleigh-Strong GM. Technical tip: Fixation of medial malleolar fractures using a suture anchor. *Foot Ankle Int* 2009;30:68-69.

20. Matson A, Barchick S, Adams S. Comparison of open reduction and internal fixation versus closed reduction and percutaneous fixation for medial malleolus fractures. *J Am Acad Orthop Surg Glob Res Rev* 2017;1:e048.

21. Choi YR, Kim BS, Kim YM, et al. Internal fixation of osteochondral lesion of the talus involving a large bone fragment. *Am J Sports Med* 2021;49:1031-1039.

22. Schachter A, Chen A, Reddy P, Teiwani N. Osteochondral lesions of the talus. *J Am Acad Orthop Surg* 2005;13:152-158.