



Arthroscopic Resection of Too-Long Anterior Process (TLAP) of the Calcaneus, Anterior Subtalar Synovectomy, Debridement of the Sinus Tarsi, and Posterior Subtalar Adhesiolysis Via Anterolateral Subtalar and Dorsolateral Midtarsal Portals

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Abstract: Lateral heel pain can have numerous causes and many of them are intra-articular pathologies of the anterior and posterior subtalar joint. Frequently, there is not a single pathology that account for the lateral heel pain and combination of different pathologies can occur. Symptomatic too-long anterior process of the calcaneus, sinus tarsi syndrome, and subtalar arthrofibrosis can be precipitated by repeated sprain. Cases recalcitrant to conservative treatment are indicated for surgery. The purpose of this Technical Note is to report a 2-portal arthroscopic approach to address these pathologies.

Lateral heel pain can have numerous causes, and many of them are intra-articular pathologies of the anterior and posterior subtalar joint.^{1,2} Frequently, there is not a single pathology that accounts for the lateral heel pain, and combinations of different pathologies can occur. A too-long anterior process (TLAP) of the calcaneus is an anatomic abnormality in which the dorsosuperior corner of the anterior calcaneal

process of the calcaneus is elongated and impinging the navicular.³ Calcaneonavicular coalition and TLAP lesion can be considered as a spectrum of types of errors that occur in the embryologic mesenchymal formation during fetal life.³ TLAP lesion can cause recurrent ankle sprain, peroneal muscle spasm, or lateral heel pain.^{3,4} Open surgical resection using a dorsolateral approach is indicated for cases recalcitrant to conservative treatment.^{3,4} This is effective approach with good clinical outcomes.⁵ However, complications, including infection, hematoma, and neuroma, can occur.⁵ Moreover, the symptoms may recur or persist, which may be a result of incomplete resection, or as a consequence of iatrogenic trauma to soft tissue, bone, or joint or an

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Table 1. Indications and Contraindications of the Arthroscopic Resection of Too-Long Anterior Process (TLAP) of the Calcaneus, Anterior Subtalar Synovectomy, Debridement of the Sinus Tarsi, and Posterior Subtalar Adhesiolysis Via Anterolateral Subtalar and Dorsolateral Midtarsal Portals

Indications	Contraindications
1. Recalcitrant symptomatic TLAP, sinus tarsi syndrome, and arthrofibrosis of the posterior subtalar joint.	1. Other intra-articular causes of lateral heel pain
	2. Extra-articular causes of lateral heel pain

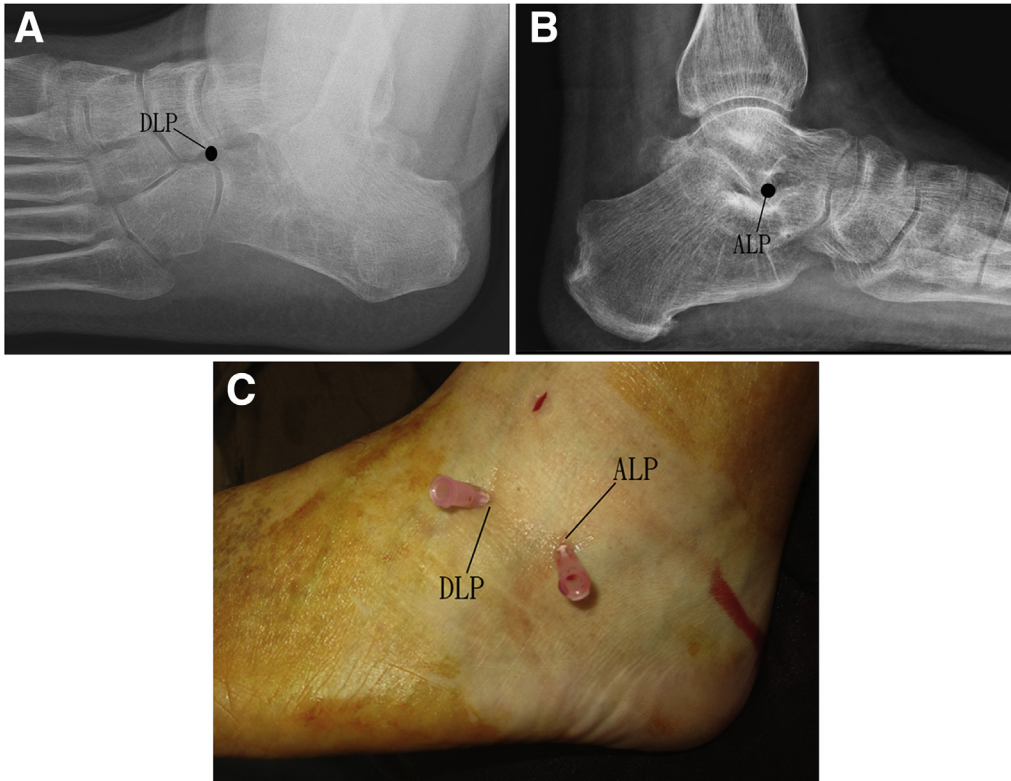


Fig 1. Arthroscopic resection of too-long anterior process (TLAP) of the calcaneus, anterior subtalar synovectomy, debridement of the sinus tarsi, and posterior subtalar adhesiolysis of the left foot via anterolateral subtalar and dorsolateral midtarsal portals. The patient is in the lateral position. The procedure is performed via the anterolateral subtalar and dorsolateral midtarsal portals. (A) The dorsolateral midtarsal portal is the junction between the talonavicular and calcaneocuboid joints. (B) The anterolateral subtalar portal is just dorsal to the angle of Gissane. (C) The portals are marked with needles. (ALP, anterolateral subtalar portal; DLP, dorsolateral midtarsal portal.)

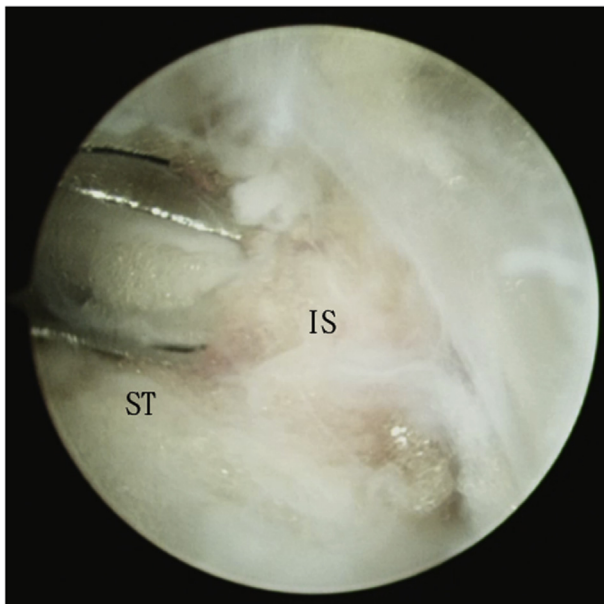


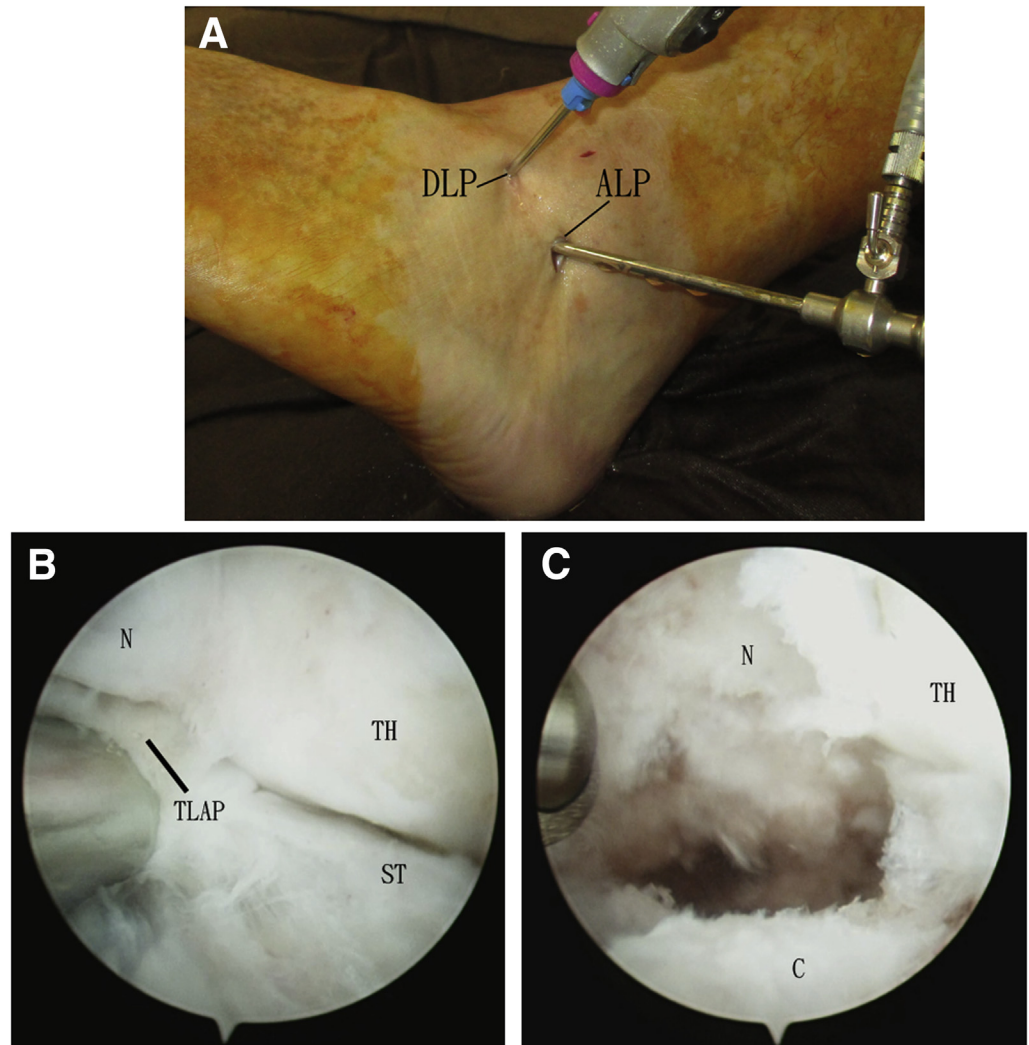
Fig 2. Arthroscopic resection of too-long anterior process (TLAP) of the calcaneus, anterior subtalar synovectomy, debridement of the sinus tarsi and posterior subtalar adhesiolysis of the left foot via anterolateral subtalar and dorsolateral midtarsal portals. The patient is in lateral position. The anterolateral subtalar portal is the viewing portal and the dorsolateral midtarsal portal is the working portal. The inflamed synovium at the lateral side of the anterior subtalar joint is resected with an arthroscopic shaver. (IS, inflamed synovium; ST, sustentaculum tali.)

ossification as a consequence of healing perioperative hematoma or overlooking possible secondary lesions of the adjacent joints.^{4,6}

Arthroscopic resection of the TLAP lesion is an effective surgical approach, with less soft-tissue trauma, accurate assessment of the degree of impingement, and feasibility to deal with other concomitant pathologies, e.g., synovitis of the anterior subtalar joint or calcaneocuboid joint and navicular osteochondral lesion as a result of the impingement.⁵⁻¹² This is performed with the dorsolateral midtarsal portal as the primary working portal and either the anterolateral subtalar portal, the lateral midtarsal portal, or the dorsomedial midtarsal portal as the primary viewing portal, depending on whether there is concomitant pathology in the anterior subtalar, calcaneocuboid, or talonavicular joint, respectively.^{5-11,13}

Sinus tarsi syndrome is a common cause of chronic lateral heel pain. It refers to a condition related to the inflammatory changes and ligamentous tears occurring in the hindfoot, characterized by lateral foot pain, which may be associated with subjective feeling of instability in the hindfoot.¹⁴ The axis of subtalar joint passes through centers of the talar head and the posterior calcaneal facet. The capsule-ligamentous structures lateral to the axis can be injured during inversion injury. Compressive injury medial to the axis also rarely occurs. The "zone of injury" centers on the sinus tarsi

Fig 3. Arthroscopic resection of too-long anterior process (TLAP) of the calcaneus, anterior subtalar synovectomy, debridement of the sinus tarsi, and posterior subtalar adhesiolysis of the left foot via anterolateral subtalar and dorsolateral midtarsal portals. The patient is in the lateral position. (A) The anterolateral subtalar portal is the viewing portal and the dorsolateral midtarsal portal is the working portal. (B) The TLAP lesion can be identified distal to the intersection between the talonavicular and anterior subtalar joints. It is found to impinge on the navicular bone. (C) The overlying fibrous tissue is debrided with the arthroscopic shaver and the TLAP lesion is resected with an arthroscopic acromionizer. (ALP, anterolateral subtalar portal; C, calcaneus; DLP, dorsolateral midtarsal portal; N, navicular; ST, sustentaculum tali; TH, talar head; TLAP, too-long anterior process of the calcaneus.)



and can extend posteriorly to the lateral recess of the posterior subtalar joint, laterally to the lateral calcaneal wall, anteriorly to the lateral half of the anterior talocalcaneonavicular joint, and medially to the tarsal canal and medial subtalar recess.¹⁴ If the medial structure is involved, the patient may present with medial heel pain. Otherwise, the patient with sinus tarsi syndrome always presents with lateral heel pain. Posterior subtalar arthroscopy is an effective treatment modality for recalcitrant sinus tarsi syndrome because the sinus tarsi, lateral calcaneal wall, and lateral recess of the posterior subtalar joint are readily accessible.¹⁵ However, if the lateral half of the of the anterior talocalcaneonavicular joint is involved, anterior subtalar arthroscopy is indicated.¹²

Arthrofibrosis of the posterior subtalar joint can occur after various soft-tissue and bony injury. It usually presents as painful stiffness of the hindfoot. Arthroscopic release of the joint is an effective treatment

means if conservative treatment fails to eliminate the pain.^{16,17}

In this Technical Note, we report the 2-portal arthroscopic approach of resection of TLAP lesion, anterior subtalar synovectomy, debridement of the sinus tarsi, and posterior subtalar adhesiolysis. It is indicated in recalcitrant symptomatic TLAP lesion, sinus tarsi syndrome, and arthrofibrosis of the posterior subtalar joint. It is contraindicated if there are other intra-articular or extra-articular causes of lateral heel pain (Table 1).

Surgical Technique (With Video Illustration)

Preoperative Planning and Patient Positioning

An oblique radiograph of the foot together with local tenderness over the superior corner of the anterior calcaneal process is sufficient to confirm the diagnosis

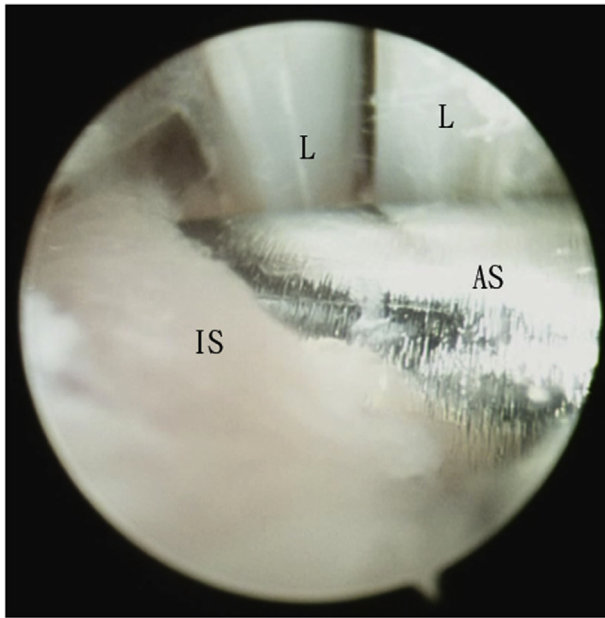


Fig 4. Arthroscopic resection of too-long anterior process (TLAP) of the calcaneus, anterior sub-talar synovectomy, debridement of the sinus tarsi, and posterior sub-talar adhesiolysis of the left foot via anterolateral sub-talar and dorso-lateral mid-tarsal portals. The patient is in the lateral position. The dorso-lateral mid-tarsal portal is the viewing portal and the anterolateral sub-talar portal is the working portal. The inflamed synovium and fibrous tissue of the sinus tarsi is debrided with the shaver. (AS, arthroscopic shaver; IS, inflamed synovium; L, ligaments of the sinus tarsi.)

of TLAP lesion.⁷ A detailed clinical assessment of the tender spot and hindfoot motion is essential.

The patient is placed in the lateral position. Floppy lateral positioning can be used if ankle arthroscopy is also being performed. A thigh tourniquet is applied to

provide a bloodless operative field. A 2.7-mm 30° arthroscope (Henke Sass Wolf GmbH, Tuttlingen, Germany) is used for this procedure. Fluid inflow is driven by gravity, and no arthropump is used.

Portal Placement

The procedure is performed via the anterolateral sub-talar and dorso-lateral mid-tarsal portals. The anterolateral sub-talar portal is just dorsal to the angle of Gissane, and the dorso-lateral mid-tarsal portal is the junction between the talonavicular and calcaneocuboid joints (Fig 1).

Anterior Sub-talar Synovectomy

The anterolateral sub-talar portal is the viewing portal and the dorso-lateral mid-tarsal portal is the working portal. The inflamed synovium at the lateral side of the anterior sub-talar joint is resected with an arthroscopic shaver (Smith & Nephew, London, UK) (Fig 2). The anterior sub-talar joint is then traced distally to the talonavicular joint.

Resection of the TLAP Lesion

The anterolateral sub-talar portal is the viewing portal and the dorso-lateral mid-tarsal portal is the working portal. The TLAP lesion can be identified distal to the intersection between the talonavicular and anterior sub-talar joints. It is found to impinge on the navicular bone. The overlying fibrous tissue is debrided with the arthroscopic shaver and the TLAP lesion is resected with an arthroscopic acromionizer (Smith & Nephew) (Fig 3). The resection is started from the dorsal surface of the process and proceeds plantarly until the soft-tissue plantar to the tarsal bones can be seen through the space between the talonavicular and calcaneocuboid joints.

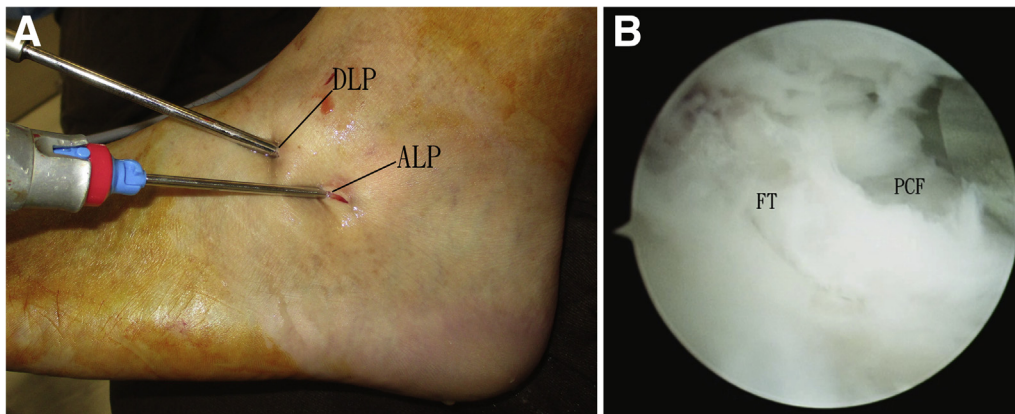


Fig 5. Arthroscopic resection of too-long anterior process (TLAP) of the calcaneus, anterior sub-talar synovectomy, debridement of the sinus tarsi and posterior sub-talar adhesiolysis of the left foot via anterolateral sub-talar and dorso-lateral mid-tarsal portals. The patient is in the lateral position. (A) The dorso-lateral mid-tarsal portal is the viewing portal and the anterolateral sub-talar portal is the working portal. (B) Arthroscopic view of the posterior sub-talar joint. (ALP, anterolateral sub-talar portal; DLP, dorso-lateral mid-tarsal portal; FT, fibrous tissue; PCF, posterior calcaneal facet.)

Table 2. Pearls and Pitfalls of the Arthroscopic Resection of Too-Long Anterior Process (TLAP) of the Calcaneus, Anterior Subtalar Synovectomy, Debridement of the Sinus Tarsi, and Posterior Subtalar Adhesiolysis Via Anterolateral Subtalar and Dorsolateral Midtarsal Portals

Pearls	Pitfalls
1. The anterolateral portal is made a bit more dorsal than usual in order to facilitate visualization of the TLAP lesion and assessment of deep part of the bone resection.	1. Pain may persist if deep part of the TLAP lesion is not adequately resected.
2. The amount of bone resection should be regularly checked arthroscopically	2. Forceful introduction of the shaver between the articular surfaces may accelerate degeneration of the posterior subtalar joint.
3. The fibrous tissue of the deep part of the posterior subtalar joint can be loosened with an arthroscopic probe before removal.	

Debridement of the Sinus Tarsi

The dorsolateral midtarsal portal is the viewing portal and the anterolateral subtalar portal is the working portal. The inflamed synovium and fibrous tissue of the sinus tarsi is debrided with the shaver (Fig 4). The ligaments of the sinus tarsi should be preserved.

Posterior Subtalar Adhesiolysis

The dorsolateral midtarsal portal is the viewing portal and the anterolateral subtalar portal is the working portal. The fibrotic capsule of the posterior subtalar joint is resected and the inflamed synovium is debrided with the shaver. The fibrous tissue of the anterior gutter and lateral gutter of the joint is resected. The interosseous and lateral talocalcaneal ligaments should be preserved. After that, the fibrous tissue between the

articular surfaces is loosened with an arthroscopic probe (ACUFEX; Smith & Nephew, Andover, MA) and then removed by the shaver. Finally, the fibrous tissue of the posterior gutter is resected by the shaver (Fig 5). Postoperatively, the patient is instructed on weight bear as pain tolerated and ankle and hindfoot mobilization exercise (Table 2, Fig 6, Video 1).

Discussion

The Technical Note demonstrates that the TLAP lesion, lateral side of the anterior subtalar joint, sinus tarsi, and posterior subtalar joint can be effectively approached via this 2-portal technique. Besides the pathologies shown in this report, other pathologies in these areas also can be managed by this arthroscopic approach. The

Fig 6. Arthroscopic resection of too-long anterior process (TLAP) of the calcaneus, anterior subtalar synovectomy, debridement of the sinus tarsi and posterior subtalar adhesiolysis of the left foot via anterolateral subtalar and dorsolateral midtarsal portals. The patient is in the lateral position. (A) Preoperative oblique radiograph of the illustrated foot shows the TLAP lesion (arrow head). (B) Postoperative oblique radiograph of the illustrated foot shows that the TLAP lesion is resected.



Table 3. Advantages and Risks of the Arthroscopic Resection of Too-Long Anterior Process (TLAP) of the Calcaneus, Anterior Subtalar Synovectomy, Debridement of the Sinus Tarsi, and Posterior Subtalar Adhesiolysis Via Anterolateral Subtalar and Dorsolateral Midtarsal Portals

Advantages	Risks
1. Better cosmetic result	1. Injury to the branches of the superficial peroneal nerve
2. Better assessment of adequate resection of the TLAP lesion	2. Injury to the nerve to the extensor digitorum brevis (terminal branch of the deep peroneal nerve)
3. Assessment and treatment of concomitant lesions of the sinus tarsi and anterior and posterior subtalar joints	3. Injury to the sural nerve
4. Minimal soft-tissue trauma	4. Injury to the sinus tarsi ligaments
5. Early mobilization	5. Injury to the articular cartilage of the subtalar joints
	6. Injury to the bifurcate ligament
	7. Injury to the inferoplantar longitudinal spring ligament
	8. Iatrogenic fracture of the anterior calcaneal process

management of concomitant pathologies in the anterior and posterior subtalar joints can be managed arthroscopically without the need of creating too many portals. However, the orientation of the sinus tarsi and posterior subtalar joint is different than that seen in classical posterior subtalar arthroscopy. The surgeon should have a clear mental picture of the anterior and posterior subtalar joint before attempting this approach.

The advantages of this minimally invasive approach include better cosmetic result, better assessment of adequate resection of the TLAP lesion, assessment and treatment of concomitant lesions of the sinus tarsi and anterior and posterior subtalar joints, minimal soft-tissue trauma, and early mobilization. The potential risks include injury to the branches of the superficial peroneal nerve, the nerve to the extensor digitorum brevis (terminal branch of the deep peroneal nerve), the sural nerve, sinus tarsi ligaments, articular cartilage of the subtalar joints, bifurcate ligament, inferoplantar longitudinal spring ligament, and iatrogenic fracture of the anterior calcaneal process (Table 3).^{5,6,18,19} This approach is not technically difficult and can be managed by the average arthroscopist if the technical details are followed.

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