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RESEARCH ARTICLE

Treatment of Resistant Planter Fasciitis: Comparsion of Three Techniques

Medhat Maaty and Ayman M Ali*

Department of Orthopedic Surgery, Mansoura University, Egypt

***Corresponding author:** *Ayman M Ali, Department of Orthopedic Surgery, Mansoura University, Egypt, E-mail: aymanhusen2002@yahoo.com*

Abstract

Background: Planter fasciitis is the most common cause of inferior heel pain that may cause significant discomfort and disability. This study was conducted to evaluate and compare the results of combining the percutaneous partial planter fasciotomy and drilling the body of the calcaneus to either driiling or partial planter fasciotomy alone in resistant planter fasciitis.

Methods: Between January 2010 to December 2012, sixty patients underwent this study. The patients were divided into 3 groups, the first one included 20 patients who underwent only percutaneous drilling of the calcaneus, the second group included 20 patients who underwent percutaneous partial planter fasciotomy alone and the third one which included 20 patients who underwent combined percutaneous drilling and percutaneous partial planter fasciotomy.

Results: The average follow up time was 15 months (range: 12 to 26 months). In the first group Heel pain was relieved within an average of 8 weeks after the surgery (range: 4 to 13 weeks) in the second group it was relieved within an average of 7 weeks (range: 3 to 12 weeks). In the third group, Heel pain was relieved within an average of 5 weeks (range: 3 to 10 weeks). Post operatively, In the third group eighteen 85.7% patients were rated as having excellent results; two patients 9.5% were rated as having good results and one patients 4.8% were rated as having a poor result without any improvement.

Conclusions: Combining the Percutaneous partial planter fasciotomy and drilling of calcaneus in resistant planter fascitis improves the results and compare favorably with either technique alone.

Keywords

Chronic planter fasciitis, Percutaneous partial plantar fasciotomy, Drilling, Heel pain

Introduction

Planter fasciitis is the most common cause of inferior heel pain, accounting for approximately 11% to 15% of all foot problems. The term plantar fasciitis implies an inflammatory condition by the suffix '-itis'. However, various lines of evidence indicate that this disorder is better classified as 'fasciosis' or 'fasciopathy' [1,2] conservative therapy is the primary method of treatment, such as nonsteroidal anti-inflammatory drugs, physiotherapy including stretching of the planter fascia, activity modification, use of shoe insoles, injection of corticosteroids, and extracorporeal shock wave therapy [3]. In chronic heel pain after failure of conservative treatment many surgical techniques have been reported such as open planter fasciotomy with heel spur resection, endoscopy, and other minimally invasive procedures have become popular [4]. In 1983 percutaneous plantae fasciotomy procedure was first described by Harvey Pelzer [4]. The advantages of percutaneous planter fasciotomy are simple procedure with rare complications, low cost-effective method compared with more invasive and high cost techniques [5]. some authors [6,7]. Underwent percutaneous drilling for chronic heel pain and reported that this technique appears to be effective in the relief of intraosseous congestion and bone-marrow edema.

Our hyposthesis is that percutaneous partial planter fasciotomy in addition to drilling of the calcaneus may be effective in management of plantar fasciitis. The aim of this study is to evaluate the results of surgical treatment of resistant planter fasciitis by a new technique of combining two procedures; percutaneous partial planter fasciotomy and drilling of the calcaneus and compare the results to either procedure separately.

Patients and Methods

Between January 2010 to December 2012, sixty patients with resistant planter fascitis were included in this

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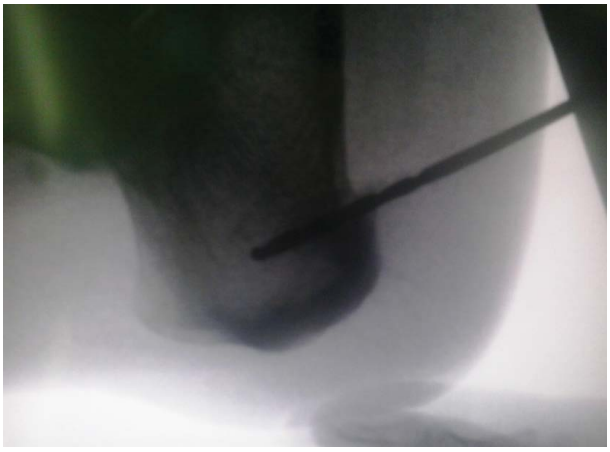

Figure 1: Drilling of the calcaneus.

Figure 2: The skin incision: A medial longitudinal incision about 1 cm length located at the point of intersection between 2 lines: the first line is perpendicular to calcaneal spur at its base while the other line is perpendicular to the first line and parallel to the inferior surface of calcaneal spur.

study. The patients were selected from the outpatient clinic at Mansoura university hospital after a consent and after a thorough history and full clinical examination of the lower extremity to locate the pain, and narrow the differential diagnosis. Imaging studies included plain x-ray and MRI. It was performed to all of them to exclude infection, stress fracture, tumor, or trauma and degenerative disease of mid-tarsal joints. All patients selected after exclusion of other pathologies and failure of conservative treatment for at least six months duration in the form of Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), ice application, posterior calf musculature stretching exercises, shoe modifications, corticosteroid injection(s), night splints, and immobilization. In this study, 46 patients (76.6%) were female and 14 patients (23.4%) were male. 52 patients were unilateral and 8 patients were bilateral. The mean age of patients was 45 years (range: 35 to 59 years). Symptoms were present for an average of 10 months (range: 6 to 19 months). The study included 3 groups, the first one included 20 patients who underwent only percutaneous drilling of the calcaneus, the second group included 20 patients who underwent percutaneous partial planter fasciotomy and the third one included 20 patients who under went combined percutaneous drilling and percutaneous partial planter fasciotomy. Gastrocnemius tightness was assessed clinically by using the Silfverskiöld test [8]. Patients were selected in a randomized manner. The first patient was included in the first group, the second one in the second group the third in the third group and so on. The average follow up time was 15 months (range; 12 to 26 months).

Surgical Technique

Surgery was performed under spinal anesthesia with a tourniquet. The patient was placed in supine position, then the foot and leg were prepared and draped. In the first group percutaneous drilling of the calcaneus around the calcaneal spur through small 1 cm medial incision. It was done by drill bit 2.5 mm and 4 drill holes were done under C-arm (Figure 1). In the second group, the technique as following, With the foot and toes in a maximum dorsiflexed position to place tension on the plantar fascia a medial longitudinal incision about 1 cm length located at the point of intersection between 2 lines: the first line is perpendicular to calcaneal spur at its base while the other line is perpendicular to the first line and parallel to the inferior surface of calcaneal spur using 2 k-wires and image intensifiers (Figure 2). After skin incision 1 cm, the medial margin of the plantar fascia is palpated and identified, the medial and central bands were only resected by surgical blade till reaching the underlying muscle, decreasing the risk of lateral column together with medial arch instability. Care was taken to leave at least 50% of the plantar fascia intact. In the third group the two techniques partial planter fasciotomy and drlling of the calcaneus were combined in the same patients. The tourniquet was released and hemostasis was achieved by pressure on the wound. The wound was sutured with the dressing was applied. Post operative follow up: the patients were discharged on the same day of the operation in a below knee cast with the foot in 15° dorsiflexion. Each patient was instructed for partial weight bearing for two weeks after the surgery and ambulate afterwards in a silicon heel for about 4 weeks. The patients underwent follow-up program for evaluating the clinical results in terms of pain, activity level and patient satisfaction.

The modified criteria of the Roles and Maudsley score (RM score) was applied as a rating scale for the patients [9]. It was defined as excellent: no pain, with satisfactory treatment outcome, with unlimited painless walking, good: substantially decreased symptoms, with satisfactory treatment outcome, with more than one hour painless walking, acceptable: somewhat decreased symptoms with more tolerable pain level than before treatment, and slightly satisfied with the treatment outcome, or poor: identical or worse symptoms and with no satisfactory outcome. Treatment was considered successful when the patient had an excellent or

good score. The visual analog pain scale was used to determine the effectiveness and patient satisfaction with the procedure [9].

The treatment was considered successful when a patient reported a percentage decrease in the VAS score larger than 60% from baseline at the final follow up. Comparisons between patients before and after treatment were performed with two-sided Chi-square tests. In all analyses, statistically significant is considered if p value was less than 0.05.

Results

There were no intraoperative nor post operative complications as infection or tender scar. Preoperative MRI ankle revealed twenty three (38%) of our cases have bone marrow odema of calcaneus. Eight cases in group 1, seven in group 2 and eight in group 3.

In the first group that underwent drilling only a visual analog pain scale, showed a preoperative pain level of 7.9 (+/- 1.2) with a range of 6-10. The pain level at final follow-up was 4.1 (+/- 2.7) with a range of 2-10 with a some difference. Utilizing a visual analog pain scale, the results in the second group that underwent percutanous partial planter fasciotomy only showed a preoperative pain level of 7.4 (+/- 1.3) with a range of 5-9. The pain level at final follow-up was 3.3 (+/- 2.7) with a range of 1-8 with a significant difference.

In the third group after combining percutaneous partial planter fasciotomy and drilling and Utilizing a visual analog pain scale, the results showed more improvement as regard to the first and second group as the preoperative pain level of 8.2 (+/- 1.4) with a range of 7-10. The pain level at final follow-up was 2.1 (+/- 2.7) with a range of 0-7 with a more significant difference.

Post operatively, in the first group no patients were rated as having excellent results; 8 (42.1%) patients were rated as having good results and 11 (57.9%) patients were rated as having a poor result without any improvement. In the second group 12 (60%) patients were rated as having excellent results; 4 (20%) patients were rated as having good results and 4 (20%) patients were rated as having a poor result without any improvement. In the third group eighteen (85.7%) patients were rated as having excellent results; two (9.5%) patients were rated as having good results and one (4.8%) patients were rated as having a poor result without any improvement. In the first group Heel pain was relieved within an average of 8 weeks after the surgery (range: 4 to 13 weeks). Heel pain, in the second group was relieved within an average of 7 weeks after the surgery (range: 3 to 12 weeks). In the third group, Heel pain was relieved within an average of 5 weeks after the surgery (range: 3 to 10 weeks). All patients with excellent or good results returned to their former occupations or activities. No patient was dissatisfied with the incision scar in the three groups.

Discussion

Planter fascitis is a known common cause of heel pain in adults with multifactorial aetiology, however, most cases result from overuse stresses which causes inflammation of the insertion of the plantar fascia on the medial process of the calcaneal tuberosity. The pain may affect most daily living activities. The treatment of Planter fascitis is a difficult problem, but most patients eventually improves with conservative treatment. After failure of conservative measures about 5% of the patients need surgical treatment for chronic planter fasciitis [5].

Various surgical techniques are available for treatment of resistant planter fascitis, such as open surgery, endoscopic surgery, and percutaneous release. Surgical interventions can include surgical release of the fascia or removal of bone spurs. Spurs are usually resected, but no study has demonstrated that this makes a difference to the result. The complications of open surgery include tender skin scar, infection, nerve disturbance, prolonged recovery time and persistent pain [10]. On the otherhand endoscopic plantar fasciotomy which is a very common procedure employed by foot and ankle surgeons and with reported high rate of success. However, the possible post operative painful portals and nerve entrapment are possible complications [11-14].

Plantar fascia tension was directly proportional to Achilles tendon tension in cadavers in dynamic gait stimulator, so, Proximal Medial Gastrocnemius Release (PMGR) is an option in the treatment of chronic plantar fasciitis [15]. However, this technique has some complications. Releasing the aponeurosis of the proximal gastrocnemius through a medial approach may put the saphenous nerve and greater saphenous vein at risk [16]. There might be concern over a potential loss of calf power following PMGR [17].

In current practice, the procedure of percutaneous partial planter fasciotomy is an acceptable alternative to other methods with many advantages and less complications [18].

In this study, a new technique was used by combined percutaneous partial planter fasciotomy and drilling of the calcaneus in resistant planter fascitis in 21 cases in the third group. As regard to the final results: Excellent and good outcomes were obtained in 8 patients (42.1%), 16 patients (80%), and 20 patients (95.2%) in the first, second and third group respectively. The poor results obtained in 11 patients (57.9%), in 4 patients (20% and 1 patient (4.8%) in the first,second and third group respectively and did not feel any improvement of pain and dissatisfied with surgery. As regard to the results, there were signinfcant improvement of the results after combining the drilling with the partial plater fasciotomy and the poor results decreased also in a significant manner.

This technique was effective in resolving chronic heel

pain with less post operative pain. The patients were able to wear normal shoes, weight bearing, and return normal activities by 4-12 weeks postoperatively. Drilling of the calcaneus may relieve pain. The idea of pain relief with drilling pain may be due to decreasing both intraosseus pressure and calcaneal bone marrow edema that was reported in 38% of our cases by using preoperative MRI ankle. There were no complications from a partial release like lateral arch pain, instability and flat foot. Many articles reported the success of open planter fascial release but this procedure has been reported to cause prolonged recovery, wound dehiscence, skin complications, painful neuromas and arch instability [19,20].

The incision in our study being a small longitudinal incision, approximately 1 cm in length, in the proximal medial arch just distal to the calcaneal fat pad lies in line with the relaxed skin tension lines and is on a non-weight bearing surface, minimizing scarring and yeiled good healing.

No cases with pain recurrence were reported in the third group during follow up. This may be attributed to the gentle stretching of the plantar fascia postoperatively may preventing reattaching and thus avoiding pain recurrence so it is helpful to avoid this complication.

The biomechanical consequences with planter fasciotomy have been investigated in many studies. Weakness of the medial longitudinal arch and pain in the lateral midfoot in cadaver specimens with a total release was repored [21]. Significant collapse of the arch in the sagittal plane was reported by Sharkey, et al. [22] with a complete fasciotomy. Sharkey, et al. [22] also in a follow up study found that cutting only the medial half of the plantar fascia did significantly increase peak pressure under the metatarsal heads with little effect on pressures in other regions of the forefoot or second metatarsal strain and loading. Significant shifts in plantar pressure and force from the toes to beneath the metatarsal heads and increased strain and bending in the second metatarsal caused by dividing the entire planter fascia. In the current study, we did partial plantar fasciotomy to avoid the above mentioned complications of complete planter fasciotomy.

In another study, the authors recommended partial release of less than 40% of the fascia to minimize the effect of arch instability and maintain normal foot biomechanics and arch stability [23].

Davies, et al. reported case series of 43 patients with 47 painful heels who underwent partial plantar fascia release and nerve decompression. 49% of the patients were reportedly satisfied with their outcome after an average of 31 months follow-up [24]. Berlin in his study, reported 89% good to excellent relief in 82 patients undergoing percutaneous plantar fasciotomy. The patients underwent a transverse puncture incision over the origin of the fascial pain, severed the medial attachment and then performed a partial fasciotomy laterally [25]. In 1998, Benton-Weil, et al. reported 83% patient satisfaction in 51 patients with percutaneous plantar fasciotomy procedure, but there was no indication on the extent of plantar fascia released [5]. In this study, we reported 95.2% good to excellent relief in (20/21) patients underwent percutaneous partial plantar fasciotomy and drilling of calcaneus which is comparable to either technique alone or other studies. Also the heel pain was relieved early within an average of 5 weeks after the surgery (range: 3 to 10 weeks). All patients with excellent or good results returned to their former occupations or activities. No patient was dissatisfied with the incision scar [26].

Conclusion

In this new technique the combining of the percutaneous partial planter fasciotomy and drilling of calcaneus in resistant planter fascitis improves siginifcantly the results and considered comparable favorably with either the partial planter fasciotomy or drilling of the calcaneus alone. Also this technique compare favorably with other reported more invasive and high-cost techniques. Finally it is a relatively short, simple, safe procedure, and it is not associated with serious complications.

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