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Autologous whole blood injection in chronic plantar fasciitis: a prospective clinical study

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ABSTRACT

Background: Plantar fasciitis represents painful inflammatory process of plantar fascia with pain beneath the heel. The disease is frustrating for both the patient and the physician as the etiology is unknown. Conservative management is the mainstay of treatment. Patients with resistant pain can be treated with local injections. In this study we evaluated the effectiveness of autologous whole blood injection for treatment of chronic plantar fasciitis.
Methods: The study was conducted on 55 patients (males=25, females=30) with chronic heel pain for more than 6 months and failed conservative treatment. After proper clinical evaluation and diagnosis, autologous whole blood was injected on medial aspect of heel at the most tender point. Visual analog score was noted before injection and at 3 and 6 months of follow-up.
Results: Mean preprocedure visual analog score was 8.2 (range=4-10), which reduced to a mean of 4.5 (range=0-9) at 3 month follow-up and 3.3 (range 0-9) at 6 month follow-up. The reduction in VAS score was statistically significant ($p<0.001$). No complications occurred in our series.
Conclusions: Autologous whole blood injections appear to be cost-effective for treatment of resistant plantar fasciitis with no serious side effects.

Keywords: Plantar fasciitis, Heel pain, Autologous whole blood, Visual analog scale

INTRODUCTION

Plantar fasciitis is the most common cause of chronic heel pain with a prevalence of about 10% in adults.[1] The plantar fascia originates from the medial side of calcaneal tuberosity and forms the medial longitudinal arch, providing static longitudinal support and dynamic shock absorption. The exact etiopathogenesis of this entity is still not clear.[2] Degenerative changes, microscopic tears, gradual reduction in collagen and elastic tissues with aging predispose to this condition.[3] Various risk factors for developing this disease include obesity, rheumatoid arthritis, ankylosing spondylitis, prolonged standing, walking barefoot, poor footwear, excessive foot pronation, increased femoral anteversion, limited ankle dorsiflexion.[4-6]

Woolnough termed the entity 'tennis heal', postulating that repeated trauma and traction due to aging produces microtears and cystic degeneration at the plantar fascia origin and flexor digitorum brevis beneath it.[7] Schon and Baxter proposed entrapment of first branch of lateral plantar nerve to abductor digiti minimi as a possible cause of heel pain, thereby suggesting a neurogenic cause.[8] Hicks described the Windlass mechanism of the

plantar fascia as the toes are dorsiflexed, resulting in traction on plantar fascia origin.[9]

The diagnosis in mainly clinical with adults in the fourth and fifth decade most affected and no sex predilection. Patients report pain on medial or plantar aspect of heel that is worst on rising in the morning or after sitting for a while. After a few steps pain diminishes and the patient is comfortable during the day. Patients may have light discomfort during the end of the day. Tenderness is present on the inferomedial aspect of calcaneal tuberosity.[2] Radiographs may reveal calcaneal spurs in about half of the patients affected, with uncertain significance.

Plantar fasciitis is a self-limiting condition and majority of patients become asymptomatic within 6-18 months, which is disappointing for both the patient and the surgeon.[10] Conservative treatment options include rest to part, anti-inflammatory medications, stretching exercises, heel pads and orthotics, ultrasound and extra-corporeal shock wave therapy, corticosteroid injections providing relief in majority of patients. Surgery is reserved for selected patients (5-10%) who do not respond to non-operative management.[11,12] Local steroid injections have been associated with plantar fascia rupture and heel fat pad atrophy.[13,14]

In recent years there has been a growing interest in the use of autologous blood derived products including Autologous whole blood (AWB) and Platelet rich plasma (PRP) for treatment of variety of musculoskeletal conditions including tennis elbow, golfers elbow, patellar tendinitis, Achilles tendinitis, knee osteoarthritis.[15-18] The various cellular and humoral factors in blood stimulate vascular and fibroblast activity, initiating an inflammatory reaction, thus producing healing.[19,20] In this study we examine the effect of Autologous Whole Blood injections for treatment of chronic plantar fasciitis with symptom duration of more than 6 months and failed conservative management.

METHODS

This study was conducted in the Orthopedics department, Government Hospital for Bone and Joint Surgery, an associated hospital of Government Medical college, Srinagar from 2014 to 2017. Institute ethical committee approval and proper informed consent was taken from all patients. 55 patients of both sexes having unilateral chronic heel pain of more than 6 months with failed conservative treatment were included. The conservative treatment included anti-inflammatory medications, stretching and orthotics. Exclusion criteria were patients with symptom duration of less than six months, bilateral involvement, prior history of local steroid injection, infection at injection site, prior history of surgery for plantar fasciitis.

The severity of patient's pain was graded according to Visual analog scale (VAS) of 100 mm length by putting a mark on the ruler (0=no pain and 100=most severe pain) before the procedure. After marking, pain was scored from one to ten with one decimal. Patients with VAS score of 3 or less than 3 were not included in the study. Patients were explained in detail about the procedure and need for follow-up.

Patients were placed in supine position with affected limb in flexion at hip and knee, limb externally rotated so that medial plantar surface is exposed. The skin was prepared with betadine solution and sterile drape applied. The superficial skin was infiltrated with 2% lignocaine. 2 ml of autologous whole blood was taken from antecubital vein under aseptic precautions. The AWB was injected into the medial plantar surface at the most tender point from medial to lateral with a 22G needle using a peppering technique. The injection site was dressed and patients were discharged with advice to follow-up at 1 month, 3 months and 6 months. VAS was recorded at 3 months and 6 months. Statistical analysis was done by using paired student t- test. Patients were instructed to perform plantar fascia stretching and intrinsic foot strengthening exercises regularly post injection.

RESULTS

The procedure was performed on 60 patients with chronic heel pain meeting our inclusion criteria from May 2014 to April 2017. Out of these, 5 patients were lost to follow-up and 55 patients were followed for a minimum of 6 months. The average duration of symptoms before the procedure was 10 months with a range of 6- 22 months. There were 25 males and 30 females. Right side was involved in 26 patients and left side in 29 patients. Patient's age ranged from 30- 65 years with an average of 44 years. The minimum follow-up period was 6 months with a maximum of 12 months and a mean of 8 months (Table 1).

Table 1: Demographic details of patients.

Sex	Males (n=25, 45.5%) Females (n=30, 55.5%)
Side involvement	Right (n=26, 47.3%)
	Left (n=29, 52.7%)
Age (years)	30-47 (n=31, 56.4%)
	48-65 (n=24. 43.6%)
Symptom duration (months)	6-10 (n=30, 54.6%)
	11-15 (n=21, 38.2%)
	16-22 (n=4, 7.2%)
Follow up duration (months)	6-9 (n=31, 56.4%)
	10-12 (n=24, 43.6%)

In our study the mean preinjection VAS score was 8.2 (range of 4-10), which reduced to a mean of 4.5 (range of 0-9) at 3 months and a mean of 3.3 (range of 0-9) at final

follow-up of months (Table 2). Statistical analysis revealed a significant decrease in the VAS score ($p<0.001$). 36 (65.5%) patients with an initial VAS score of 4-10 (moderate to severe pain) had a VAS score of 0-3 (mild or no pain) at final follow-up. 24 patients (43.6%) were completely pain free with VAS score of 0 at final follow-up. 3 (5.4%) patients did not respond significantly to treatment with no or minimal change in VAS scores at 3 months and final follow-up. No patient reported increased pain at 3 months or final follow-up, although about 18 patients (32.7%) reported increased pain after injection which subsided in 2-3 days with analgesics. There was no plantar fascia rupture, infection or neurovascular damage in our patients.

Table 2: VAS scores prior to AWB injection and at 3 months and 6 months follow-up.

Visual analog scale	Preprocedure (%)	At 3 months (%)	At 6 months (%)
0-3	0	24 (43.63)	36 (65.45)
4-7	21 (38.18)	25 (45.45)	16 (29.09)
8-10	34 (61.81)	6 (10.9)	3 (5.4)
Total	55	55	55

DISCUSSION

Plantar fasciitis is the most common foot disorder in adults managed by podiatric foot and ankle specialist.[2] The exact etiology of plantar fasciitis is unknown with different etiological factors contributing to the condition.[4] The long term prognosis is satisfactory based upon the natural history of the condition.[10] Most patients are treated conservatively with good outcome reported in majority of patients. Patients who do not improve with conservative treatment are interested in options other than surgery, such as local injections.[21] Presently, treatment with extra corporeal shock wave therapy has contradictory evidence.[22] Surgery is reserved for minority of patients with recalcitrant symptoms, with prognosis and complications explained. Infection, risk of nerve injury and plantar fascia rupture are some of the complications associated with surgical treatment.

Autologous whole blood contains strong growth factors within platelets that can induce healing of chronic soft tissue injuries. There is increased growth factor expression, angiogenesis and proliferation of cells with AWB injection. PRP injections have been given in plantar fasciitis with good outcomes reported in majority of studies.[17,19] PRP injections require blood withdrawal of about 50 ml, sophisticated platelet concentrating equipment's and special techniques in clinical setting.

Wheeler did a pilot case series study on 62 patients with Ultrasound guided Autologous blood injection for plantar fasciitis.[23,24] Their study showed promising results with average reduction of VAS by 84% and 68% of patients virtually pain free. They reported no complications, although 3 patients required surgery at long term follow-up. Compared to the study of Wheeler, our study did not show such promising results. This may be because we did not use ultrasound guided injections. Our study showed decrease in VAS scores in all patients by a mean of 40.3%, with 43.6% patients completely pain free at one year follow-up.

Raeissadat et al compared the effect of autologous blood and corticosteroid injection for plantar fasciitis in 36 patients with significant improvement in VAS scores.[25] Patients with AWB injection had a steady gradual decrease in pain, while patients with corticosteroid injection had an early sharp decrease followed by gradual decrease in pain scores. At 3 months, two groups showed no significant difference in pain scores. Similar results were shown by Lee et al, who compared autologous blood injection with corticosteroids in 61 patients.[26] The corticosteroid group had significantly lower VAS than the autologous blood group at 6 weeks and 3 months but the difference was not significant at 6 months. In our study, 32.7% patients reported slight increase in pain after injection which improved gradually. All patients had gradual decrease in pain.

Vahdatpour et al reported short term similar effectiveness between AWB and platelet rich plasma injection in series of 34 patients.[15] Both patients had significantly reduced plantar fascia thickness on ultrasounds. They described AWB injections as cost effective as compared to PRP injections which need special equipment for preparation.

CONCLUSION

This study indicated benefit to majority of patients with chronic plantar fasciitis from use of autologous blood injection. Patients with failed conservative treatment can be treated successfully with AWB injections with no adverse effects reported. However large multicenter randomized comparative clinical trials are needed to establish efficacy of AWB compared to established corticosteroid and PRP injections. Also studies with long term follow-up are needed to evaluate sustained relief in symptoms and any recurrences.

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