LOCAL CORTICOSTEROID VS. AUTOLOGOUS BLOOD FOR PLANTAR FASCIITIS

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ABSTRACT

BACKGROUND

Plantar fasciitis is the most common cause of heel pain for which professional care is sought. Initially thought of as an inflammatory process, plantar fasciitis is a disorder of degenerative changes in the fascia and maybe more accurately termed plantar fasciosis. Traditional therapeutic efforts have been directed at decreasing the presumed inflammation. These treatments include icing, Nonsteroidal Anti-inflammatory Drugs (NSAIDs), rest and activity modification, corticosteroids, botulinum toxin type A, splinting, shoe modifications and orthosis. Other treatment techniques have been directed at resolving the degeneration caused by the disease process. In general, these techniques are designed to create an acute inflammatory reaction with the goal of restarting the healing process. These techniques include autologous blood injection, Platelet-Rich Plasma (PRP) injection, nitroglycerin patches, Extracorporeal Shock Wave Therapy (ESWT) and surgical procedures. Recently, research has focused on regenerative therapies with high expectations of success. The use of autologous growth factors is thought to heal through collagen regeneration and the stimulation of a well-ordered angiogenesis. These growth factors are administered in the form of autologous whole blood or Platelet-Rich Plasma (PRP). Platelets can be isolated using simple cell-separating systems. The degranulation of the alpha granules in the platelets releases many different growth factors that play a role in tissue regeneration processes. Platelet-derived growth factor, transforming growth factor-P, vascular-derived endothelial growth factor, epithelial growth factor, hepatocyte growth factor and insulin-like growth factor are examples of such growth factors. Injections with autologous growth factors are becoming common in clinical practice. The present study was an attempt to compare the efficacy of autologous blood injection in plantar fasciitis by comparing it with the local corticosteroid injection.

MATERIALS AND METHODS

A total of 120 patients who attended Orthopaedic OPD at Government General Hospital, Kakinada, during the time spanning January 2015 to December 2015, who were suffering from plantar fasciitis were randomly allocated either autologous blood injection or corticosteroid injection as treatment. Both groups were analysed with VAS and Nirschl pain staging at presentation, 1st week, 4th week, 12th week and at six-month intervals. Results were tabulated and analysed statistically. All patients were treated on OPD basis. No inpatient care was needed in any patient.

RESULTS

In this study, slight male preponderance was seen in both the groups (53.33%). The mean in group A was 41.80±10.96 years and in group B the mean age was 40.68±10.47 years. Most of the patients in group A and B presented with right foot involvement (51.67% and 65.00%). The mean duration in group A was 10.88 weeks compared to 8.62 weeks in group B. The mean VAS scores at the beginning were comparable in both the groups (7.55±1.40 vs. 7.70±1.14). At fourth week, the mean VAS score in group A significantly reduced to 3.18±2.38 and at 12 weeks and six months to 0.3±1.37 suggesting significantly less pain in group A compared to group B. Similar trend of reduction among patients is group A was observed with Nirschl staging scores. No patient in group A reported complications and recurrence was not observed in patients with group A.

CONCLUSION

Based on the results of our present study, it maybe concluded that autologous blood injection significantly reduced the pain based on VAS and Nirschl staging without complications there by lowering the recurrence rate up to six months in patients with plantar fasciitis. It also provided complete relief of pain for the period of six months without any complication. Autologous blood is simple to acquire and prepare, easy to carry out. Hence, autologous blood provides intermediate and long-term results in term of pain relief when compared to corticosteroid injection, which gives early and short-term relief of pain from plantar fasciitis.

KEYWORDS

Autografts A01.941.750; Methylprednisolone D04.210.500.745.432.769.795.539; Fasciitis, Plantar C05.360.350.

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BACKGROUND

Plantar fasciitis is the most common cause of heel pain for which professional care is sought. It is an inflammation of the fascia of the plantar surface of the foot usually at the calcaneal attachment.[1] It is one of the most common causes of heel pain presenting to the outpatient clinic. Plantar fasciitis is diagnosed on the basis of a history of pain on

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taking the first few steps in the morning, worsening pain with weight bearing and pain and tenderness to palpation over the medial calcaneal tubercle.[2,3,4,5,6,7] Various terms have been used to describe plantar fasciitis, including jogger's heel, tennis heel, policeman's heel, painful heel syndrome, heel spur syndrome, subcalcaneal pain, calcaneodynia, calcaneal periostitis[4] and even gonorrhoeal heel. Although, a misnomer, this condition is sometimes referred to as heel spurs by the general public.

AIMS AND OBJECTIVES

- To evaluate the efficacy and role of autologous blood injection for plantar fasciitis.
- To compare the effect of local corticosteroid injection in the management of plantar fasciitis to that of autologous blood injection.

MATERIALS AND METHODS

The present study was conducted at the Department of Orthopaedics, Rangaraya Medical College, Kakinada, A.P. during the period of January 2015 to December 2015. The study design was one year randomised controlled trial. 120 confirmed patients of plantar fasciitis attending Orthopaedic OPD at Government General Hospital, Kakinada/Rangaraya Medical College during the study period. Patients fulfilling the selection criteria were briefed about the nature of the study and a written informed consent was obtained from the selected patients. Investigations such as x-ray foot, AP and lateral, random blood sugar, bleeding time and clotting time were done. Based on the computer generated randomisation, the selected patients were randomised into two groups namely; Group A (n=60) - Autologous blood injection group. Group B (n=60) - Corticosteroid injection group. After obtaining written informed consent from the selected patients, demographic data, chief complaints at presentation and history was taken and clinical examination was done for all patients and findings were recorded.

Procedure

Group A- Autologous Blood Injection Group

Under aseptic precautions, patients were given an injection of 2 mL autologous blood drawn from cubital vein and 1 mL 0.5% bupivacaine was added to the blood and was injected at the medial side of the calcaneum at the level of medial calcaneal tubercle.

Group B- Local Corticosteroid Injection Group

Patients were given 2 mL of local corticosteroid (mixed with methylprednisolone acetate 80 mg) mixed with 1 mL 0.5% bupivacaine at medial border of calcaneum.

Technique

Patients were positioned supine and the heel involved was thoroughly scrubbed and painted with povidone-iodine solution. Point of maximum tenderness was located by palpation at the level of medial process of calcaneal tuberosity and injection was performed with walkover technique. Pain of the participants was assessed by most widely used and accepted "visual analogue scale." It consists of a 10 centimetre line marked at one end with "no pain" and at other end with "worst pain ever." Participants were asked to indicate where on the line he or she rates the pain on the day of presentation, 1, 4, 12 weeks and 6 months of follow-up. Numerical value is then given to it simply by measuring length between "no pain" to patient's mark.

Nirschl Staging

Phase 1- Mild pain with exercise; resolves within 24 hours.
Phase 2- Pain after exercise; exceeds 48 hours.
Phase 3- Pain with exercise; does not alter activity.
Phase 4- Pain with exercise; alters activity.
Phase 5- Pain with heavy activities of daily living.
Phase 6- Pain with light activities of daily living; intermittent pain at rest.
Phase 7- Constant pain at rest; disrupts sleeps.
No pain 1 __2__3__4__5__6__7 worst pain.

Inclusion Criteria

1. Clinically confirmed cases of plantar fasciitis with a pain in the anteromedial border of calcaneum.
2. Both sexes were included.
3. Age above 15 years.

Exclusion Criteria

1. Patients receiving steroid injections within three months before blood injection.
2. A history of substantial trauma.
3. Previous surgery on the heel.
4. Diabetes mellitus.
5. Calcaneal stress fracture.
6. Retrocalcaneal bursitis.
7. Peroneal, posterior tibial, flexor hallucis longus tendonitis.
8. Tarsal tunnel syndrome.
9. Lumbar radiculopathy.
10. Other causes like rheumatoid arthritis, ankylosing spondylitis and Reiter's syndrome.

RESULTS

This study showed slight male preponderance in both the groups (53.33% and 55%) with male-female ratio of 1.14:1 in group A and 1:1.22 in group B. However, this difference was statistically not significant (p=0.361) (Table 1). Most of the patients in group A (65%) and in group B (50%) were aged between 30 to 45 years. The mean age in group A was 41.80±10.96 years and in group B the mean age was 40.68±10.47 years suggesting both the groups were comparable with respect to age (p=0.568) (Table 2). Most of the patients in group A and group B presented with right foot involvement (51.67% and 65.00%, respectively) (Table 3). In group A, among 35% and in group B among 50% of

patients' duration of symptoms was within five weeks. The mean duration in group A was 10.88 weeks compared to 8.62 weeks in group B (Table 4). At the beginning of treatment, severe pain was recorded among 71.67% in group A and 85% in group B. However, this difference was statistically not significant. Hence, all the demographic and clinical variables were comparable in both the groups. In this study, at the first week of treatment in group A, 61.67% patients were still having severe grade of pain, but in group B, only 11.67% patients having pain. P value for VAS score was p<0.001, which was statistically significant. Hence, the decrease in pain at 1st week was statistically significant in corticosteroid injection group compared to autologous blood injection group. At fourth week follow up, most of the patients (70%) reported mild pain in group B compared to group A. This difference was statistically not significant. At 12 weeks and at six months follow up, almost all the patients (96.67%) reported mild pain in group A compared to group B. 76.67% of patients at 12 week follow up and 73.33% patients at six months follow up reported mild pain (p<0.001) suggesting overall better pain control in group A at 12 weeks and six months follow up period. In this study, the mean VAS scores at the beginning were comparable in both groups (7.55±1.40 vs 7.70±1.14). At first week, these scores reduced significantly in group B (4.27±1.76) compared to group A (6.92±2.04; p<0.001). Further, at fourth week, the mean VAS scores in group A significantly reduced to 3.18±2.38 and at 12 weeks and six months to 0.3±1.37 (p<0.001) suggesting significantly less pain in group A compared to group B (Table 5 and Graph 1). Similar trend of reduction among patients in groups A was observed with Nirschl staging scores (p<0.001) (Table 6 and Graph 2). In the present study, 6.6% patients had local skin atrophy in group B, whereas no patient in group B had this problem. Recurrence was not observed in patients with group A, whereas 16.67% patients reported recurrences between four to six months follow up suggesting significantly less recurrence rates with the treatment of autologous blood injection (p=0.003) (Table 7). At six months of follow up, significantly more number of patients (91.67%) patients in group A were completely relieved of pain whereas more than half (51.67%) patients in group B were not relieved of pain (p=<0.001) (Table 8).

	Group A		Group B	
Sex	**Number**	**Percent**	**Number**	**Percent**
Male	32	53.33	27	45.00
Female	28	46.67	33	55.00
Total	**60**	**100**	**60**	**100**

Table 1. Sex Distribution

	Group A		Group B	
Age Group (Years)	**Number**	**Percent**	**Number**	**Percent**
<30	6	10.00	9	15.00
30 to 45	39	65.00	30	50.00
46 to 60	9	15.00	20	33.33
>60	6	10.00	1	1.67
Total	**60**	**100**	**60**	**100**

Table 2. Age Distribution

	Group A		Group B	
Side	**Number**	**Percent**	**Number**	**Percent**
Right	31	51.67	39	65.00
Left	29	48.33	21	35.00
Total	**60**	**100**	**60**	**100**

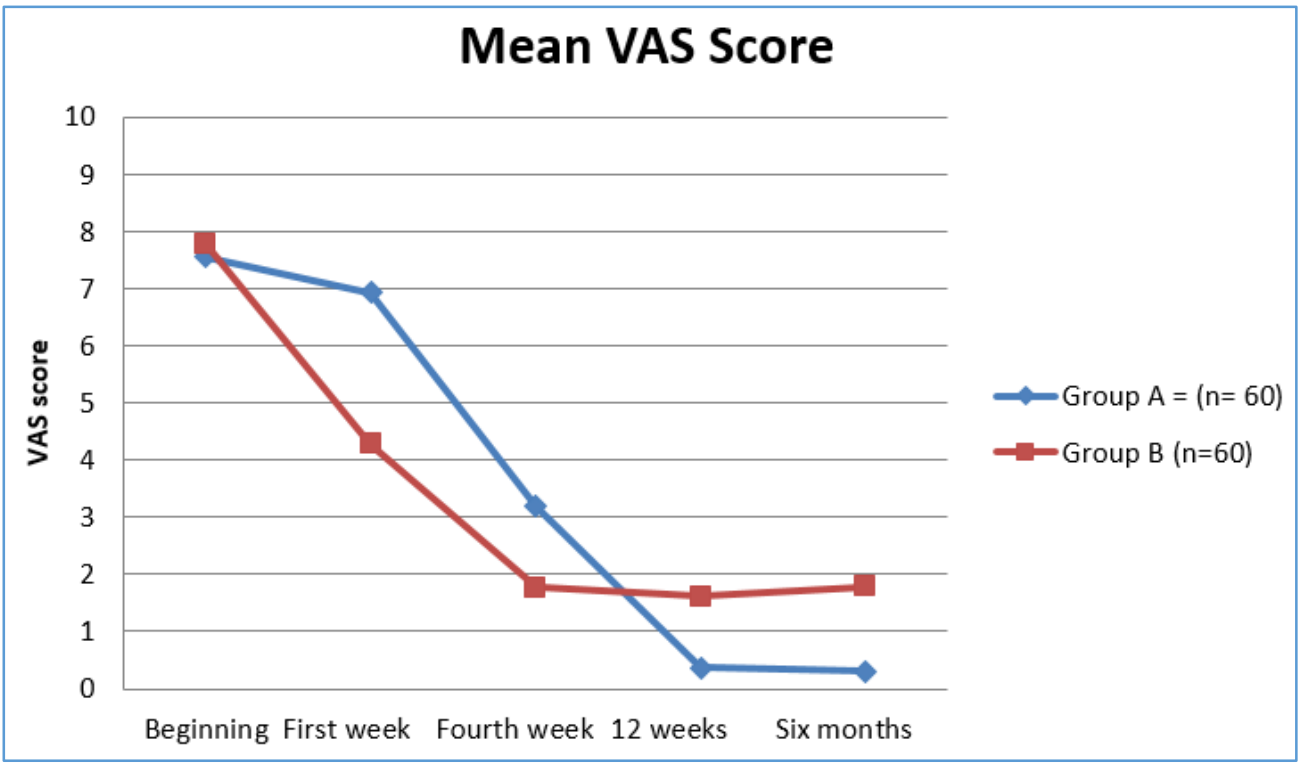
Table 3. Side

	Group A		Group B	
Duration (Weeks)	**Number**	**Percent**	**Number**	**Percent**
<5	21	35.00	30	50.00
5 to 10	15	25.00	5	8.33
11 to 15	7	11.67	10	16.67
16 to 20	5	8.33	12	20.00
>20	12	20.00	3	5.00
Total	**60**	**100**	**60**	**100**

Table 4. Duration

	Group A		Group B		'z' value	'p' value
Duration (Weeks)	**Mean**	**SD**	**Mean**	**SD**		
Beginning	7.55	1.4	7.7	1.14	0.240	0.810
First week	6.92	2.04	4.27	1.76	6.229	<0.001
Fourth week	3.18	2.38	1.77	2.49	3.969	<0.001
12 weeks	0.37	1.38	1.62	2.03	4.215	<0.001
Six months	0.3	1.37	1.78	2.14	4.843	<0.001

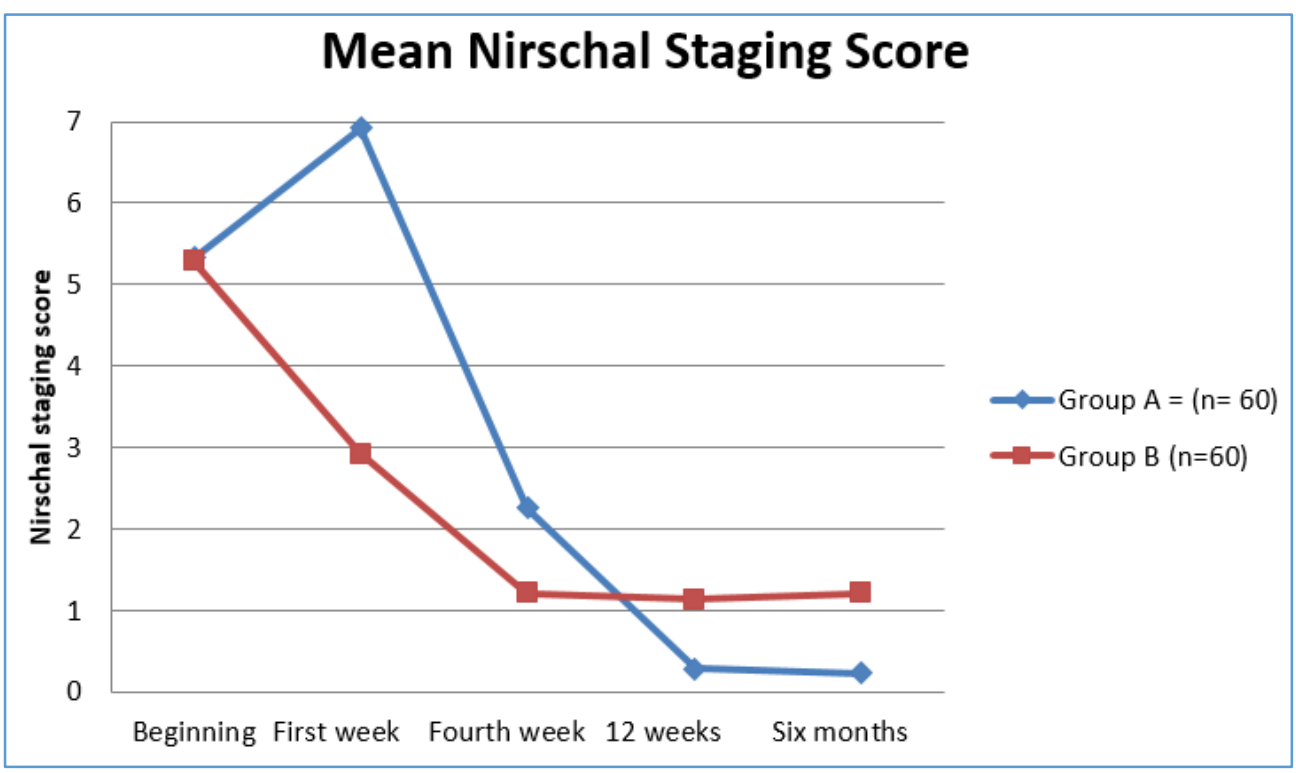
Table 5. Mean VAS Score



Graph 1

	Group A		Group B		'z' value	'p' value
Duration (Weeks)	**Mean**	**SD**	**Mean**	**SD**		
Beginning	5.33	1.23	5.28	0.98	0.508	0.611
First week	4.97	1.55	2.92	1.29	6.361	<0.001
Fourth week	2.25	1.61	1.2	1.71	4.108	<0.001
12 weeks	0.28	0.94	1.13	1.5	4.003	<0.001
Six months	0.22	0.92	1.2	1.52	4.758	<0.001

Table 6. Mean Nirschl Staging Score



Graph 2

	Group A		Group B	
Recurrence	**Number**	**Percent**	**Number**	**Percent**
Yes	0	0.00	10	16.67
No	60	100.00	50	83.33
Total	**60**	**100**	**60**	**100**

Table 7. Recurrence Rate Between Four Months to Six Months

	Group A		Group B	
Pain Relief	**Number**	**Percent**	**Number**	**Percent**
Yes	55	91.67	31	51.67
No	5	8.33	29	48.33
Total	**60**	**100**	**60**	**100**

Table 8. Complete Relief of the Pain at Six Months

DISCUSSION

A single histologic study of specimens obtained from cases with inflamed plantar fascia revealed mucinoid degeneration or fibrous degeneration in 34 of 35 specimens.[8] Pathologically prolonged inflammatory changes in the tissue are seen initially as oedema and are seen later as thickening of the plantar fascia. In one study, the dorsoplantar thickness of the plantar fascia was 3 mm in normal subjects and 15 mm in patients with plantar fasciitis.[9] Regarding gender predominance, some authors report that PF affects both males and females equally, while Ambrosius and Kondracki report a male predominance.[10,11] In contrast to this, Gill and Kiebzakand, the South African studies by Blake, Du Plessis, Hammond and Morris report a slight female predominance.[12,13,14,15] Rano et al found that the average age of the patients presenting to their facility with heel pain was almost 10 years higher than controls who presented for other reasons.[16] Matheson et al in their retrospective review of 1407 patients from an outpatient sports medicine clinic, found that younger athletes had a lower prevalence of plantar fasciitis (2.5%) than older athletes (6.6%).[17] The association of plantar fasciitis with increasing age is consistent with the histopathological findings of degenerative, rather than inflammatory changes within the plantar fascia. These degenerative findings support the hypothesis that plantar fasciitis is secondary to repetitive microtrauma caused by prolonged weight bearing activities.[18] A prospective, randomised, controlled, observer-blinded study was done over a period of 6 months in Kuala Lumpur, Malaysia. Sixty-four patients were randomly allocated to either the autologous blood or corticosteroid treatment group. All patients were assessed for the worst pain daily on Visual Analogue Scale (VAS) and Tenderness Threshold (TT) at the plantar fascia origin using a pressure algometer before treatment and at 6 weeks, 3 months and 6 months after treatment. A p value of 0.05 was considered significant. Data were complete for 61 patients. The reduction in VAS and increase in TT for both groups was significant over time ($p<0.0001$).[19] At 6 weeks and 3 months, the corticosteroid group had significantly lower VAS than the autologous blood group ($p<0.011$ and $p<0.005$, respectively), but the difference was not significant at 6 months. The corticosteroid group had significantly higher TT than the autologous blood group at 6 weeks, 3 months and 6 months ($p<0.003$, $p<0.003$, $p<0.008$, respectively).

CONCLUSION

Based on the results of our present study, it maybe concluded that autologous blood injection significantly reduced the pain based on VAS and Nirschl staging without complications thereby lowering the recurrence rate up to six months in patients with plantar fasciitis. It also provided complete relief of pain for the period of six months without any complication. Autologous blood is simple to acquire and prepare, easy to carry out. Hence, autologous blood provides intermediate and long-term results in term of pain relief when compared to corticosteroid injection, which gives early and short-term relief of pain from plantar fasciitis.

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