

Treatment of Chronic Plantar Fasciitis With Percutaneous Latticed Plantar Fasciotomy

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ABSTRACT

Plantar fasciitis, the most common cause of pain in the inferior heel, accounts for 11% to 15% of all foot symptoms requiring professional care among adults. The present study reports the results of a minimally invasive surgical treatment of chronic plantar fasciitis. All patients with plantar fasciitis who had undergone percutaneous latticed plantar fasciotomy at 3 clinical sites from March 2008 to March 2009 were included in the present study. The follow-up evaluations for this treatment were conducted using the Mayo clinical scoring system. We investigated 17 patients with recalcitrant chronic plantar fasciitis who had undergone this treatment within a follow-up period of ≥ 13 months. All procedures were performed in the clinic with the patient under local anesthesia. No wound infections or blood vessel or nerve damage occurred. At a mean follow-up period of 16.0 ± 2.29 (range 13 to 21) months, significant improvement was seen in the preoperative mean Mayo score (from 12.06 ± 2.54 to 89.76 ± 4.28 , $p < .001$) and no patient had developed symptom recurrence. Also, none of the patients had developed complex regional pain syndrome. All patients were able to return to regular shoe wear by 3 weeks postoperatively. The technique of plantar fasciitis with percutaneous latticed plantar fasciotomy could be a promising treatment option for patients with recalcitrant chronic plantar fasciitis.

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Plantar fasciitis is the most common inferior heel pain, accounting for approximately 11% to 15% of all foot problems requiring medical attention (1). Bergman (2) described the clinical features for the first time but incorrectly attributed it to tuberculosis. Plettner (3) coined the German term *Kalkaneussporn* in his first radiologic study in 1900. He described an exostotic plantar bone formation at the insertion of the plantar fascia and muscles that led to the term *plantar heel spur*. A later study described the condition as “policemen’s heel” in 1915 (4). Currently, this symptom is defined as plantar fasciitis (5). A variety of therapeutic options have been proposed for the treatment of plantar fasciitis. These treatments include body weight reduction, orthoses for the feet, heel pads, or shoe modifications, ultrasound therapy, local injections, drug therapy, physical therapy, and heat or cold application massage. Alternative methods such as faradic foot soaks, herbal medicine, acupuncture, lasers, spiritual

methods, and extracorporeal shock wave therapy have also been proposed. Refractory cases have been treated with surgical intervention and radiotherapy (6). Surgical interventions for plantar fasciitis can be divided into 3 categories: plantar subcutaneous fasciotomy, open fasciotomy, and endoscopic plantar fasciotomy.

Relapses after surgery are common because pain is induced by postoperative scarring; thus, most patients and physicians prefer nonoperative techniques (7–9). In the present study, we evaluated the effects of a minimally invasive surgical treatment, percutaneous latticed plantar fasciotomy, on recalcitrant plantar fasciitis. This technique has a number of advantages. It is inexpensive and only requires 1 doctor and 1 nurse without special equipment. This method also has few postoperative complications, and scarring is minimal.

Patients and Methods

Patient Characteristics

The present study was retrospective and included 17 patients with plantar fasciitis who had undergone percutaneous latticed plantar fasciotomy at 3 clinical sites in the People’s Republic of China from March 2008 to March 2009. The sites included the Fourth People’s Hospital of Siping (Siping, Jilin Province, People’s Republic of China),

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Xu Yanbin and Chu Haikun contributed equally to this study.

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Daqing Oilfields General Hospital (Daqing, Heilongjiang Province, People's Republic of China); and China-Japan Union Hospital of Jilin University (Changchun, Jilin Province, People's Republic of China). Two of us (L.S., Y.W.) abstracted the data from the patients' medical records to select patients for the present investigation and analyzed the data; 3 of us (X.Y., C.H., J.X.) performed the intervention and assessed the patient outcomes; and 1 of us (X.Y.) wrote the report.

We performed a search of the electronic medical records using the term *plantar fasciitis*. All electronic medical records retrieved were reviewed to confirm the cases. All the patients in the present study had had a diagnosis of idiopathic painful heel syndrome and had experienced the typical idiopathic symptoms of chronic plantar fasciitis on the metatarsal side, including thickening of the periosteum at the tuber calcanei and a wide plantar fat pad (10,11). All the patients in the present study had undergone an 8-month course of conservative therapy before surgery, including all of the following: local icing, plantar fascia rest taping, calf and arch stretching, shoe modifications (including roller soles and antipronation designs), functional foot orthotics, plantar fascia night splinting, local corticosteroid injections, oral and topical nonsteroidal anti-inflammatory drugs, professional and self-managed physical therapy, immobilization with a controlled ankle motion walker brace, and non-weightbearing ambulation with crutches or other assistive devices. The exclusion criteria were distinct findings indicative of bone fracture, previous heel trauma, bone tumor, lumbosacral radiculitis, peripheral neuropathy, systemic arthritis, tarsal tunnel syndrome or findings consistent with entrapment of Baxter's nerve, pregnancy, narcotic analgesic dependency for pain relief, drug addiction, and alcohol addiction. A routine preoperative foot and ankle examination was performed for all patients. All the patients had also undergone preoperative screening laboratory tests (erythrocyte sedimentation rate, C-reactive protein, serum uric acid, and rheumatoid factor) to exclude rheumatic disorders.

Surgical Technique

Preoperative Preparation

The patient's foot was soaked in a bath of 1:5000 potassium permanganate liquid water twice daily for 20 minutes. Before administration of anesthesia, the area of pain on palpation was marked on the foot. The most obvious point was selected to begin the procedure (Fig. 1).

Surgical Procedure

The posterior tibial nerve, which can be found midway between the medial malleolus and calcaneal tuberosity, was anesthetized using 2% lidocaine without epinephrine (5 mL). The patient was placed in the prone position. The foot was routinely disinfected with iodophor and was then prepared and draped in the usual sterile manner. Next, the skin was punctured using a sterile flat-blade scalpel (Beijing Huite Zhuoyue Technology Co., Ltd., Beijing, People's Republic of China; Fig. 2). At the beginning of the insertion, the scalpel edge was parallel to the dermatoglyph. The scalpel was inserted vertically into the skin until it reached the adipose tissue. The blade was then rotated to the longitudinal direction of the plantar fascia in the subcutaneous fat layer, and the plantar fascia was punctured through until palpable resistance to penetration was identified. At that point, the scalpel was removed. The surgeon took special care to avoid penetration through the intrinsic musculature deep to the plantar fascia. This procedure was repeated in order. The tissues surrounding the bone spur were stripped if the patient had a heel spur. Next, the toes were dorsiflexed, and the plantar fascia was torn into the grid shape. The surgeon used the contralateral hand to apply gentle tension to the plantar fascia by dorsiflexing the

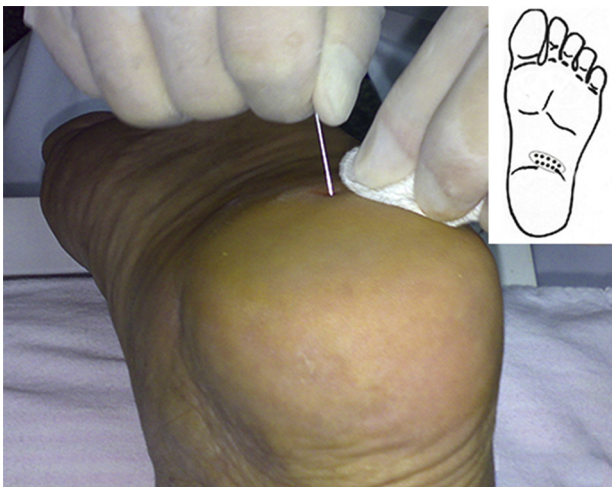


Fig. 1. The area of pain on palpation was marked on the foot.

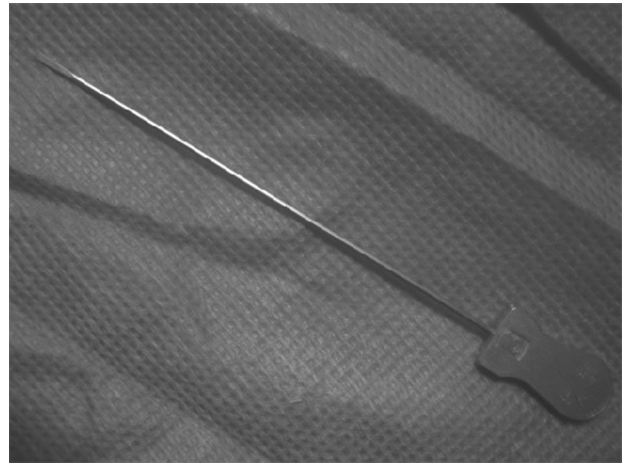


Fig. 2. Flat-blade scalpel: length 100 mm and blade breadth 1.5 mm.

metatarsophalangeal and ankle joints. After completion of the plantar fasciotomy, a sterile dressing was applied, and the patient was placed in a controlled ankle motion brace for 2 weeks and then allowed to bear weight to tolerance. The procedure was completed in about 12.7 ± 0.69 (range 12 to 14) minutes (12–14).

Follow-Up and Observational Findings

The status of the patients was determined through follow-up visits that continued until May 2010. The preoperative and postoperative Mayo clinical scoring systems, which include a possible 100 possible points, were used to evaluate the results of the plantar fasciotomy. The Mayo clinical scoring system has been shown to be both reliable and valid to evaluate the results of plantar fasciotomy (15). The evaluation day for the preoperative value was 1 day before surgery and the evaluation day for the postoperative value was 1 month after surgery. Signs or symptoms consistent with complex regional pain syndrome, localized plantar neuropraxia, intrinsic muscle atrophy or paresis, lateral column syndrome, exacerbation of pes planus or planovalgus, plantar scar hypertrophy or pain, or any new symptoms were recorded (16).

Statistical Analysis

Statistical analysis was completed using the Statistical Package for Social Sciences, version 16.0 (SPSS Inc, Chicago, IL). Descriptive statistics were used to analyze the data. Statistical significance was defined at the 5% ($p \leq .05$) level.

Results

A total of 26 patients were eligible for the present study, but we excluded 2 pregnant women (7.7%), 5 patients (19.2%) with alcohol addiction, and 2 (7.7%) with bone tumors. Thus, 17 patients and 17 feet were included in the present study. The patient characteristics are listed in Table 1. The mean age of the patients was 40.5 (range 25 to 60) years. Of the 17 patients, 7 (41.2%) were female and 10 (58.8%) were male; 11 (64.7%) underwent the intervention on the right foot and 6 (35.3%) on the left. Four patients (23.5%) were runners and did not train for 2 months. Lateral radiographs showed a heel spur in 8 patients (47.1%). The mean postoperative follow-up duration was 16.0 ± 2.29 (range 13 to 21) months. The functional outcome was evaluated using the Mayo clinical scoring system for evaluating the results of plantar fasciotomy (Table 2). At a mean follow-up point of 13 months, statistically significant improvement was seen in the mean Mayo clinical score from 12.06 ± 2.54 preoperatively to 89.76 ± 4.28 postoperatively ($p < .001$), and no patient had developed a recurrence of symptoms. The preoperative Mayo scores are listed in Table 3. The overall classification of the postoperative Mayo score (15,17) was as follows: 5 patients (29.4%) had a good score (80 to 89 points) and 12 (70.6%) an excellent score (≥ 90 points; Table 4). Four patients (23.5%) with a heel spur had a minimum score of 80 points. All the patients (100.0%) were able to return to regular shoe wear by 3 weeks after the procedure. No complications developed.

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