5 points on

Osteochondral Lesions of the Talar Dome

James W. Stone, MD

1 Recognize the essential differences between medial and lateral talar dome lesions.

The most common locations of osteochondral lesions of the talar dome are either the anterolateral or posteromedial talar dome.[1-3] The lateral lesions are almost always posttraumatic in origin, occurring most often after inversion ankle sprains. They tend to be thinner and more wafer-like than their medial counterparts and may cause an acute hemarthrosis. Radiographic findings range from a minimal flake fragment to a large bony fragment that may be displaced or even inverted such that the articular surface faces downward. These lesions tend to have viable bony fragments that may be amenable to internal fixation with accurate reconstitution of the articular cartilage surface in the acute situation. Internal fixation with absorbable pins or screws may be performed arthroscopically or with a small anterolateral arthrotomy exposing the lesion. Excision of these lesions is usually easily accomplished arthroscopically with standard portals and techniques.

In contrast, posteromedial lesions are more often chronic in origin, and patients may present with complaints of long-standing chronic or intermittent ankle pain that may be poorly localized to the medial side of the ankle, but occasionally lateral ankle pain may be the chief complaint.[4] These lesions are generally deeper and cup-shaped and may have a substantial amount of subchondral bone involvement. The underlying subchondral bone tends to be necrotic and insufficient to support the overlying lesion, which includes unstable articular cartilage and bone (Figure 1). These lesions are rarely amenable to treatment that retains the native articular cartilage, because the poor quality of the articular cartilage and subchondral bone prevents healing with attempts at internal fixation. Open approaches to the most posteromedial lesions have traditionally included exposure using medial malleolar osteotomy. Arthroscopic techniques have essentially replaced open approaches to these lesions, and arthroscopy affords excellent exposure while minimizing complications related to osteotomy and accelerating postoperative rehabilitation.

Figure 1. Anteroposterior x-ray shows large posteromedial talar dome osteochondral lesion.

2 Carefully consider the differential diagnosis for ankle pain.

Presence of an osteochondral lesion of the talar dome does not assure the treating physician that the lesion is the cause of the patient's pain. The differential diagnosis for ankle pain must be considered and other possible diagnoses ruled out as a cause of the disability. Patients with medial lesions may present with lateral ankle pain, and vice versa. Diagnoses to be ruled out by history taking, physical examination, and appropriate radiographic studies include tendinitis (eg, peroneal, posterior tibial, Achilles), generalized synovitis, arthrofibrosis with limitation of range of motion, subtalar pathology, os trigonum, tarsal tunnel syndrome, soft-tissue impingement, and bony impingement.

Each patient with an osteochondral lesion of the talar dome should be assessed for ankle instability. This assessment may include history of recurrent ankle sprains, objective evidence of joint laxity on physical examination and/or stress x-rays, and magnetic resonance imaging (MRI), which may reveal chronic lateral ligament injury. Failure to recognize and treat symptomatic instability may result in recurrent ankle pain and disability after treatment of the osteochondral lesion. If surgical treatment

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Figure 2. Surgical setup for arthroscopic surgery of ankle. Applied to the ankle is a sterile noninvasive distractor that allows for constant distraction and affords access to anterior and posterior portals.

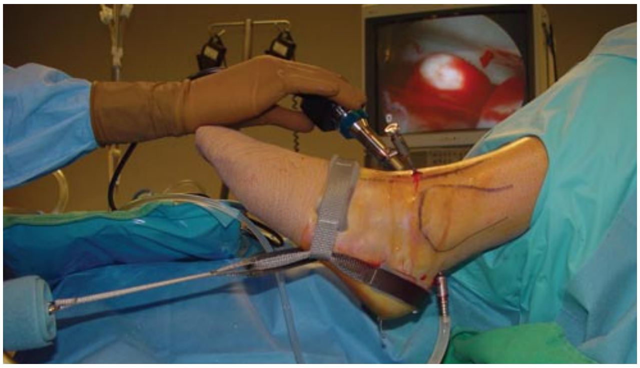

Figure 3. Intraoperative use of arthroscope in anteromedial portal with inflow (through arthroscopic fluid pump) in posterolateral portal. In the anterolateral portal is a cannula.

of ligament laxity is required, it may be performed when the talar dome lesion is being treated, or it may be staged.

Last, careful assessment should be made for fixed varus or valgus deformity. As an example, a fixed deformity of the tibia resulting in varus malalignment of the ankle joint associated with a medial osteochondral lesion might require concurrent treatment of the deformity by corrective osteotomy to realign the joint, followed by treatment of the osteochondral lesion itself. Failure to address deformity may result in persistent abnormal biomechanics and persistence of symptoms.

3 Become facile with arthroscopic ankle exposures of even the most posterior lesions.

Two major advances in arthroscopic ankle surgery have facilitated treatment of even the most posterior talar dome lesions. First, use of noninvasive ankle joint distraction allows the joint to be maintained in a maximally open state intraoperatively using constant application of distraction force (Figure 2). A commercially available distraction clamp allows the distraction device to be applied in a sterile manner over the operative drapes with a commercially available a disposable distraction strap. Second, small joint arthroscopes with wide-angle viewing and high optical resolution make use of large joint arthroscopes unnecessary. The small joint arthroscopes are more easily maneuvered across the joint to expose the posteromedial lesions while minimizing risk for iatrogenic articular cartilage injury. The standard 30° viewing scope is most often used, but the 70° view arthroscope should also be kept routinely available, as it may facilitate complete viewing of the lesions and minimize the need for intraoperative repositioning of the scope medial to lateral. The 2.7-mm arthroscope is generally small enough for this application and is relatively sturdy. However, it is convenient to have a 1.9-mm scope available in case a particularly tight ankle is encountered.

Surgeons should become comfortable with 3 standard portals. The anteromedial portal is created just medial to the anterior tibial tendon at the level of the joint line. The best position of the portal should be determined first by introducing an 18-gauge needle across the joint to determine the level of entry to allow easiest passage through the joint. Next, the anterolateral portal is placed under direct visualization, again using a hypodermic needle as a guide to the appropriate level. The portal is located just lateral to the peroneus tertius tendon and must be placed to avoid injury to the adjacent branches of the superficial peroneal nerve. Nerve injury is avoided by proper portal creation procedures. The scalpel should be used to incise the skin only, and then the subcutaneous tissue is spread with a mosquito forceps to the level of the capsule, which is then penetrated with a cannula with a blunt obturator. Making the portals large enough to easily pass cannulas and other instruments will decrease soft-tissue injury with its associated complications of sinus tract formation and infection.

The last portal is the posterolateral portal. It is located adjacent to the lateral border of the Achilles tendon and approximately 1 to 2 cm distal to the anterior portals. This location allows the instruments to accommodate the curvature of the posterior talar dome and allows entry of the cannula into the joint just beneath the posterior tibiofibular ligament complex. This portal may be used for fluid inflow using a pump or gravity, posterior viewing using the scope, or instrumentation (Figure 3).

4 Become familiar with options for drilling intact lesions.

Lesions amenable to simple drilling are uncommon. Rarely, a lesion is symptomatic and unresponsive to nonoperative treatment, but x-rays reveal no abnormality, and MRI shows only subchondral bone edema without a separate articular cartilage or subchondral bone fragment. In other cases, x-rays document a nondisplaced articular cartilage lesion with a nondisplaced bone fragment, and MRI documents the absence of fluid underlying the lesion. To be able to heal, these lesions must have adequate blood supply to the subchondral bone. If MRI suggests significant necrotic subchondral bone, then drilling of a posteromedial lesion will not lead to healing even if the articular surface appears intact. Arthroscopic inspection must demonstrate intact articular cartilage in the absence of a mobile bone fragment or substantial necrotic subchondral bone.

Figure 4. Intraoperative arthroscopy shows medial talar dome lesion with elevation of loose fragment.

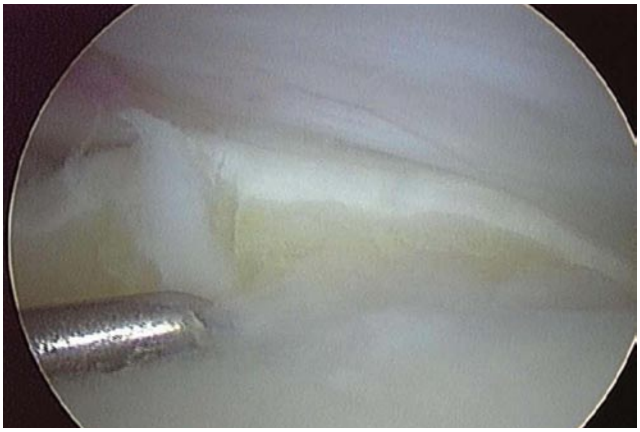

Figure 5. Elevation of talar dome lesion using a probe. The loose fragment is then removed with loose-body forceps.

Lateral lesions are usually located anterior enough that drilling may be performed through the anterolateral portal or through an accessory anterolateral portal placed immediately adjacent to the anterior edge of the tibia to allow the most perpendicular approach to the lesion. Intraoperative ankle plantar flexion may facilitate drilling. Multiple holes are drilled using a small-diameter Kirschner wire at 3- to 5-mm intervals.

Posteromedial lesions are more difficult to approach for drilling. Most are too posterior to allow a simple drilling from anterior because an angle close to perpendicular cannot be obtained. Historically, we have used the so-called transmalleolar approach to drilling these lesions. A commercially available drill guide facilitates passage across the medial malleolus into the lesion under arthroscopic visualization. Multiple passages through the same tract with various positions of ankle dorsi or plantar flexion allow placement of multiple holes. Alternatively, multiple tracts may be used in combination with different angles of dorsi and plantar flexion.

Transmalleolar drilling has the disadvantage of requiring penetration of the normal articular cartilage of the medial tibial plafond to reach the abnormal area of the talus. Retrograde transtalar drilling avoids this undesirable aspect of the transmalleolar procedure.[5,6] Again, a commercially available drill guide facilitates passage of the guide pin using an entry point in the sinus tarsi and directed posteromedially into the lesion. The drill can be slowly advanced until vibrations are noted under the articular cartilage and can be stopped before articular cartilage penetration. Multiple holes are drilled using the guide to direct proper angulation.

5 Refine techniques for débridement of the osteochondral lesion with treatment of the bone base using curettage, abrasion, or drilling.

The precise outlines of the lesion are determined after a complete and organized diagnostic arthroscopy of the joint (Figure 4). A probe outlining the perimeter of the lesion is a useful initial instrument for elevating the fragment and inspecting the quality of the attached subchondral bone and the underlying bone bed (Figure 5). Often, major fragments can be elevated with a probe or curette and then removed piecemeal with a small loose-body forceps. As the major fragments are removed and the remaining necrotic bone fragments become smaller, a small joint shaver facilitates debris removal. It is important to establish well-attached articular cartilage margins at the periphery of the entire lesion. A frequently neglected area of débridement is the vertical surface of the talus in the medial gutter. Failure to remove all unstable bone and articular cartilage fragments in the gutter will lead to a poor clinical result (Figure 6).

Once the major bone and cartilage fragments along with the necrotic bone of the base have been débrided, a decision must be made regarding treatment of the base. Studies have suggested better outcomes with some type of treatment of the base to stimulate a viable subchondral bone bed. Options include simple curettage, abrasion, drilling, and “microfracture” of the base. No studies have specifically recommended one type of base treatment over another. If simple curettage results in adequate bleeding as demonstrated intraoperatively by diminishing the inflow pressure (and deflating the tourniquet if it was inflated for the débridement), then further treatment is probably unnecessary. If a bleeding bed is not demonstrated, then the base can be abraded with a round burr. Alternatively, drilling can be done, but drilling in this application involves the same difficulties experienced with intact lesions. Therefore, many surgeons have switched to using microfracture awls, which are available in angles and allow multiple penetrations of the base in the absence of any heat necrosis caused by drilling. In most applications, this procedure is not a true microfracture as defined by Steadman[7] and applied to the knee joint, as the subchondral bone and substantial necrotic cancellous bone have been removed.

After surgery, the ankle is placed into a posterior splint for 5 to 7 days, and the patient is kept non–weight-bearing while the wounds heal. Sutures are then removed, and range-of-motion exercises are encouraged. A continuous passive motion may be used postoperatively. For small lesions (<1 cm in diameter), patients may be allowed to increase weight-bearing as tolerated. For larger lesions (>1 or 1.5 cm in diameter),

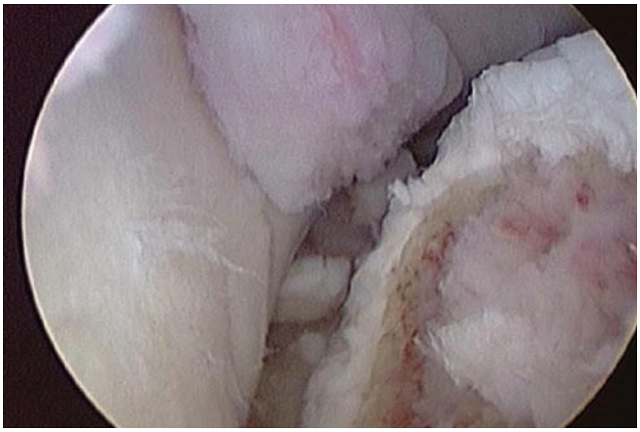

Figure 6. Talar dome lesion after complete débridement and abrasion of the base. The lesion extends from the horizontal surface of the talar dome onto the vertical surface in the medial gutter. Complete excision requires débridement of the medial gutter component with stabilization of the articular cartilage margins.

non–weight-bearing or touch-down weight-bearing may be indicated for 4 to 6 weeks. Physical therapy can then be useful for increasing range of motion and strength. Anticipated return to jogging is approximately 12 weeks after surgery, and return to full activities is 3 to 6 months after surgery.

This technique for arthroscopic débridement of osteochondral lesions of the talar dome applies to the vast majority of lesions that do not respond to nonoperative treatment and are not accompanied by obvious mechanical symptoms mandating surgical treatment. The goal of this type of surgery is to replace the normal articular cartilage with fibrocartilage. This treatment yields successful results in 80% to 90% of patients in short-to medium-term follow-up.[8-10] Some study results suggest that patients with osteochondral lesions of the talar dome associated with a significant cystic component have poorer outcomes with such traditional treatment.[11-13] In addition, large lesions (>1.5 cm in diameter) may also have a poorer prognosis.

Conclusions

This article has described arthroscopic treatment of osteochondral talar dome lesions. Using newer techniques, orthopedic surgeons have attempted to replace normal articular cartilage with a new articular cartilage surface using one or more osteoarticular autografts in a single or mosaic form with the knee as the usual donor site.[14-16] Early results have been encouraging, but issues of donor site morbidity, durability of transplanted articular cartilage tissue, and potential complications of malleolar osteotomy (which is usually required for these lesions) require careful consideration of the potential risks and benefits of these procedures. Better long-term follow-up studies must address these issues before indications for these procedures can be clearly defined in relation to traditional débridement procedures.

Other methods of articular cartilage replacement, using cultured chondrocytes, are available for treatment of these lesions. Autologous chondrocyte implantation requires obtaining donor cartilage from the knee or from a suitably sized fragment from the ankle and culturing the cells in vitro.[17-20] The cells are then transplanted beneath a layer of periosteum usually through a malleolar osteotomy. The procedure is expensive, usually requires osteotomy, and may require supplemental bone grafting if there is significant bone loss (sandwich procedure). In addition, at least one knee study has shown that biopsy of the resulting tissue demonstrates tissue quality similar to that obtained by simple microfracture of the bone lesion without transplantation.

Studies of matrix scaffolds with embedded chondrocytes have been conducted mainly in Europe—Membrane/Matrix Autologous Chondrocyte Implantation (MACI), for example.[21] Results have been encouraging in short-term studies, which lack control groups. These procedures have the potential advantage of being able to be performed completely arthroscopically, but, again, further well-designed studies with adequate follow-up are required to determine how these procedures may fit into our surgical armamentarium.

Author's Disclosure Statement

The author reports no actual or potential conflict of interest in relation to this article.

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