

Calcaneal decompression as part of painful heel syndrome treatment

Saad Mubarak Rasheed, F.I.C.M.S

Department of Surgery, College of Medicine, Al-Mustansiriya University, Baghdad, Iraq.

Date Submitted: 19.3.2014

Date Accepted: 21.9.2014

Address for Correspondence:

Dr. Saad Mubarak Rasheed

Department of Surgery, College of Medicine, Al-Mustansiriya University, Baghdad, Iraq.

Abstract

Background: Many modalities of surgical treatment are available for painful heel syndrome like: release of half of planter fascia, excision of spur, drilling of calcaneum, and calcaneal osteotomy, without agreement on the most effective one.

Aim: to evaluate the effect of calcaneal bone drilling in addition to planter fascia release and calcaneal spur removal for patients with painful heel syndrome.

Patients and methods: between 2007-2011 at Al-Yarmouk Teaching hospital, a retrospective comparative study of (44) feet of (38) patients (M=11 and F=27) with persistent painful heel syndrome divided into 2 groups: first group (24) feet of (18) patients were treated by calcaneal drilling with the traditional surgery (release of planter fascia + calcaneal spur excision), and the second group (20) feet of (20) patients were treated with traditional surgery only (control group). Evaluation of patient's pain and satisfaction was based on VAS (visual analogue pain scale) system for local pressure tenderness and rest pain.

Results: The mean pre-operative rest pain and local pressure tenderness were 8.38 ± 0.99 and 8.95 ± 1.21 for group I respectively and 8.50 ± 0.81 and 8.80 ± 0.81 for group II respectively. There was significant decrease in rest heel pain in group I in comparison with group II after 6 months (from 4.40 ± 0.97 for group II to 0.88 ± 1.05 for group I), and after 2 years follow-up (from 2.25 ± 1.47 for group II to 0.25 ± 0.66 for group I) with $p < 0.05$. There was significant decrease in local pressure tenderness in group I in comparison with group II after 6 months follow-up (from 5.85 ± 1.01 for group II to 1.92 ± 1.58 for group I), and after 2 years follow-up (from 3.85 ± 1.56 for group II to 0.33 ± 0.75 for group I) with $p < 0.05$. Complications were post-operative infection (9.1%), heel paresthesia (13.6%), and persistent pain (2.3%).

Conclusions: calcaneal drilling is one of significantly effective modality of treatment for recurrent heel pain syndrome when combined with ordinary release of planter fascia and spur excision.

Keywords: recurrent heel pain syndrome, planter fasciitis, calcaneal spur excision.

INTRODUCTION

The pathogenesis of painful heel syndrome is multifactorial including plantar fasciitis, increased intra-osseous pressure of the os calcis, calcaneal periostitis, and

presence of calcaneal spur^[1]. There is no reliable surgical procedure for this condition; limited fasciotomy to release part of the plantar fascia can help in some cases^[2]. Plantar fasciosis is a foot condition characterized by heel pain in plantar fascia (a strong and dense connective tissue

structure on the sole of foot that supports the foot arch). This condition has historically been called plantar fasciitis because it was believed that plantar fascia inflammation was the principle underlying cause. Plantar fasciosis is a more accurate name for this condition because it involves degeneration (microtears), and cell death of plantar fascia [3]. Although commonly associated with “heel spurs,” only 50% of patients with plantar fasciitis have “heel spurs” present radiographically and this finding of itself is not the cause of the patient's sub-calcaneal discomfort [4]. Risk factors are: decreased ankle dorsiflexion/tight heel cord, obesity/body mass index >30, prolonged standing, running, jumping sports, lupus or inflammatory spondyloarthropathy, diabetes, and thyroid dysfunction [5]. Patients commonly complain of heel pain that is worse in the morning with the 1st step or after prolonged sitting. There is tenderness to the plantar-medial heel at the origin of the plantar fascia. MRI may show thickening and degenerative changes of the plantar fascia origin, along with bony edema adjacent to it [6]. Most patients can be managed non-operatively, but they should be counseled that it commonly takes 6 to 9 months for symptoms to resolve. Effective modalities include orthotics that unload the heel, exercises to stretch the Achilles tendon, night splints to keep the Achilles tendon on stretch, and steroid injections. Recalcitrant symptoms may require surgery [7]. Failure of non-operative treatment for 6-9 months indicates surgical intervention. The following procedures can be used: (1) exposure of the entire heel pad through a horseshoe incision around the hindfoot, with release of all soft-tissue origins from the anterior aspect of the calcaneal tuberosity; (2) neurolysis of a single nerve (1st branch of lateral planter nerve); (3) osteotomy of the calcaneus; (4) excision of the medial inferior tuberosity of the calcaneus; and (5) simple drilling of multiple holes in the calcaneus in a “decompressing operation”. Excision of calcaneal spur sometimes done if present [3]. Promising new interventions include shockwave lithotripsy and localized radiofrequency (coblation) therapy may be used [2].

The aim of this study was to evaluate the clinical result of adding the calcaneal drilling to the ordinary surgical procedure of the chronic painful heel syndrome.

PATIENTS AND METHODS

From 2007-2011, 50 patients at Al-Yarmouk Teaching hospital were collected to undergo surgery for persistent heel syndrome which are resistant to all measures of conservative treatment and more than 6 months without cure. Written patient's consents are adapted. Exclusion criteria; were diabetic patients, older age patients > 60 year

old, and loss of follow-up. Twelve patients were excluded from the study because of the loss of follow-up. Thirty-eight patients ranging from 21-55 year (mean= 43) with 44 feet included in the study (table 1). Patients divided into 2 groups, the first group (18 patients [47.7%]) with 24 feet [54.5%] was treated by calcaneal drilling in addition to the ordinary calcaneal surgery (release half of the planter fascia + removal of calcaneal spur), and the second group (20 patients [52.3%]) with 20 feet [45.5%] was treated by the ordinary surgery. Sex distribution is shown in (table 2). Right and left sided foot involvement is shown in (figure1). Six patients had bilateral surgery. Twenty-five patients were smokers more than 1 pack per day .

Surgical procedure: Under appropriate (GA, epidural, or spinal) anaesthesia, small lower medial ankle transverse incision was done, isolation and retraction of lateral planter nerve, release of half of the planter fascia, excision of calcaneal spur by osteotome and hammer, drilling of the medial calcaneal wall by 3.2 pit drill of about 3-4 holes in different directions (for the 1st group), hemostasis secured, skin closed by 1/0 nylon, tourniquette removed, and then dressing. Sutures are removed after 15 days. Weight bearing prohibited for about 3 months for both groups. Analgesia was given to all patients of both groups. Follow-up continued for 2 years, visits divided in 15th day post-operative to remove sutures, 2nd month, 3rd month post-operatively where the patients starts weight-bearing, 6th month, 1st year, and finally 2nd year. Assessment of improvement was based on VAS (visual analogue scale) system, which grades the pain from 1-10 according to the patient's questionnaire. Two parameters are used, rest pain and local pressure tenderness.

Statistical analysis: student's t-test was used to determine the significance, p-value < 0.05 considered significant.

RESULT

Thirty-eight patients ranging from 21-55 year (mean= 43) with 44 feet included in the study (table 1). Sex distribution is shown in (table 2). Right and left sided foot involvement is shown in (figure1). Six patients had bilateral surgery. Twenty-five patients were smokers more than 1 pack per day (figure 2). The mean of local pressure tenderness with its corresponding p-value for each group in each visit is shown in table (3). There is significant decrease in local heel pressure tenderness in group I in comparison with group II 0.5-2 years follow-up (p<0.05). There is significant decrease in rest heel pain in group I (surgery with calcaneal drilling) in comparison with group II after 6 months-2 years follow-up (p<0.05).

Rasheed: painful heel syndrome

A 44 feet of 38 patients ranging from 21-55 year (mean= 43) undergone surgery for persistent heel painful syndrome. 28.9% are male and 71.1% are female. 65.9% were L foot and 34.1% were R foot. There is no significant association in rest pain and local tenderness resolution between the 2 group during the early post-operative period (1st two months) ($p>0.05$). Four feet (9.1%) (4 patients) developed post-operative infection which were treated by antibiotics and backslab, only one patient (2.3%) developed osteomyelitis which necessitates abscess drainage. six feet (13.6%) developed paresthesia of the heel due to neuropraxia of the medial calcaneal nerve which resolved after 3-6 months. One patient (2.3%) still complains from persistent pain in his heel

Table 1. Age distribution.

Age distribution	Number of patients	
	Group I	Group II
20-29 year	3 [7.9%]	2 [5.3%]
30-39 year	5 [13.2%]	3 [7.9%]
40-49 year	9 [23.9%]	14 [36.8%]
50-59 year	1 [2.5%]	1 [2.5%]

Table 2. Sex distribution.

Sex distribution	Number of patients	
	Group I	Group II
male	4 [10.5%]	7 [18.4%]
female	14 [36.8%]	13 [34.3%]



Figure 1. Side distribution.

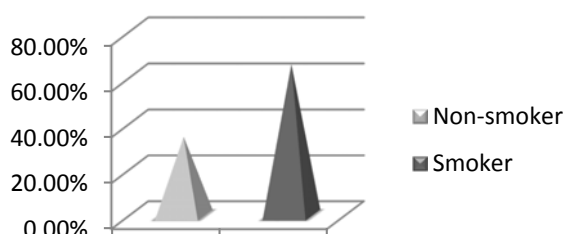


Figure 2. Smoker and non-smoker patients

Table 3. Local pressure tenderness.

	Group I	Group II	P value
Pre-operative	8.95±1.21	8.80±0.81	P = 0.3759
2nd month	8.21±1.35	7.80±0.93	P = 0.1368
3rd month	4.83±1.81	6.60±0.92	P = 0.0432
6th month	1.92±1.58	5.85±1.01	P = 0.0139
1st year	0.79±1.08	4.90±1.34	P = 0.0095
2nd year	0.33±0.75	3.85±1.56	P = 0.0018

Table 4. Rest pain.

	Group I	Group II	P value
Pre-operative	8.38±0.99	8.50±0.81	P = 0.2405
2nd month	6.36±1.11	7.50±1.28	P = 0.0769
3rd month	2.42±1.12	6.35±1.11	P = 0.0437
6th month	0.88±1.05	4.40±0.97	P = 0.0194
1st year	0.46±0.92	3.20±1.21	P = 0.0087
2nd year	0.25±0.66	2.25±1.47	P = 0.0009

DISCUSSION

There is statistical significance in age distribution ($p<0.05$) where 23 feet (60.5%) are within the range of 40-49 year old. These results may be explained by the heavy work at this age group and increase body mass index.

There is statistical significance in sex distribution where 27 patients (71.1%) are female and 11 (28.9%) are male ($p<0.05$). These results are comparable to the results of Joseph A. et al [8]. This may be attributed to the heavy and long duration of standing in the daily activities or wearing a high-heel shoes and more body mass index.

About the side distribution, there is significant correlation between L sided feet and the painful syndrome, where 29 feet (65.9%) are L side ($p<0.05$), and this may be related to the long duration of standing on the L side.

Rasheed: painful heel syndrome

There is statistical correlation between smokers (more than 1 pack per day) and the persistent heel syndrome ($p < 0.05$), which may be attributed to the effect of smoking on bone marrow oedema syndrome and in healing of planter degeneration.

Our result shows statistically significant decrease in rest pain after 2 years (0.25 ± 0.66) $p < 0.05$, which is comparable to the result of El Shazly O. et al, which was 0.663 and $p < 0.05$ [1]. Santini. S. et al [9], showed a similar results to our study, using a visual analog pain scale, the preoperative pain level was 8.8 (range, 4 to 10), and at latest follow-up, it was 2.4 (range, 0 to 10). The percutaneous drilling of chronic painful heel syndrome appears to be effective in the relief of intraosseous congestion and bone-marrow edema. Many modalities of surgical treatment of calcaneal spur and planter fasciitis are advocated. Komatsu. F. et al [10], determines the clinical results of deep-fascial medial and lateral portals in performing endoscopic surgery for plantar fasciitis, and his result was 64.2 ± 6.3 points before surgery and 92.6 ± 7.1 points at 2 years after surgery ($P < 0.001$) by using the American Orthopedics Foot and Ankle Society Ankle Hindfoot Scale. Scott W. et al [11] used an electrohydraulic shock wave with a mean of 20.6 kV combined with a mean of 2,506 pulses, and the result was 83% of the patients treated, stated that shock wave therapy improved their symptoms. Another method of treatment of calcaneal spur described by Brian H. et al [12], who used cryosurgery (a minimally invasive, percutaneous, office-based technique) to treat 59 consecutive patients (61 heels); and his result was the mean pain rating (8.38) before cryosurgery (day 0) is statistically significant to the mean pain rating (1.26) at day 365 postoperatively, while in our study was 0.46 ± 0.92 .

In Brock L. et al [13], a retrospective study involving 22 patients (31 feet) with a history of prolonged moderate to severe heel pain treated by nerve ablation using radiofrequency energy, the result was mean pre-intervention visual analog pain score was 8.12 ± 1.61 , and this dropped to 2.07 ± 2.06 at 6 months, but in our study the score dropped to 0.88 ± 1.05 at 6 months.

In comparison to Wendy Benton et al [14], which was a retrospective study done to evaluate patient pain level and satisfaction after a percutaneous plantar fasciotomy and the results: the pain level at 2 year follow-up was 2.1

(± 2.7) with a range of 0–10, in our study, the pain level was $0.25 (\pm 0.66)$.

Six feet (13.6%) of our patients develop paresthesia of the heel due to neuropraxia of the medial calcaneal nerve which resolved after 3-6 months. Our results showed frequent injury to the medial calcaneal nerve more than the results of Abu Hassan study [15] in which the complications affect 3 (7.9%) transient paresthesia at the distribution of that nerve that resolved spontaneously after 8 weeks post-surgery. This may be attributed to the wide surgical incision in our study. In conclusions, Calcaneal drilling is an effective modality of treatment for recurrent heel pain syndrome when combined with ordinary release of planter fascia and spur excision after failure of conservative management.

REFERENCES

1. El Shazly O, El Beltagy A.: Endoscopic plantar fascia release, calcaneal drilling and calcaneal spur removal for management of painful heel syndrome, The Journal of Foot and Ankle Surgery, 2010, vol. 44, P: 137-143.
2. Gavin Bowyer.: the foot and ankle, painful heel, Apley's System of Orthopaedics and Fractures, 9th Edition, 2010; P: 618-619.
3. Canale & Beaty: painful heel - the foot and ankle, Campbell's operative orthopedics, edited by Crenshaw A.H., 11th edition, 2010, Mosby Company. P: 3397-3421.
4. Weinstein, Stuart L.; Buckwalter, Joseph A. Turek's Orthopaedics: Principles and Their Application, 2005, 6th Edition, Lippincott Williams & Wilkins. P: 700-701.
5. Riddle, D.L. & Pulisic, M. & Pidcoe, P. & Johanson, R.E., "Risk factors for plantar fasciitis: a matched case-control study", J Bone Joint Surg, 2003, vol. 85, P: 872-877.
6. Frank J. Frassica, Paul D. Sponseller, and John H. Wilckens: The 5-minute orthopedic consult, 2007, 2nd edition, Lippincott Williams & Wilkins, P: 567-577.
7. Greene, Planter fasciitis- Foot and Ankle, Netter's Orthopaedics, 2006, 1st edition, Saunders. P: 304-305.
8. Joseph A. Cione, John Cozzarelli, Christopher Jay Mullin: A Retrospective Study of Radiofrequency Thermal Lesioning for the Treatment of Neuritis of the Medial Calcaneal Nerve and its Terminal Branches in Chronic Heel Pain, The Journal of Foot and Ankle Surgery, 2009, vol. 48, Issue 2 , P: 142-147.

Rasheed: painful heel syndrome

9. Santini, S. & Rebeccato, A. & Schiavon, R. & Nogarin, L., "Percutaneous drilling for chronic heel pain", J Foot Ankle Surg, 2003, vol. 42, P: 296-301.
10. Komatsu F., Masato T., Ken I., Takashi M.: Endoscopic Surgery for Plantar Fasciitis: Application of a Deep-Fascial Approach. The Journal of Arthroscopic and Related Surgery, 2011, vol. 27, P: 1105-1109.
11. Scott W. Thomas S. Anthony H.: Extracorporeal shock wave therapy for the treatment of chronic plantar fasciitis: Indications, protocol, intermediate results, and a comparison of results to fasciotomy. The Journal of Foot and Ankle Surgery, 2002, vol.41, P: 166-172.
12. Brian H. Allen, Lawrence M. Fallat, Steve M. Schwartz,; Cryosurgery: An Innovative Technique for the Treatment of Plantar Fasciitis, The Journal of Foot and Ankle Surgery, March 2007, vol. 46, Issue 2 , P: 75-79.
13. Brock Liden, Melitta Simmons, Adam S. Landsman: A Retrospective Analysis of 22 Patients Treated with Percutaneous Radiofrequency Nerve Ablation for Prolonged Moderate to Severe Heel Pain Associated with Plantar Fasciitis, 2009, vol. 48, Issue 6, P: 642-647.
14. Wendy Benton-Weil, Anthony H. Borrelli, percutaneous plantar fasciotomy: A minimally invasive procedure for recalcitrant plantar fasciitis. The Journal of Foot and Ankle Surgery, 1998, vol. 37, P: 269-272.
15. Abu Hassan, F.O., "Percutaneous fenestration of the anteromedial aspect of the calcaneus for resistant heel pain syndrome", J Foot Ankle Surg, 2009, vol. 15.