Lateral plantar nerve release with or without calcaneal drilling for resistant plantar fasciitis

Ahmed Fathy Sadek,1 Ezzat Hassan Fouly,1 Mostafa Mohammed Elian2
1 Orthopaedic Surgery Department, Minia University Hospital, Egypt
2 Radiology Department, Minia University Hospital, Egypt

ABSTRACT

Purpose. To compare the outcome following lateral plantar nerve release with or without calcaneal drilling for resistant plantar fasciitis.

Methods. 30 women and 3 men aged 30 to 60 (mean, 45) years with resistant plantar fasciitis were randomised to undergo release of the first branch of the lateral plantar nerve with (group 1, n=18) or without (group 2, n=15) calcaneal drilling.

Results. Patients were followed up for a mean of 27 months. According to the modified Mayo scoring system for plantar fasciotomy, group 1 was superior to group 2 in terms of score (93.9±6.97 vs. 83±8.2, p<0.001) and grading (15 excellent, 2 good, and one fair vs. 6 excellent, 4 good, and 5 fair; p=0.031). Three patients in group one and one patient in group 2 (16.7% vs. 6.6%, p=0.381) developed complications of heel numbness, foot oedema, and 2 cases of superficial wound infection, respectively.

Conclusion. Adding calcaneal drilling to release of the first branch of the lateral plantar nerve achieves better outcome than release alone in patients with resistant plantar fasciitis.

Key words: calcaneus; fasciitis, plantar; heel spur

INTRODUCTION

Plantar heel pain is usually caused by plantar fasciitis, periostitis of the heel, and/or spur formation.1-3 Plantar fasciitis is the most common cause and is secondary to mechanical overloading and biomechanical abnormality (such as a tight Achilles tendon, excessive pronation of the foot, and low or abnormal arch movement).4 Contracture of the gastrocnemius fascia or Achilles tendon restricts ankle dorsiflexion and may predispose to plantar fasciitis.5 Proximal release of the gastrocnemius is advocated for resistant plantar fasciitis.6 Nonetheless, in some anatomic variants where the posterior tibial nerve divides at the most distal region of the tarsal tunnel, the first branch of the lateral plantar nerve may become entrapped.2

The incidence of heel spurs is higher in patients...
with plantar fasciitis than in asymptomatic patients (75% vs. 63%). In 80% to 90% of patients with plantar fasciitis, symptoms resolve within 10 months. Most patients with plantar fasciitis respond to conservative treatment; 90% of such patients have improvement in symptoms of 90%. Surgery is indicated in resistant cases. Release of the plantar fascia from the calcaneus with or without removal of the calcaneal spur is standard practice, with a success rate of 36% to 89%. Release of the first branch of the lateral plantar nerve achieves a success rate of up to 92%. Drilling of the calcaneus alleviates venous congestion and intra-osseous pressure. Endoscopic release of the plantar fascia achieves a success rate of up to 90%, but is unable to achieve neurolysis of the first branch of the lateral plantar nerve. This study compared the outcome following release of the first branch of the lateral plantar nerve with or without calcaneal drilling for resistant plantar fasciitis.

MATERIALS AND METHODS

This study was approved by the review board of our hospital. Informed consent was obtained from each patient. Between December 2008 and July 2013, 30 women and 3 men aged 30 to 60 (mean, 45) years with resistant plantar fasciitis after ≥6 (range, 6–36) months of conservative management were randomised to undergo release of the first branch of the lateral plantar nerve with (group 1, n=18) or without (group 2, n=15) calcaneal drilling.

The diagnosis was confirmed by the presence of a calcaneal spur and perifascial oedema, and increased plantar fascial thickness of ≥4 mm. Patients with systemic causes of heel pain or enthesopathy (such as gout, pseudogout, rheumatoid arthritis, or ankyllosing spondylitis), mechanical abnormality, a history of heavy smoking, diabetes mellitus, or peripheral vascular insufficiency were excluded.

Patient characteristics (age, sex, occupation, pain score, other systemic symptoms, previous conservative treatment) were recorded, as were urinalysis, complete blood count, serum calcium level, serum uric acid level, HLA-B27, and rheumatoid factor.

Under spinal anaesthesia, the patient was placed supine with the knee and hip semi-flexed. An incision was made along the medial side of the heel, extending 1 cm postero-inferior to the tip of the medial malleolus to 5 cm distally. The medial approach was preferred as it is a non-weightbearing area and enables adequate surgical exposure. The subcutaneous fat was retracted, and the abductor hallucis muscle identified. The fascia was split longitudinally, and the muscle was dissected from proximal to distal until the neurovascular bundle was visualised. The neurovascular bundle was released along the incision (Fig. a). In addition for group 1, the superficial and deep surfaces of the plantar fascia were separated from the muscle and fat. The fascia was incised transversely toward the medial calcaneal tuberosity, and the lateral one third was spared. The spur was excised using a small bone nibbler, and the medial calcaneal tuberosity and surrounding bone plate were smoothened and drilled with five 1-cm
deep holes in 3-mm intervals using a 2.5 mm drill bit (Fig. b). Postoperatively, stitches were removed after a mean of 14 days. A below-knee plaster cast was applied for 6 weeks with non-weightbearing, followed by partial weightbearing for 4 weeks.

Outcome was assessed using the modified Mayo scoring system for plantar fasciotomy. The 2 groups were compared using the independent sample t test for continuous data and the Chi-square test for categorical data. A p value of <0.05 was considered statistically significant.

RESULTS

The patients were followed up for a mean of 27 months. The 2 groups were comparable in terms of age (43.9±8.4 vs. 46.3±7.5 years, p=0.401), body mass index (29.5±2.8 vs. 30.2±2.3 kg/m², p=0.390), thickness of the plantar fascia (6.3±0.3 vs. 6.5±0.4 mm, p=0.171), time to surgery (17.1±6.9 vs. 18.7±7.5 months, p=0.541), and follow-up period (27.6±20.4 vs. 25.6±14 months, p=0.755), except for the operating time (45.8±4.9 vs. 38.6±3.1 minutes, p<0.001).

According to the modified Mayo scoring system for plantar fasciotomy, group 1 was superior to group 2 in terms of score (93.9±6.97 vs. 83±8.2, p<0.001) and grading (15 excellent, 2 good, and one fair vs. 6 excellent, 4 good, and 5 fair; p=0.031).

Three patients in group 1 and one patient in group 2 (16.7% vs. 6.6%, p=0.381) developed complications of heel numbness (which resolved spontaneously after 3 months), foot oedema for 4 months (which resolved by rest, elevation, ice packs, compression, and anti-oedema measures), and 2 cases of superficial wound infection (which was resolved with antibiotics and daily dressing), respectively.

DISCUSSION

10% of the population have experienced plantar heel pain during their lifetime, and plantar fasciitis accounts for approximately 1% of all visits to orthopaedic clinics. Various surgical procedures have been used for the treatment of resistant plantar fasciitis, but the outcome varies, owing to the diversity of the underlying pathology (such as entrapment of the first branch of lateral plantar nerve, tight Achilles tendon, increased calcaneal intra-osseous pressure and venous congestion, calcaneal periostitis, and presence of calcaneal spur). Spur excision can be through a medial incision. The optimal site for drilling multiple holes in the calcaneus remains controversial. Involvement of the heel spur as a primary cause of heel pain has been discounted; however, if the spur size is considerable, the spur can be a secondary cause of pain by entrapping the first branch of the lateral plantar nerve (branch to the abductor digit minimi), as seen in 15% to 20% of patients with chronic plantar heel pain. Perifascial oedema can also compress the lateral plantar nerve where it passes dorsal to the plantar fascia and heel spur. The other common site of entrapment is beneath the deep fascia of the abductor hallucis muscle.

10% of the population have experienced plantar heel pain during their lifetime, and plantar fasciitis accounts for approximately 1% of all visits to orthopaedic clinics. Various surgical procedures have been used for the treatment of resistant plantar fasciitis, but the outcome varies, owing to the diversity of the underlying pathology (such as entrapment of the first branch of lateral plantar nerve, tight Achilles tendon, increased calcaneal intra-osseous pressure and venous congestion, calcaneal periostitis, and presence of calcaneal spur). Spur excision can be through a medial incision. The optimal site for drilling multiple holes in the calcaneus remains controversial. Involvement of the heel spur as a primary cause of heel pain has been discounted; however, if the spur size is considerable, the spur can be a secondary cause of pain by entrapping the first branch of the lateral plantar nerve (branch to the abductor digit minimi), as seen in 15% to 20% of patients with chronic plantar heel pain. Perifascial oedema can also compress the lateral plantar nerve where it passes dorsal to the plantar fascia and heel spur. The other common site of entrapment is beneath the deep fascia of the abductor hallucis muscle.

Endoscopic release of the plantar fascia alone has been reported to have a success rate of 81.1% to 97%. When it is combined with calcaneal spur removal and calcaneal drilling, most underlying aetiologies of heel pain can be resolved, and the outcome in terms of function, pain, and patient satisfaction improves significantly. However, the endoscopic approach cannot address the entrapment of the first branch of the lateral plantar nerve. It is also highly dependent on surgeon skill. Our open technique is a simpler and less demanding.

Ultrasonography is a useful diagnostic tool. It can easily differentiate the fascia from the superficial fat pad and the underlying calcaneus. The thickness of the plantar fascia is 2 to 4 mm in healthy patients and 5 to 7 mm in patients with plantar fasciitis. Ultrasonography can also detect hypoechogenicity, biconvexity, partial rupture, perifascial oedema, and intratendinous calcification. The thickness of the plantar fascia positively correlates to the severity of the plantar fasciitis.

CONCLUSION

Adding calcaneal drilling to release of the first branch of the lateral plantar nerve achieves better outcome than release alone in patients with resistant plantar fasciitis.

DISCLOSURE

No conflicts of interest were declared by the authors.
REFERENCES


