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TREATMENT OF PLANTAR FASCIITIS BY CORTICOSTEROID INJECTION: TO RELY ON YOUR FINGERS OR THE ULTRASOUND PROBE

General Surgery

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ABSTRACT

Introduction: Plantar fasciitis (PF) is treated by corticosteroid injection using ultrasound-guidance (US) or palpation-guided. Our study aims to compare the efficacy and outcome parameters of the two modalities.

Methods:208 patients of PF were randomly allocated in two groups, group A (US-guidance) and group B (palpation-guided) while treating them with corticosteroid injection. Pain, plantar fascia thickness (PFT) and heel pad thickness (HPT) were measured and analysed during follow-up.

Results:Statistically significant improvement in pain score and decrease in PFT was recorded in both groups which was more in US-guided group, while no difference was noted in HPT. Decrease in pain significantly correlated to decrease in PFT but had no correlations with decrease in HPT.

Conclusion:US-guided injection is better than palpation-guided injection providing greater relief in pain and normalization of PFT as it enhances the accuracy of injection site by precise localization of the plantar fascia and guided needle placement during injection. It also aids in diagnosis and plays an important role in prognosis of PF.

KEYWORDS

Plantar fasciitis, corticosteroid injection, ultrasound-guided injection, plantar fascia thickness, office-procedure

INTRODUCTION

Plantar fasciitis (PF), commonest cause of heel pain, affects 1/10th of the population once in their life-time(1,2). Patients seek help when the pain causes significant distress and disruption to their day-to-day activities (3). Steroid injections are used to treat PF when other conservative measures have failed(4). The procedure is cheap, simple and offers instant pain relief and can be performed as an office procedure(5). Ultrasound-guidance (US) enhances the accuracy of the procedure(6) making it a preferred modality of treatment for PF. But, few studies believe that traditional palpation-guided injection (an equally effective and cheaper modality) is better(7). Our study aims to compare the efficacy and outcome parameters of the two modalities, US and palpation-guided corticosteroid injection in treatment of PF.

MATERIAL AND METHODS

It was a prospective-observational study for a duration of one year in clinically diagnosed patients of PF.

I.Inclusion Criteria:

- Age >18 years
- Patients with no improvement with oral analgesics, exercises, contrast bath, ultrasonic therapy, LASER therapy and footwear modification for 3 weeks or more

US showing Plantar fascia thickness (PFT) >4.0 mm or difference in PFT >1 mm in symptomatic heel in comparison to asymptomatic heel, in association with hypo echogenicity and/or loss of definition of the borders of the fascia

II. Exclusion criteria

- Received local corticosteroid injection within 3 months
- History of bleeding disorders or on anticoagulant therapy
- Previous surgery for PF
- Local malignancy
- Pregnancy
- Vascular insufficiency or neuropathy related heel pain
- Uncontrolled Diabetes
- Local trauma or infection

III. Methodology

A total of 368 patients were screened for PF based on the inclusion and exclusion criteria. All patients were given conservative treatment (analgesics, anti-inflammatory, contrast bath, exercise therapy, shoe modification) for three weeks of which 118 responded. Out of 250 patients of failed conservative therapy, 20 were not willing to participate in the study. Rest 230 were randomly allocated in two groups (115 in each). One group was treated with US-guided (group A) and other with palpation-guided corticosteroid injection (group B). Eleven patients in each group were lost to follow up. 104 patients in each group underwent pain-assessment by visual analogue scale (VAS) and US examination of PFT and heel pad thickness (HPT) at pre-injection (0 week), 3 weeks and 6 weeks after injection. All patients were advised to continue the rehabilitation measures (patient-education, footwear advice, stretching and strengthening exercises).

IV.Assessment parameters

1.Patient-assessed outcomes: Heel pain was assessed by VAS.

2.Surgeon-assessed outcomes: PFT and HPT was measured by US. Thickness of the plantar fascia was measured near its insertion to the calcaneus using the electronic callipers of the scanner. PF was considered to be present when PFT was ≥4 mm or difference in PFT was >1 mm in symptomatic heel in comparison to asymptomatic heel, in association with hypo echogenicity and/or loss of definition of the border of the fascia. HPT was measured from skin surface to calcaneal tuberosity.

***3.Disease-oriented outcomes*:** Reduction in PFT and HPT subsequent to corticosteroid injection were noted in both groups.

V.Injection protocol

A 22-gauge, 1.5-inch needle connected to a 2 ml syringe filled with concoction of 1 ml (40mg) of methylprednisolone acetate and 1 ml of 2% Lignocaine was used for injection. In the US-guidance technique, needle was inserted through the posterior heel parallel to the long axis of the transducer. Injection was given in the region of maximal fascia thickening. In the palpation-guided technique, needle was inserted from the medial aspect of heel to the point of maximal tenderness. Injection was given above the plantar fascia attachment.

VI.Follow up
The patients were followed up in 3 weeks and 6 weeks and all parameters were assessed.

VII.Statistical analysis
All data were entered in MS EXCEL sheet and were analysed using SPSS version 20.

Quantitative variables were compared using unpaired t-test/Mann-Whitney Test between the two groups and Paired t-test/ Wilcoxon ranked sum test within the groups across follow ups. Qualitative variables were compared using Chi-Square test/Fisher's exact test. A p-value of <0.05 was considered statistically significant.

Results
Majority of patients were in the range of 30-40 years in both groups (Table 1). The mean duration of symptoms in group A was 31.33 ± 22.35 while it was 24.20 ± 19.97 weeks in group B (Table 1). Most of the patients had involvement of right side. Mean VAS, PFT and HPT at 0, 3 and 6 weeks in both groups and comparison of decrease in these parameters within the group at sequential follow-ups is shown in Table 2. Statistically significant improvement in pain score and decrease in PFT was recorded in both groups which was more in US-guided group, in their follow ups (Table 2) while no difference was noted in HPT in both the groups. Decrease in pain significantly correlated to decrease in PFT (Table 3) but had no correlations with decrease in HPT.

Table 1 General characteristics of the patients

Age distribution		Group A (USG guided	Group B (Palpation guided)	p-value
	<30	17 (16.63 %)	24 (23.07 %)	0.141
	30-40	42 (40.4 %)	48 (46.15 %)	
	41-50	28 (26.9 %)	24 (23.07 %)	
	51-60	17 (16.34 %)	8 (7.6 %)	
Gender	Female	62 (60 %)	55 (53.3 %)	0.602
	Male	42 (40 %)	49 (46.7 %)	
Laterality	Left	42 (40 %)	45 (43.3 %)	0.793
	Right	62 (60 %)	59 (56.7 %)	
Mean age (years)	40.66 ± 11.77	36.46 ± 9.97	0.141	
Mean weight (kg)	70.06 ± 11.33	67.46 ± 9.58	0.341	
Duration of symptoms (weeks)	Mean ± SD	31.33 ± 22.35	24.20 ± 19.97	0.089
	Median	24	16	
	Range	4-96	2-96	

Table2: Assessment parameters on follow up

VAS score						
	Base line (0 weeks)	3 weeks	6 weeks	0 vs 3 weeks	0 vs 6 weeks	3 vs 6 weeks
	Mean ± SD	Mean ± SD	Mean ± SD	p-value	p-value	p-value
Group A (USG guided)	76.00 ± 11.62	18.27 ± 17.33	0.68 ± 3.71	<0.001	<0.001	<0.001
Group B (Palpation guided)	76.66 ± 10.28	33.10 ± 20.89	16.20 ± 14.49	<0.001	<0.001	<0.001
p-value	0.9365	0.0074	<0.001			
Plantar fascia thickness (in mm)						
	Base line (0 weeks)	3 weeks	6 weeks	0 vs 3 weeks	0 vs 6 weeks	3 vs 6 weeks
	Mean ± SD	Mean ± SD	Mean ± SD	p-value	p-value	p-value
Group A (USG guided)	5.40 ± 0.67	3.99 ± 0.53	3.57 ± 0.57	<0.001	<0.001	<0.001
Group B (Palpation guided)	5.06 ± 0.40	4.48 ± 0.66	4.16 ± 0.69	<0.001	<0.001	<0.001
p-value	0.0212	0.0030	0.0009			
Heel pad thickness (in cm)						
	Base line (0 weeks)	3 weeks	6 weeks	0 vs 3 weeks	0 vs 6 weeks	3 vs 6 weeks
	Mean ± SD	Mean ± SD	Mean ± SD	p-value	p-value	p-value
Group A (USG guided)	1.22 ± 0.22	1.22 ± 0.20	1.23 ± 0.19	0.999	0.999	0.421
Group B (Palpation guided)	1.20 ± 0.16	1.18 ± 0.17	1.18 ± 0.17	0.320	0.774	0.999
p-value	0.6350	0.4982	0.4010			

Table3: Correlation of pain and PFT and HPT on follow up

Correlation of follow up VAS with PFT			
	PFT 0 to 3 weeks (p-value)	PFT 3 to 6 weeks (p-value)	PFT 0 to 6 weeks (p-value)
VAS 0 to 3 weeks	0.108	0.612	0.339
VAS 3 to 6 weeks	0.695	0.229	0.322
VAS 0 to 6 weeks	0.007	0.488	0.009
Correlation of follow up VAS with HPT			
	HPT 0 to 3 weeks (p-value)	HPT 3 to 6 weeks (p-value)	HPT 0 to 6 weeks (p-value)
VAS 0 to 3 weeks	0.083	0.016	0.026
VAS 3 to 6 weeks	0.780	0.171	0.016
VAS 0 to 6 weeks	0.093	0.129	0.593

Discussion
Plantar fascia forms the medial longitudinal arch of the foot providing static support and dynamic shock absorption to foot —(8-11). PF is seen in athletes as well as sedentary people, in middle-aged and older individuals, higher incidence in females and right-sided involvement. Diagnosis is clinical. Patients experience insidious onset pain at bottom of feet with tenderness on palpation of plantar fascia at its origin (12). This is supported by findings of calcaneal spur on radiograph, which is not the cause, but effect of plantar fasciitis. It is found in around 50% of symptomatic patients and 20% of asymptomatic patients (13,14). Similar findings were obtained in our study.

PF is treated by non-invasive (heat modalities, electric modalities, patient education, soft tissue therapy, massage, taping, night splints, stretching, strengthening, extra-corporeal shock wave therapy), injections (steroids, local anaesthetics, platelet rich plasma) and surgical intervention (endoscopic or open fasciotomy). Local steroid injection is used to control pain when other conservative treatment has failed —(15-18). Corticosteroids inhibit fibroblast proliferation and express ground substance proteins and are beneficial for treatment of early stage tendinopathy (19). Methylprednisolone acetate is the recommended agent with minimal side effects (20,21). We employed a mixture of methylprednisolone and lignocaine to achieve beneficial effects in providing instant pain relief, dilution of harmful corticosteroid crystals, and confirmation of accurate solution deposit as described in other studies (22,23).

Our study showed statistically significant improvement in symptoms during follow-up assessed by VAS and decrease in PFT with insignificant changes in HPT in both groups, as shown in studies by Tsai et al and Tahririan et al (24,25). We observed decrease in VAS to significantly co-relate with decrease in PFT as found in study by Mc Millan et al (26). There was no co-relation with decrease in VAS with change in HPT consistent with Tsai et al (24).

US has diagnostic, therapeutic and prognostic role in treatment of PF (27). It can visualize the thickening of the plantar fascia, hypoechoic changes, perifascial fluid collections and calcaneal spur —(12-14). In our study, sonographic diagnosis was based on the presence of plantar fascia thickening of >4mm, fusiform thickening of the plantar fascia

close to the calcaneal enthesis and an abnormal fascial echo texture. US-guidance increases accuracy, improves efficacy and accelerates the outcome parameters in terms of PFT, HPT and VAS scores (24,27) and we found it as a better modality in treatment of PF in comparison with palpation-guidance (28). It is additionally associated with negligible complications and none of our patients had fat pad atrophy or plantar fascia rupture due to the procedure(29,30).

Conclusion

US-guided injection is better than palpation-guided injection providing greater relief in pain (VAS scores) and normalization of PFT as it enhances the accuracy of injection site by precise localization of the plantar fascia and guided needle placement during injection. It also aids in diagnosis and plays an important role in prognosis of PF.

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