

A Push-Pull Distraction Method for Arthroscopic Subtalar Joint Arthrodesis



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ABSTRACT

Unlike ankle joint arthroscopy, distraction of the subtalar joint can be challenging. We introduce a powerful distraction method that can be used during an arthroscopic subtalar joint arthrodesis procedure using a “push-pull” technique. A fully threaded screw is used to push the talus while the calcaneus is pulled to distract the joint. The technique allows the surgeon to access the rather tight joint without disrupting a significant amount of the ligamentous and capsular structures. It also allows preservation of the vascular structures that supply the talus. The “push-pull” screw can also be converted to a second point of fixation at the end of the procedure.

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It has been shown that arthroscopic subtalar joint arthrodesis results in a good outcome with a relatively low complication rate (1–7). The arthroscopic approach provides a more manageable postoperative course in terms of wound healing, pain control, and bone healing compared with an open procedure. However, unlike in arthroscopic ankle arthrodesis, distraction of the subtalar joint can be challenging.

Different techniques have been described for distraction of the subtalar joint during the arthroscopic procedure. Gravity distraction has been described as having the patient in the prone position with the foot hanging off the edge of the bed, allowing gravity to distract the joint (5). This technique can be used when adequate joint space is available for the instrumentation to complete the synovectomy, debridement, and joint preparation. When there is not enough space, an external foot strap can be used for additional distraction.

A blunt trocar can be also used to distract the subtalar joint (8). For this technique, the trocar is inserted from a separate portal and forced into the subtalar joint to achieve separation of the talar and calcaneal

surfaces of the posterior facet. Although simple, distraction using this technique will be limited by the thickness of the trocar.

Calcaneal skeletal traction can also be used. A transfixation wire is placed in the calcaneal tuberosity, and the wire is pulled using a traction device to distract the subtalar joint. Different modifications of the technique have been described (9–11). This technique is useful, especially when joint preservation is needed. However, in many situations, the traction force will be dissipated by distraction of the ankle joint.

We introduce a powerful distraction method that can be used during an arthroscopic subtalar joint arthrodesis procedure using a “push-pull” technique. A fully threaded cortical screw is used to push the talus while the calcaneus is pulled proximally to distract the joint.

Surgical Technique

This technique works best when the subtalar joint is approached from the posterior portals. The patient should be placed in a prone position with the operative foot hanging off the end of the table. A sand bag or bump can be placed under the contralateral hip to internally rotate the operative lower extremity to position the foot straight up and down. Posteromedial and posterolateral portals are then created just medial and lateral to the Achilles tendon, approximately 1 to 2 cm proximal to the tip of the lateral malleolus (Fig. 1).

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 Video online only at <http://www.jfas.org>



Fig. 1. Patient positioning and portal placement.

From the posterior portals, the arthroscopic instruments are introduced. The arthroscopic instruments should be aimed slightly plantarly to identify the posterior aspect of the posterior facet of the subtalar joint. A hemostat can be used at this point to spread the soft tissue structures, and a shaver or resector is used to debride the posterior ligamentous and capsular structures of the subtalar joint. The flexor hallucis longus tendon can then be identified (Fig. 2). The vital neurovascular structures are located just medial to the tendon; therefore, the rest of the procedure should be performed lateral to the tendon.

Once the posterior aspect of the posterior facet of the subtalar joint is clearly visualized, the joint should be placed through its range of motion to confirm that the joint is the subtalar joint. A third stab incision can be created at the retrolateral malleolar area, just posterior to the peroneal tendons to perform a “predistraction” using the trocar technique (8). From this portal, a trocar is inserted and advanced toward the posterior lateral aspect of the posterior facet of the



Fig. 3. An intraoperative C-arm fluoroscopic image showing the trocar inserted in the posterior facet of the subtalar joint to distract the subtalar joint.

subtalar joint. The trocar is then identified under arthroscopy and forced into the posterior facet (Supplemental Video S1). This will in turn distract the joint to some degree (Fig. 3). This “pre-distraction” will allow visualization of the subtalar joint while performing the next step: insertion of the “push-pull” screw.

At this point, under-drilling for the “push-pull” screw is performed in the calcaneal tuberosity. It is drilled from the plantar and posterior aspect of the calcaneal tuberosity through a stab incision toward the posterior facet of the subtalar joint (Fig. 4). We typically use an AO 4.5-mm fully threaded cortical screw. Many types of screws can be used for this technique, but they must have some key features for this technique to be successful. First, the length of the screw must be longer than the drill hole in the calcaneus. We recommend a screw length that is at least 2 to 3 cm longer than the drill hole in the calcaneus. Second, the screw should be fully threaded so that the threads purchase both the near and far cortices of the calcaneus. Third, non-self-tapping or drilling screws work better than self-tapping or drilling screws as they do not easily penetrate into the talus.

If the AO 4.5-mm cortical screw is selected as the push-pull screw, under-drilling should be performed using a 3.2-mm-diameter drill bit. For more powerful distraction, the drill hole can be aimed more posteriorly; however, if planning to use this “push-pull” screw as a second point of fixation later, it is recommended to place the under-drill exactly where the second point of fixation is desired. It is important not to penetrate the talus while under-drilling.

At this point, the screw is inserted through the drill hole from the plantar and posterior aspect of the calcaneus. Once the screw has been advanced to the subtalar joint, the tip of the screw can be visualized under arthroscopy. At this point, under visualization, the screw should be slowly advanced until it reaches the talar surface of the posterior facet. As the screw is inserted further, it will push the talus. Because the screw will not advance into the talus owing to the lack of a drill hole, it will distract the joint (Supplemental Video S2). The screw therefore “pushes” the talus while it “pulls” the calcaneus relative to the talus. Once the desired distraction has been achieved, the advancement is discontinued (Fig. 5).

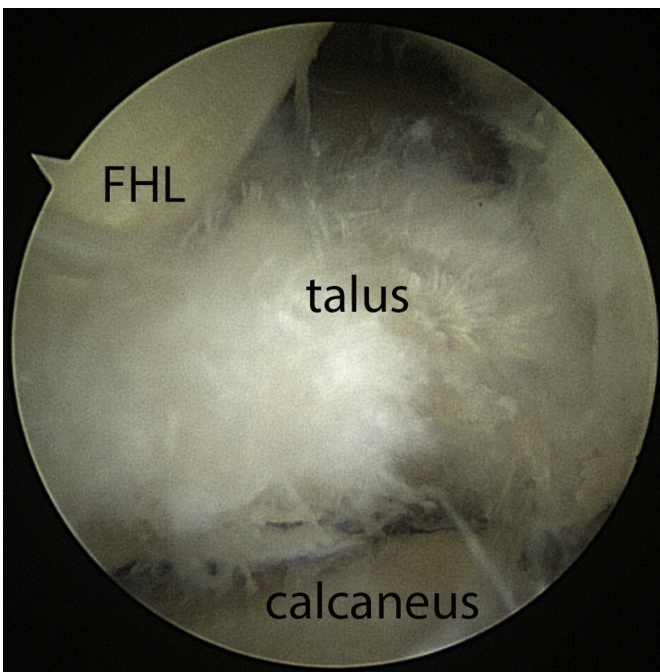


Fig. 2. The major medial neurovascular bundle is located medial to the flexor hallucis longus (FHL) tendon.

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