



Endoscopic Lateral Calcaneal Osteotomy and Peroneal Tendon Decompression With the Patient in the Prone Position as Management of Subfibular Impingement After Calcaneal Fracture

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Abstract: Subfibular impingement is a common cause of lateral heel pain after calcaneal fracture. It can be caused by calcaneofibular impingement, peroneal impingement, or a combination thereof. It may not be easy to differentiate bony impingement from soft-tissue impingement. Simultaneous lateral calcaneal osteotomy and peroneal tendon decompression may increase the chance of pain relief. The purpose of this Technical Note was to report the technical details of endoscopic lateral calcaneal osteotomy and peroneal tendon decompression with the patient in the prone position. This technique is indicated for symptomatic subfibular impingement recalcitrant to conservative treatment. It has the advantages of being minimally invasive surgery and allowing early mobilization of the foot and ankle.

Lateral heel pain is the most common symptom after calcaneal fracture. It may be the result of subfibular impingement, peroneal tendon pathologies, subtalar arthrosis, calcaneocuboid arthrosis, symptomatic hardware, and/or sural nerve problems.¹ Subfibular impingement can be caused by either calcaneofibular impingement or peroneal impingement or a combination thereof. Lateral calcaneal osteotomy with or without peroneal tendon release is an effective surgical option if subfibular impingement is recalcitrant to conservative treatment.¹ To avoid extensive soft-tissue dissection in open approaches, endoscopic lateral

calcaneal osteotomy has been developed.² It can be performed via lateral²⁻⁴ or posterior^{5,6} portals. The purpose of this Technical Note was to report the technical details of a 3-portal endoscopic approach using calcaneal osteotomy and peroneal tendon decompression with the patient in the prone position. It is indicated for symptomatic subfibular impingement due to calcaneal malunion that is recalcitrant to conservative treatment. The procedure is contraindicated if the lateral heel pain has other causes, such as peroneal tendon problems (instability, tears), calcaneocuboid arthrosis, symptomatic hardware, and/or sural nerve problems. If the lateral heel pain is due to impingement of the lateral malleolus by the top line of the shoe as a result of decreased calcaneal height, this procedure is

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The authors report that they have no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

Received April 16, 2019; accepted May 14, 2019.

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2212-6287/19510

<https://doi.org/10.1016/j.eats.2019.05.021>

Table 1. Indications and Contraindications of Endoscopic Lateral Calcaneal Osteotomy and Peroneal Tendon Decompression With Patient in Prone Position

Indications

Symptomatic subfibular impingement due to calcaneal malunion that is recalcitrant to conservative treatment

Contraindications

Lateral heel pain with causes other than subfibular impingement
Lateral heel pain due to impingement of lateral malleolus by top line of shoe as a result of decreased calcaneal height
Subfibular impingement due to hindfoot valgus malalignment or significant associated calcaneal deformity requiring open calcaneal osteotomy

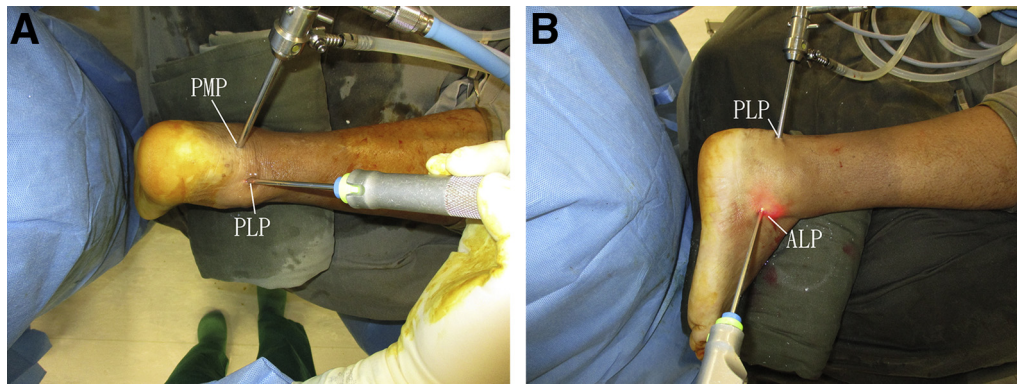


Fig 1. Endoscopic lateral calcaneal osteotomy and peroneal tendon decompression in a right foot. The patient is in the prone position. The procedure is performed with the posteromedial portal (PMP), posterolateral portal (PLP), and anterolateral portal (ALP). (A) The PMP and PLP are just above the posterior calcaneal tubercle and on the medial and lateral sides of the Achilles tendon, respectively. (B) The ALP is located at the sinus tarsi and just above the angle of Gissane.

contraindicated. It is also contraindicated if the calcaneofibular impingement is related to hindfoot valgus malalignment⁷ or significant associated calcaneal deformity that requires open calcaneal osteotomy (Table 1).

Technique

Preoperative Planning and Patient Positioning

Subfibular impingement can be confirmed by clinical examination. Lateral and axial radiographs of the calcaneus can be used to assess the degree of lateral calcaneal bulge and subtalar degeneration. Computed tomography is useful to exactly locate the lateral cortical bulge and its relation with the lateral malleolus. Magnetic resonance imaging is useful to study the peroneal tendon pathology.

The patient is in the prone position. A thigh tourniquet is applied to provide a bloodless operative field. A 4.0-mm 30° arthroscope (Dyonics; Smith & Nephew, Andover, MA) is used for this procedure. Fluid inflow is by gravity, and no arthro-pump is used.

Portal Placement

The procedure is performed with the posteromedial, posterolateral, and anterolateral portals. The posteromedial and posterolateral portals are just above the posterior calcaneal tubercle and on the medial and lateral sides of the Achilles tendon, respectively. The anterolateral portal is located at the sinus tarsi and just above the angle of Gissane (Fig 1). Five-millimeter longitudinal incisions are made at the portal sites. The subcutaneous tissue is bluntly dissected, and the deep fascia is penetrated by a hemostat.

Resection of Fibrous Tissue at Subfibular Space

The posteromedial portal is the viewing portal, and the posterolateral portal is the working portal. The thick fibrous tissue on the posterior side of the subfibular

space is resected with a serrated banana knife (Acufex; Smith & Nephew) and an arthroscopic shaver (Smith & Nephew) (Fig 2). After resection of the fibrous tissue, impingement between the lateral malleolus and lateral calcaneal bulge can be shown.

Endoscopic Lateral Calcaneal Osteotomy

The posteromedial portal is the viewing portal, and the posterolateral portal is the working portal. The lateral calcaneal cortical bulge is resected with an arthroscopic acromionizer (Dyonics; Smith & Nephew) (Fig 3). During anterior progression of the bone resection, the impinged fibrous tissue between the lateral malleolus and calcaneus needs to be

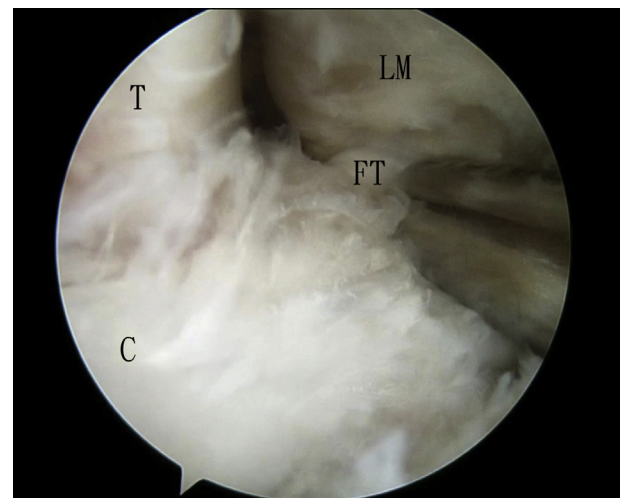


Fig 2. Endoscopic lateral calcaneal osteotomy and peroneal tendon decompression in a right foot. The patient is in the prone position. The posteromedial portal is the viewing portal, and the posterolateral portal is the working portal. The thick fibrous tissue (FT) on the posterior side of the subfibular space is resected with an arthroscopic shaver. (C, calcaneus; LM, lateral malleolus; T, talus.)

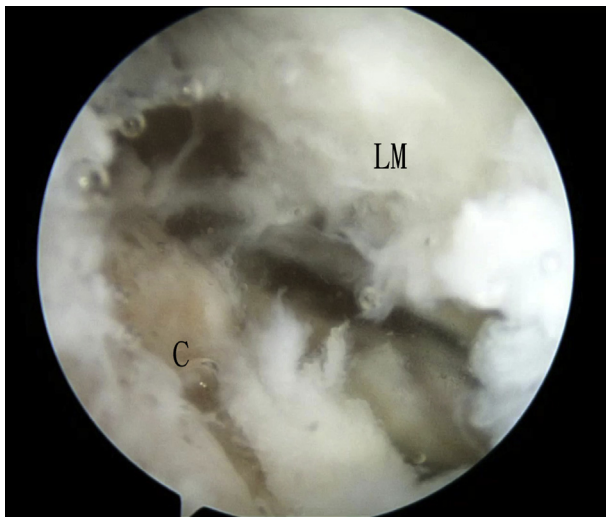


Fig 3. Endoscopic lateral calcaneal osteotomy and peroneal tendon decompression in a right foot. The patient is in the prone position. The posteromedial portal is the viewing portal, and the posterolateral portal is the working portal. The lateral calcaneal cortical bulge is resected with an arthroscopic acromionizer. (C, calcaneus; LM, lateral malleolus.)

repeatedly resected with the arthroscopic shaver to expose the impinging bone. The bone resection should extend dorsally to the posterior subtalar joint, in a plantar manner beyond the tip of the lateral malleolus, and anteriorly beyond the lateral malleolus. The bone resection is considered adequate if there is no more impingement between the calcaneus and lateral malleolus even with passive eversion of the hindfoot.

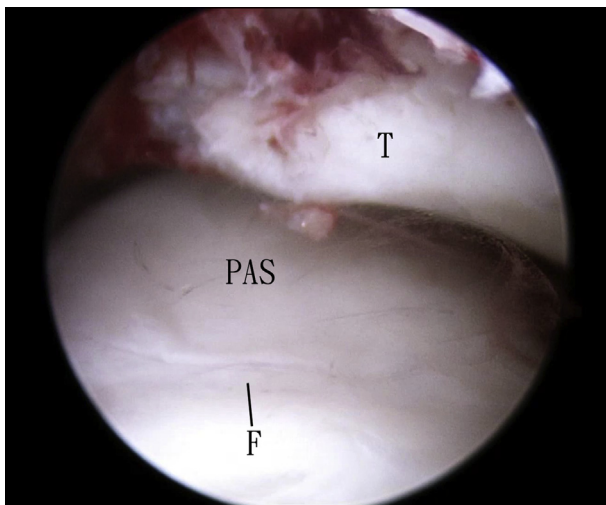


Fig 4. Endoscopic lateral calcaneal osteotomy and peroneal tendon decompression in a right foot. The patient is in the prone position. The anterolateral portal is the viewing portal, and the posterolateral portal is the working portal. The posterior subtalar joint is examined. (F, healed intra-articular fracture line of calcaneus; PAS, posterior articular surface of calcaneus; T, talus.)

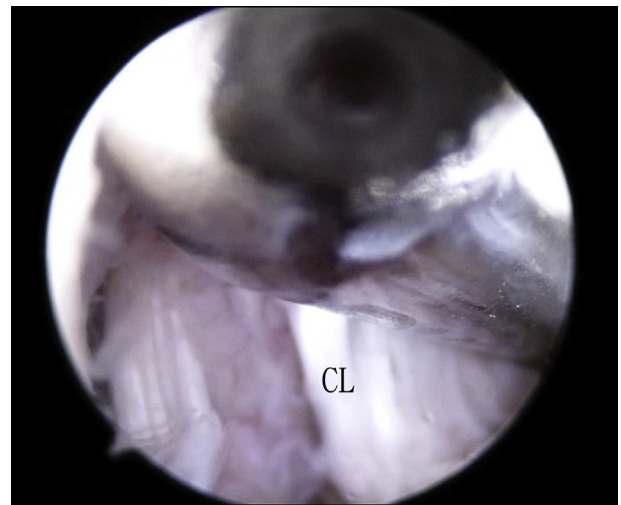


Fig 5. Endoscopic lateral calcaneal osteotomy and peroneal tendon decompression in a right foot. The patient is in the prone position. The posterolateral portal is the viewing portal, and the anterolateral portal is the working portal. The scar tissue and inflamed synovium are resected with an arthroscopic shaver. (CL, cervical ligament.)

Evaluation and Debridement of Posterior Subtalar Joint

The anterolateral portal is the viewing portal, and the posterolateral portal is the working portal. The articular cartilage of the posterior subtalar joint is examined for any degeneration (Fig 4). Far-lateral degeneration of the posterior calcaneal facet can be resected arthroscopically. Any loose bony fragment is removed. The inflamed synovium of the joint is resected with an arthroscopic shaver.

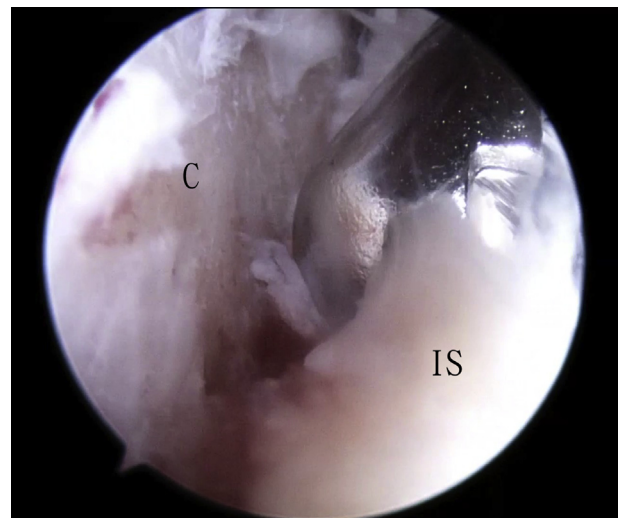


Fig 6. Endoscopic lateral calcaneal osteotomy and peroneal tendon decompression in a right foot. The patient is in the prone position. The posterolateral portal is the viewing portal, and the anterolateral portal is the working portal. The residual inflamed synovium is resected with the arthroscopic shaver. (C, calcaneus; IS, inflamed synovium.)

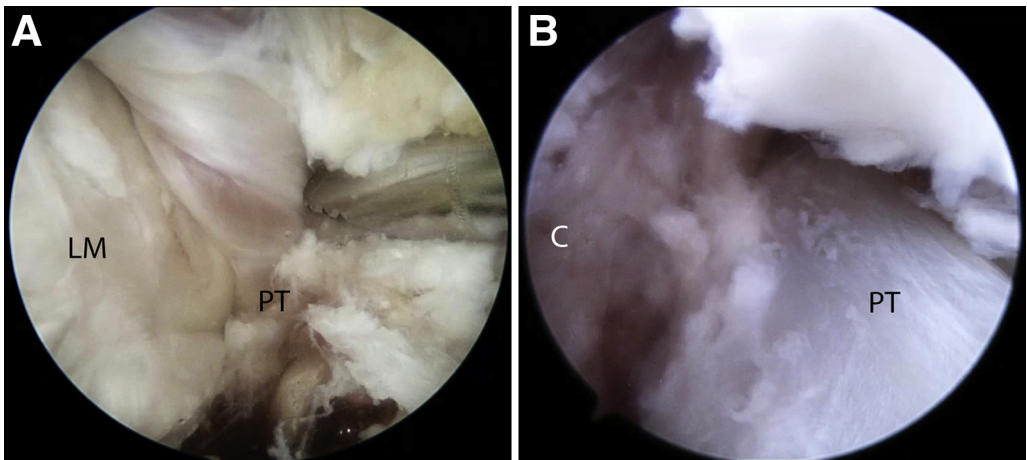


Fig 7. Endoscopic lateral calcaneal osteotomy and peroneal tendon decompression in a right foot. The patient is in the prone position. (A) The posteromedial portal is the viewing portal, and the posterolateral portal is the working portal. The thick fibrous tissue on the posterior side of the lateral malleolus (LM) is released to expose the peroneal tendons (PT). (B) The posterolateral portal is the viewing portal. The inframalleolar part of the PT is examined. (C, calcaneus.)

Debridement of Sinus Tarsi

The posterolateral portal is the viewing portal, and the anterolateral portal is the working portal. The scar tissue and inflamed synovium are resected with an arthroscopic shaver (Fig 5). The ligamentous structures of the sinus tarsi should be preserved.

Debridement of Subfibular Space

The posterolateral portal is the viewing portal, and the anterolateral portal is the working portal. Any residual bony fragment, fibrous tissue, and inflamed synovium are removed with the arthroscopic shaver (Fig 6).

Endoscopic Peroneal Tendon Decompression

The posteromedial portal is the viewing portal, and the posterolateral portal is the working portal. The thick fibrous tissue on the posterior side of the lateral malleolus is carefully incised longitudinally with the serrated banana knife to expose the peroneal tendons. The incision is extended proximally and distally with SuperCut scissors (Stille, Lombard, IL). The distal extension should pass beyond the tip of the lateral malleolus. The integrity of the peroneal tendons can be examined with an arthroscopic probe (Acufex; Smith & Nephew). The arthroscope is then switched to the

posterolateral portal, and the inframalleolar part of the peroneal tendons can be examined. Any residual bony impingement to the peroneal tendons can be resected with the arthroscopic acromionizer via the anterolateral portal (Fig 7, Video 1, Table 2).

Postoperatively, the patient is allowed weight-bearing walking as tolerated by pain. Active and passive mobilization of the foot and ankle is allowed.

Discussion

It may be difficult to differentiate calcaneofibular impingement and peroneal impingement in patients with lateral heel pain after calcaneal fracture.⁴ Decompression of both the bony impingement and soft-tissue impingement may have a better chance of yielding pain relief.^{1,3} Early mobilization is important to prevent postoperative ankle and hindfoot stiffness.⁵ Endoscopic procedures with small surgical incisions and less surgical trauma can facilitate early mobilization exercise. We prefer the posterior approach rather than the lateral approach for lateral decompression. This is because the posterior approach allows larger instruments to be used and can deal with any concomitant posterior ankle impingement or a Haglund deformity due to calcaneal malunion.^{4-6,8,9}

Table 2. Pearls and Pitfalls of Endoscopic Lateral Calcaneal Osteotomy and Peroneal Tendon Decompression With Patient in Prone Position

Pearls	Pitfalls
Lateral decompression should span from posterior to anterior to the lateral malleolus and from the subtalar joint to beyond the tip of the lateral malleolus.	Because of the deformed calcaneus, the portals should not be located as a reference from the tip of the lateral malleolus.
Peroneal tendon decompression should span from behind the lateral malleolus to the inframalleolar portion of the tendons.	The peroneal tendons are embedded in the thick fibrous tissue posterior to the lateral malleolus. Careful dissection is needed to avoid injury to the peroneal tendons.

Table 3. Advantages and Risks of Endoscopic Lateral Calcaneal Ostectomy and Peroneal Tendon Decompression With Patient in Prone Position

Advantages
Better cosmetic results
Less pain
Less soft-tissue dissection
Risks
Injury to sural nerve
Injury to peroneal tendons
Injury to posterior subtalar joint
Residual impingement

The described endoscopic approach has the advantages of better cosmetic results, less pain, and less soft-tissue dissection. The potential risks of this procedure include injury to the sural nerve, peroneal tendons, or posterior subtalar joint and residual impingement (Table 3). This technique is not technically demanding and can be attempted by the average foot and ankle arthroscopist.

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