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Endoscopic Debridement for Treatment of Chronic Plantar Fasciitis: An Innovative Technique and Prospective Study of 46 Consecutive Patients

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ABSTRACT

Plantar fasciitis is one the most common pathologies treated by foot and ankle surgeons. When nonoperative therapy fails, surgical intervention might be warranted. Various surgical procedures are available for the treatment of recalcitrant plantar fasciitis. The most common surgical management typically consists of open versus endoscopic plantar fascia release. Comorbidities associated with the release of the plantar fascia have been documented, including lateral column overload and metatarsalgia. We present an innovative technique for this painful condition that is minimally invasive, allows visualization of the plantar fascia, and maintains the integrity of the fascia. Our hypothesis was that the use of endoscopic debridement of the plantar fascia with or without heel spur resection would provide a minimally invasive technique with acceptable patient outcomes.

Plantar heel pain, specifically plantar fasciitis, will be experienced by 10% of the general population at least once in their lifetime (1–4). The anatomy of the plantar fascia is divided into 3 bands: medial, central, and lateral. The central band attaches proximally at the medial tuberosity of the calcaneus, coursing distally into 5 separate divisions, those divisions attaching to the sesamoids and to the plantar plate of toes 2 through 5 (5). Biomechanical stress of the plantar fascia and its insertion into the calcaneus is the most commonly cited reason for plantar fasciitis developing (6–9). The plantar fascia provides 2 important functions, specifically supporting the arch of the foot and aiding in resupination of the foot during propulsion (1,10,11).

Conservative therapy should be recommended initially and consists of nonsteroidal anti-inflammatory drugs, steroid injections, physical therapy, and posterior muscle group stretching. When conservative therapy fails to relieve the symptoms, surgical intervention is an option. Various published studies have investigated the biomechanical effects of performing a plantar fasciotomy. Daly et al (12) found a significant decrease in arch height and a less efficient gate compared with those of controls. Ward et al (13) performed an in vivo cadaveric study, sequentially releasing the plantar fascia from medially to laterally and observing the forces from heel strike to toe off. The force and duration of force in the remaining fascia increased significantly, the force was shifted later in propulsion, and the subtalar joint was unable to resupinate as the amount of fascia released increased (13).

Some studies have shown that the plantar fasciitis is better described as plantar fasciosis, with histologic changes at the calcaneal enthesis consistent with a chronic inflammatory condition (6,14,15). We present an innovative approach to the surgical treatment of plantar fasciitis. This technique addresses the pathologic features by debriding the plantar fascia at its insertion into the calcaneus and the surrounding inflammatory tissue, excising the calcaneal exostosis, and maintaining the integrity of this band and its attachment. This procedure was performed on 46 consecutive patients. Visual analog scores (VAS) and American Orthopaedic Foot and Ankle Society (AOFAS) scoring systems were used to compare the preoperative and postoperative pain and functional outcomes (16–18). In addition, the Foot Function Index was used to analyze the outcomes further. This surgical technique was introduced to the senior author (J.M.C.) by Kenneth Bramlett, MD (personal communication, September 2011).

Patients and Methods

A prospective study of 46 patients with chronic plantar fasciitis was performed with a minimum follow-up period of 12 months. Endoscopic debridement of the plantar fascia was performed by 1 surgeon (J.M.C.) after failed conservative treatment, with all patients complaining of continued pain. Conservative treatment consisted of corticosteroid injections, physical therapy, orthotics, and nonsteroidal

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Fig. 1. Operative extremity in full external rotation. First portal made distal to the posterior aspect of the medial malleolus at the level of the plantar fascia with the second portal 2 cm distally at the level of the plantar fascia.

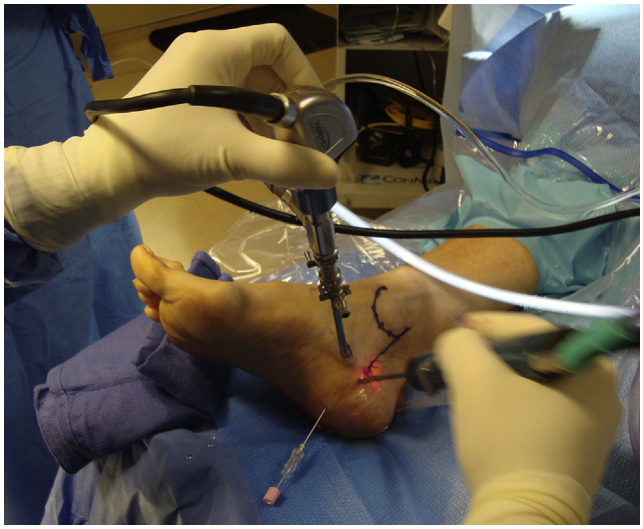

Fig. 2. Positioning of the 4.0-mm camera within the distal portal and 3.5-mm shaver within the proximal portal. Note the spinal needle placed through the bottom of the heel pad. This can assist with orientation when first starting debridement.

anti-inflammatory drugs. The duration of conservative treatment and the time to postoperative weightbearing were recorded. The consecutive patients who had undergone this procedure were identified by medical record review by 2 of us (J.M.M., P.R.). The data were abstracted from the medical records and analyzed by 2 of us (J.M.M., P.R.). The patient outcomes were assessed by all 4 of us, and all 4 of us contributed to writing this report. The VAS and AOFAS ankle-hindfoot scores were taken before and after endoscopic debridement of the plantar fascia. In addition, the functional outcome was measured using the Foot Function Index (primary outcome measure). This was developed to measure the foot pathologic features on function regarding pain, disability, and activity restriction (19). The 23 questions were scored from 0 (no pain, difficulty, none of the time) to 10 (worst pain imaginable, too difficult or unable, all the time). The final maximum score could be 100 points, with a higher score indicating more disability. Endoscopic debridement of the plantar fascia, including resection of calcaneal heel spur, was also performed for all patients. The demographic data, time to weightbearing, associated procedures, and complications were also recorded. Statistical analysis was performed with the level of statistical significance set at $p \leq .05$.

Each patient underwent outpatient surgery, and a preoperative popliteal nerve block was administered by the anesthesiology staff. The patient was placed on the operating room table in a supine position, with the surgical limb allowed to lay maximally externally rotated such that the lateral column of the foot was allowed to lay flush on the operating table. When necessary, a bump was placed under the contralateral hip to ensure full external rotation. The patient was placed under general anesthesia, and a thigh tourniquet was applied and inflated to 300 mm Hg after exsanguination. Using a surgical marker, the medial malleolus was outlined, and a straight line was drawn from the posterior malleolus to the heel. The first portal was marked out along this line at the level of the plantar fascia. The second portal was placed 2 cm distal to the first portal at the level of the plantar fascia (Fig. 1). These portals should be placed at the level of the plantar fascia or slightly superior, with intention of debriding between the fascia and calcaneus.

After marking out the portal sites, full-thickness incisions were made using an no. 11 blade. A curved hemostat was used for blunt dissection, and the plantar fascia was identified. An obturator was placed into each portal, and the superior aspect of the fascia was again identified. The 4.0-mm camera was then positioned into the distal portal, with the 3.5-mm shaver placed into the proximal portal (Fig. 2). A spinal needle was then inserted from the plantar heel into the most painful area. This allowed for direct visualization and debridement of the most painful part of the plantar fascia. This was also used as a marker to help orient the surgeon during debridement. Debridement of the inflammatory tissue was performed next under direct visualization (Fig. 3). Next, the calcaneal spur was identified and removed with an arthroscopic burr or shaver (Fig. 4). This was also confirmed by fluoroscopic visualization (Fig. 5). The fascia can be thinned out with a shaver or with an ablator to the physiologic thickness (Fig. 6). An arthroscopic probe was then used to confirm that the insertion of the fascia was intact (Fig. 7). After adequate debridement of the plantar fascia and the calcaneal spur had been removed, platelet-rich plasma was injected into the site under direct visualization.

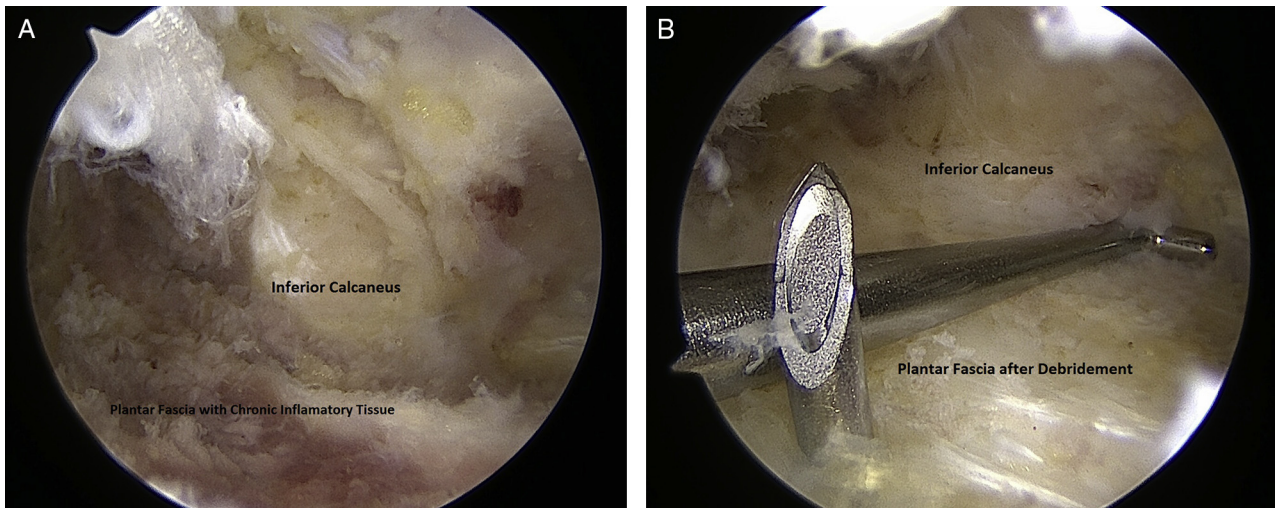

Fig. 3. (*A*) Note the bright red inflamed tissue encountered on initial debridement. This tissue is superior to the healthy plantar fascia. (*B*) After initial debridement of the inflamed tissue, the plantar fascia was identified. Note the tip of arthroscopic probe between the inferior aspect of the calcaneus and the plantar fascia origin.