

Improved Visualization of the 70° Arthroscope in the Treatment of Talar Osteochondral Defects

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Abstract: Osteochondral defects (OCDs) of the talus are a common cause of residual pain after ankle injuries. When conservative treatment fails, arthroscopic debridement combined with drilling/microfracturing of the lesion (bone marrow stimulation [BMS] procedures) has been shown to provide good to excellent outcomes. Not uncommonly, talar OCDs involve the borders of the talar dome. These uncontained lesions are sometimes difficult to visualize with the 30° arthroscope, with potential negative effect on the clinical outcome of an arthroscopic BMS procedure. The use of the 70° arthroscope has been described for a multitude of common knee, shoulder, elbow, and hip procedures. The purpose of this article is to show the usefulness of the 70° arthroscope in arthroscopic BMS procedures, pointing out which kinds of talar OCDs can benefit most from its use.

Osteochondral defects (OCDs) of the talus are a common cause of residual pain after ankle injuries. Published data report incidences of talar OCDs up to 60% in association with chronic ankle joint instability and from 28% to 70% in association with ankle fracture.¹ Less frequently, the etiology of a talar OCD is atraumatic.

Several procedures have been described for the operative treatment of OCDs of the talus,² but no surgical guidelines have been generally agreed upon for this challenging problem. When conservative treatment fails, arthroscopic debridement combined with drilling/microfracturing of the lesion (bone marrow stimulation [BMS] procedures) has been shown to provide good to excellent outcomes.^{2,3} The aims of BMS techniques are to create multiple connections with the subchondral bone, to introduce bone marrow cells in the OCD, and to promote filling of the lesion with new fibrocartilaginous tissue.

The use of the 70° arthroscope has been described for a multitude of common knee, shoulder, elbow, and hip procedures.^{4,5} The purpose of this article is to describe the advantages afforded by the use of the 70° arthroscope in terms of visualization and treatment of uncontained OCDs of the talus.

Localization of Osteochondral Defect and Arthroscopic Visualization

Arthroscopic exploration of the ankle may be demanding because of the tight nature of this congruent joint. In particular, it can be difficult to gain access to the narrow spaces of the joint gutters because of the inability of the 30° arthroscope to look “around the corner” of the talar dome shoulders.

Not uncommonly, talar OCDs involve the borders of the talar dome, extending to the posterior areas of the medial or lateral gutter. These uncontained lesions are sometimes difficult to visualize with the 30° arthroscope positioned in the anterior portal contralateral to the OCD (Fig 1). In these cases treatment of the lesion under direct visualization is compromised, with potential negative effect on the clinical outcome of an arthroscopic BMS procedure.

The 70° arthroscope gives the surgeon the ability to look around the corner of the talar dome, improving the arthroscopic view of the joint gutters. In this way better visualization of uncontained lesions is provided, with consequent advantages in terms of complete debridement and creation of stable cartilage edges of the whole defect (Fig 2).

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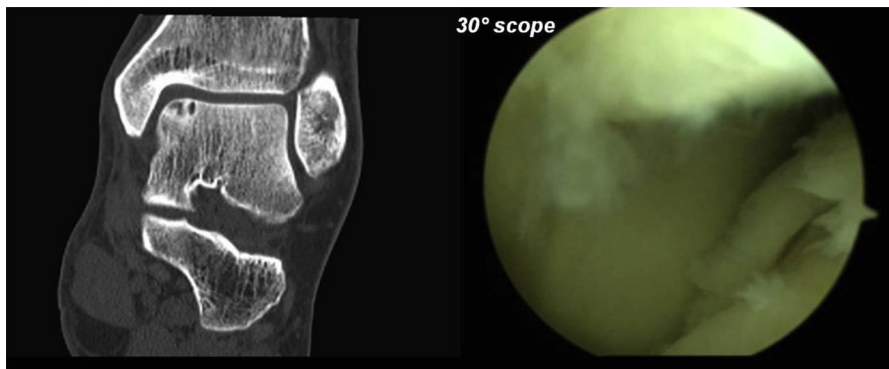


Fig 1. Uncontained OCD involving the medial talar shoulder in a left ankle. A computed tomography scan, coronal image, is shown on the left. Arthroscopic view through the anterolateral portal is shown on the right. The area of the lesion localized over the medial talar shoulder is hardly seen with the 30° arthroscope placed in the anterior portal contralateral to the lesion.

Surgical Technique

Unless specific contraindications are present, the arthroscopic BMS procedure is performed with the patient under spinal anesthesia. The patient is positioned supine, with a tourniquet at the upper thigh level. The affected side is slightly elevated with a small cushion under the buttock (Fig 3).

Standard anterior portals are created, the antero-medial first and the anterolateral under arthroscopic control. Visualization of the anterior ankle joint with a 4-mm 30° angled arthroscope is routinely performed, with the ankle in a position of dorsiflexion⁶ (Video 1, 24 seconds). When present, hypertrophy of the synovium, fibrous adhesions, and osteophytes are visualized and excised, with either a mechanical shaver (4.5-mm full-radius Bonecutter blade [Dyonics Power Shaver System]; Smith & Nephew, Andover, MA) or a chisel, depending on the nature of the tissue to be removed. The osteochondral lesion is then identified based on the

preoperative imaging, by means of a noninvasive distraction device⁷ (Video 1, 40 seconds) and using plantar flexion to bring the lesion toward the arthroscope. Uncontained lesions are usually scarcely visualized with the 30° arthroscope placed in the anterior portal contralateral to the OCD (Fig 4; Video 1, 67 seconds). At this point of the procedure, leaving the arthroscope shaft in place, the surgeon exchanges the 30° arthroscope for a same size arthroscope (Video 1, 77 seconds). The improved visualization of the gutters enables clear identification of the borders of the lesion (Video 1, 99 seconds) that can be debrided under direct visualization either with a curette (ring shaped or curved) or with a 3.5-mm full-radius Bonecutter shaver blade. Once stable cartilage borders have been created, microfractures are performed in the subchondral bone (microfracture 45° awl; Linvatec, Largo, FL), holding the 70° arthroscope in place (Fig 5; Video 1, 108 seconds).

The postoperative management consists routinely of early, unrestricted, active ankle movements in the pain-free range. Partial weight bearing with an ankle orthosis is allowed after 4 weeks, with subsequent progressive advancement to full weight bearing as tolerated. Running and any other impact activity are forbidden for 4 months.

Discussion

Several authors agree to define arthroscopic BMS as the most effective treatment strategy for OCD of the talus.^{2,3} Successful outcomes also have been reported after osteochondral autograft transplantation and autologous chondrocyte implantation (ACI),² but several complications, such as failure of graft incorporation, irregularity of joint surfaces, and donor-site morbidity, have been typically associated.^{8,9} The need for a 2-stage procedure and cost represent further barriers for ACI.

Arthroscopic BMS can be performed in a minimally invasive manner, may avoid potential complications, and is a relatively inexpensive procedure. Criticism toward this technique focuses on the mechanical properties of the fibrocartilage tissue that fills the

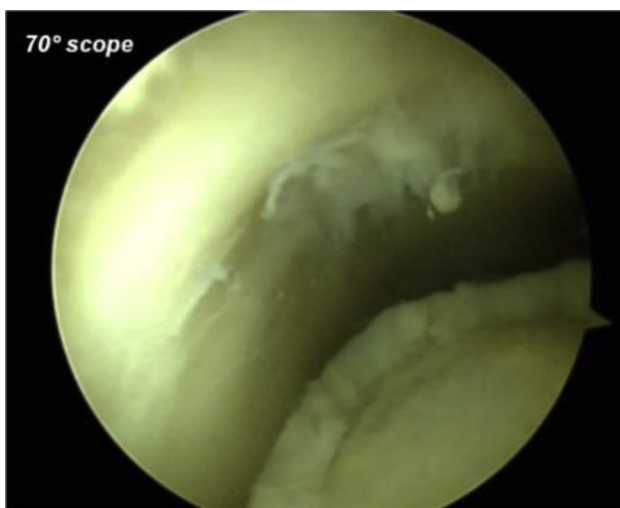


Fig 2. Uncontained OCD involving medial talar shoulder (same lesion shown in Fig 1) (arthroscope in anterolateral portal). With the 70° arthroscope, the injured area behind the medial talar shoulder is clearly visualized and the complete debridement of the lesion is verified.

Fig 3. Anterior ankle arthroscopy setup. Positioning of the ankle in neutral rotation facilitates anterior triangulation, as shown on the left. A slight elevation of the affected side prevents potential impingement of the devices from the anteromedial portal with the contralateral side, as shown on the right.



debrided lesion. However, the only available Level I trial comparing operative procedures for talar OCDs failed to show superiority of both osteochondral autograft transplantation and ACI over BMS techniques,¹⁰ despite the theoretic advantage related to repair of the lesion with tissue that more closely resembles hyaline cartilage.

To improve the success rate of BMS procedures, some studies have been designed to define specific outcome predictors.¹¹⁻¹³ Size of the lesion has been found to be the most powerful predictor of clinical outcome, with a defect area of approximately 1.5 cm² as a cutoff for the risk of clinical failure after arthroscopic BMS.¹¹ These data confirm the major therapeutic role of BMS procedures, because the large majority of diagnosed talar osteochondral lesions do not exceed an area of 1.5 cm².^{13,14}

An integral step in BMS procedures is creating a stable border of cartilage to surround the osteochondral lesion, to provide some degree of protection to the fibrocartilage that will form. Besides, any left injured cartilage fragment, detached from the underlying subchondral bone, will act as an irritant in the joint space, promoting recurrence of symptomatology. Therefore an essential requisite for a successful arthroscopic BMS procedure is visualization of the complete extension of the lesion.

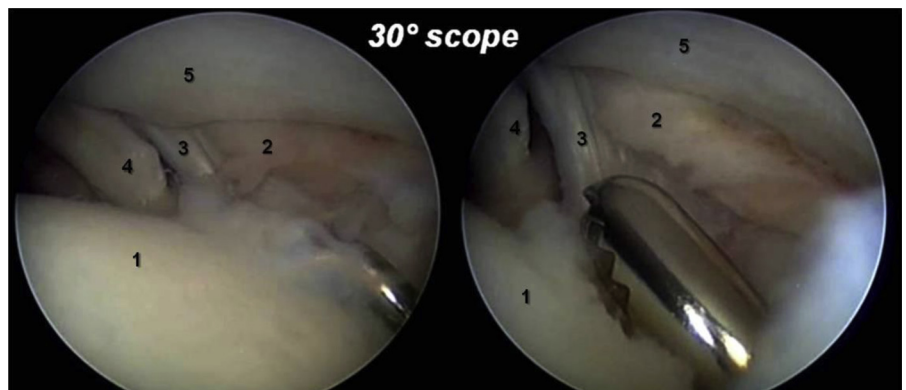
Uncontained OCDs are the lesions that benefit the most from the use of the 70° arthroscope, because

improved visualization of the lesion portions “hidden” in the joint gutters is guaranteed. In this way any area of loose cartilage can be excised under direct visualization, until stable edges of the whole lesion are achieved. Containment of a talar osteochondral defect recently has been identified as a variable predictor of poor outcome after BMS procedures.^{13,15} The authors’ explanation is that the involvement of talar dome shoulders has a negative impact on the formation of a stable area of fibrocartilage.

On the basis of our experience, we suggest that a contribution to the detrimental consequences for clinical outcome also could be related to the fact that uncontained OCDs are the most difficult to visualize and to treat with the most commonly used 30° arthroscope. Other aspects than the containment of the lesion have to be considered during the preoperative planning for the arthroscopic treatment of a talar OCD (Table 1).

The amount of ankle plantar flexion recently has been defined by van Bergen et al.¹⁶ as a predictive factor of the accessibility of the talus, by means of anterior ankle arthroscopy. In fact, limited plantar flexion prevents anterior displacement of the posterior areas of the talar dome toward the arthroscopic field of view. In this regard, the removal of eventual osteophytes of the anterior distal tibial rim, homolateral to the lesion (Video 1, 9 seconds), is a useful tip, because it facilitates arthroscopic access to posterior OCDs.

Fig 4. Uncontained posterolateral OCD in a left ankle (arthroscope in anteromedial portal). The lesion is first identified with a probe (left) and then debrided as permitted by the 30° arthroscope (right). (1, talus; 2, synovial fringe; 3, transverse ligament or deep component of posterior tibiofibular ligament; 4, posterior intermalleolar ligament; 5, tibia.)



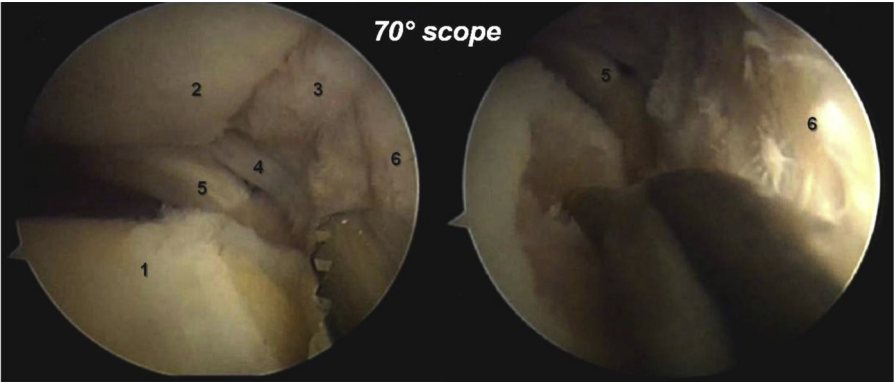


Fig 5. Uncontained posterolateral OCD (same lesion shown in Fig 3) (arthroscope in anteromedial portal). The ability of the 70° arthroscope to look around the talar dome shoulder enables complete debridement of the lesion (left) and microfracture under direct visualization (right). (1, talus; 2, tibia; 3, synovial fringe; 4, transverse ligament or deep component of posterior tibiofibular ligament; 5, posterior intermalleolar ligament; 6, lateral malleolus.)

Table 1. Preoperative Planning for Arthroscopic BMS Procedure for Talar OCD

Lesion Type/Patient-Related Features	Technical Tip
Containment of lesion	Use the 70° arthroscope to look over the talar dome shoulders.
Location of lesion (sagittal plane)	Use ankle plantar flexion to bring posterior lesions toward the arthroscope.
	Use articular distraction to allow the arthroscope to move safely between the articular surfaces, toward posterior lesions.
Anterior distal tibial rim osteophytes (in line with OCD on axial plane)	Perform surgical excision to facilitate arthroscopic access to the lesion.
OCD located far posterior in stiff joint with limited plantar flexion	Consider alternative approaches: Supplementary posterolateral portal Posterior 2-portal approach with patient in prone position

Stiffness of the joint also has to be considered, because of its consequence on articular distraction. In case of tight joints, the ability of the arthroscope to glide safely between the talar and tibial surfaces toward the lesion is affected, resulting in potential impaired visualization. The negative impact of these clinical features is limited by the use of the 70° arthroscope, which guarantees visualization of the lesion from a farther distance than the 30° arthroscope, because of its typical field of view (Figs 6 and 7).

In our experience the use of a 4.0-mm 70° arthroscope, combined with noninvasive distraction and plantar flexion of the ankle, has always allowed

treatment of uncontained posterior lesions from standard anterior portals, without the need for supplementary posterior portals. This contributed to maintain the minimally invasive nature of the arthroscopic BMS procedure while minimizing the risk of potential complications.¹⁷ No specific risk associated with the use of the 70° arthroscope has been noticed. Nevertheless, in case of far posteriorly located OCDs, especially in stiff joints with limited plantar flexion, alternatives should be considered. In these cases the use of a posterolateral portal or posterior arthroscopy with the patient in the prone position represent valid options.¹⁸

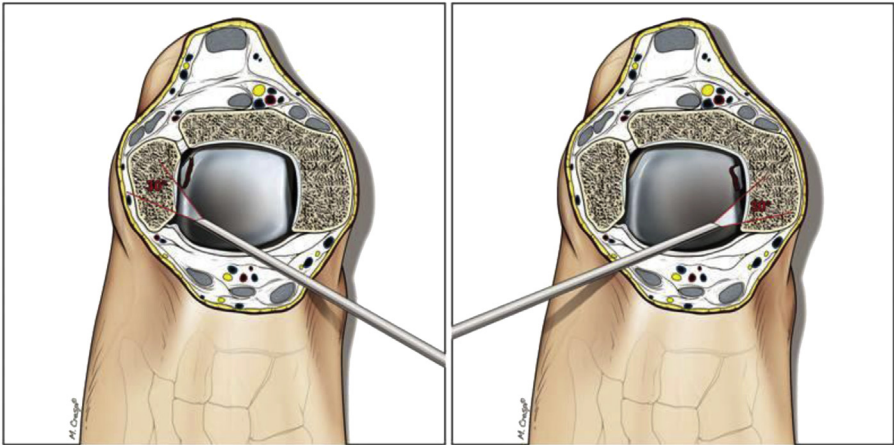
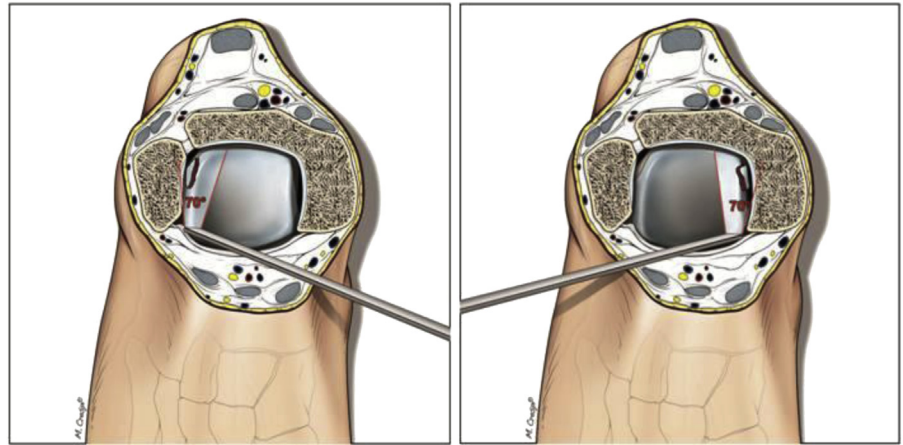


Fig 6. The anatomic environment of the portals used in anterior ankle arthroscopy determines the need for the arthroscope to be displaced posterior between the articular surfaces, so as to visualize the injured area. This is notably true in case of limited plantar flexion, because the potential anterior displacement of a posterior lesion toward the arthroscopic field of view is affected.

Fig 7. The 70° arthroscope's field of view allows visualization of a posteriorly located OCD with no need to be as close to the lesion as the 30° arthroscope. As a consequence, the reduction of potential anterior displacement of the lesion toward the arthroscope, associated with limited plantar flexion and/or joint stiffness, has limited effect on visualization.



We recommend the use of a 70° arthroscope in the arthroscopic BMS treatment of uncontained OCDs of the talus. The improved visualization contributes to the execution of a correct procedure, which is essential for a successful clinical outcome.

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