



Autologous whole blood versus corticosteroid local injection in treatment of plantar fasciitis

Authors

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Abstract

Plantar fasciitis is the most common cause of heel pain. Local injection modalities are among treatment options in patients with resistant pain.

Purpose: The aim of the present study was to evaluate the effect of local autologous whole blood compared with corticosteroid local injection in treatment of plantar fasciitis. In this randomized controlled study,

Method: 75 patients with chronic plantar fasciitis were recruited. Patients were allocated randomly into three treatment groups: local autologous blood, local corticosteroid injection, and control groups receiving no injection. Patients were assessed with visual analog scale (VAS) and plantar fasciitis pain/disability scale (PFPS) before treatment, as well as 4 and 12 weeks post therapy.

Result: Variables of pain and function improved significantly in both corticosteroid and autologous blood groups compared to control group. At 4 weeks following treatment, patients in corticosteroid group had significantly lower levels of pain than patients in autologous blood and control groups.

Keywords: Autologous whole blood. Corticosteroid. Plantar fasciitis.

Introduction

Plantar fasciitis (PF) is one of the common causes of heel pain characterized by pain at the calcaneal origin of the plantar fascia, exacerbated by weight bearing.

Conservative management is usually the initial treatment of PF¹⁻⁴. Common conservative treatment modalities include modification in daily activities, use of orthoses, stretching exercises, and non-steroidal anti-inflammatory drugs (NSAID)^{5,6}. Modalities such as extra corporeal shockwave therapy, low-level laser therapy, fascial release, acupuncture, and needling are also used in conservative management.^{6,7,8,9,10}

Chronic form of plantar fasciitis is disabling.^{11,12} It is believed that plantar fasciitis is a degenerative

condition of the plantar fascia rather than an inflammation^[4], which is characterized by micro tears of the plantar fascial ligament and intrinsic flexor muscles of the foot at their attachments on the calcaneus, resultant from repeated microtrauma due to overuse.^{4,13}

Structural changes such as excessive foot pronations, forefoot varus, posterior tibialis weakness, and higher or lower arched foot are linked to developing PF.^{14,15}

When conservative treatment fails in chronic PF, local injection of corticosteroid is among the treatment options available to patients with resistant pain^[11]

Intralesional injection of autologous blood-derived products (ABDPs) such as platelet-rich

plasma (PRP) or autologous whole blood (AWB) have gained attention as treatments for chronic musculoskeletal problems such as knee osteoarthritis.^{16,17}

There are potent chemical factors in blood that can stimulate vascular in growth and fibroblast activity.^{18,19,20} Improvement in pain and function of patients with lateral epicondylitis²¹ and patellar tendinitis²² by blood product injections has been shown in previous studies.^{11,12} Blood product injections probably initiate an inflammatory reaction, with the potential to heal the tendinopathy.²¹⁻²³ A number of studies have shown that intralesional injection of AWB provides comparable results to PRP for the treatment of tendinopathies.²⁴

Intralesional AWB injection was shown to improve pain in patients with chronic PF²⁵, but it has not been as effective as corticosteroid injection in some studies.²⁶ In a systematic review, Tsikopoulos K and his colleagues compared the efficacy of AWB with corticosteroid injections on epicondylopathy and plantar fasciopathy. Corticosteroids were marginally superior to autologous whole blood in relieving pain on plantar fasciopathy at 2–6 weeks²⁶

Aims and Objectives

To compare the effect of intralesional injection of AWB and corticosteroid with conservative treatment in patients with chronic PF.

Material and Methods

Patients with signs and symptoms of chronic Plantar fasciitis who visited Department of Orthopaedics, GMC Srinagar from Sep 2018–March 2020, were evaluated to enter this study.

Inclusion Criteria

Criteria for inclusion in the study were chronic clinically diagnosed PF based on history of pain beneath the heel for at least 8 weeks and site of tenderness and pain elicited by palpation of the medial calcaneal tubercle and or the proximal plantar fascia.)

Exclusion Criteria

Patients were excluded from the study if they had received any injection for PF within the previous 6 months, had history of previous surgery for plantar fasciitis, had active bilateral PF, had systemic inflammatory disease such as rheumatoid arthritis, or vascular insufficiency and neuropathy related heel pain. Other reasons for exclusion were if they were pregnant, or had history of vasovagal shock, hematologic, cardiovascular, renal or hepatic diseases, and infection near the injection site or local trauma.

Ethical Considerations

Informed consent was obtained from all patients. The process of the treatment was explained to the patients. The written consent form was signed or fingerprinted by the patients.

Patients were divided into three groups

Group 1. (Autologous whole blood (AWB))

The patients in this group received 1 ml of autologous peripheral whole blood and 1 ml of lidocaine 1% in single syringe.

Group 2. (Corticosteroid)

The patients in this group received 40 mg methyl prednisolone and 1 mL lidocaine for a total of 3 mL volume in one syringe.

Group 3. (Control group)

Patients in this group did not receive any injection.

Conservative treatment was provided for these patients in form of education and daily stretching program.

Injection technique

Patients in group 1 and 2 were placed in prone position with knees extended in order to expose the plantar surface for treatment. The skin of the injection site was prepared with Betadine scrub and solution and sterile drape applied. In group 1, the autologous blood was injected in a single dose. The blood was drawn at the same session, mixed

with anesthetic and injected immediately using a 22-gauge needle into the most tender point of plantar fascia at medial heel region²⁷. The needle was inserted medially and directed laterally on the plantar surface just superior and anterior to the calcaneus²⁸. Group 2 received corticosteroid at the same site and under identical circumstances as group one.

Patient's instructions

All patients were asked to avoid running and other high impact activities for at least 2 weeks. Patients in groups 1 and 2 received the injection and were instructed to perform stretching exercises, while the control group received only the stretching exercises. During the 12 weeks of enrollment, all patients including control group were instructed to perform a daily stretching program shown to decrease pain associated with plantar fasciitis. The stretching technique required participants to cross their affected leg over the contralateral knee in a seated position, then pull back on the toes until they felt a stretch in the arch of their foot. Patients were instructed to repeat the stretch 10 times, with each stretch lasting for 10 s. All patients were asked to complete the stretching program three times per day and to record their stretching frequency in a diary.

Outcome Measures

Before injections, all patients in three groups were asked to fill out the plantar fasciitis pain/disability scale (PFPS) questionnaire²⁹ and were assessed by VAS³⁴. At follow up intervals (at 4 and 12 weeks post treatment) the same measures were applied to evaluate pain and dysfunction related to PF.

Functional Outcome Measures

PFPS questionnaire evaluates patient's symptoms, satisfaction, disability, and disturbance in living activities³¹⁻³³. Pain intensity ranges from 0 (no pain) to 10 (agonizing pain). The validity and reliability of self-rating scales like the VAS have previously been well described³⁴.

Results

75 patients were evaluated to enter this study. There were 25 patients in each group: corticosteroid, AWB, and control groups

Outcome Measures

All pain measures (VAS, and PFPS) improved significantly in corticosteroid and AWB groups at each of the three measurement intervals ($P < 0.050$ for all changes). Table 1, 2 and 3 summarizes the mean VAS, and PFPS scores for the three groups at baseline, 4 and 12 weeks after treatment. As depicted in Table 1, 2 and 3 VAS and PFPS scores decreased in all groups at the 4 and 12 week follow-up evaluations. This improvement was not significant in the control group.

Variable	Autologous Blood	Steroid	Control
No of Patients	25	25	25
Age (yrs)	43.2 ± 13.1	46.8 ± 14.3	48.4 ± 16.1
Gender (F/M)	17/8	18/7	16/9
Duration of Symptoms (months)	6.3 ± 3.2	11.3 ± 4.3	8.4 ± 4.1

Table 1 Baseline values

Group	VAS	PFPS
Blood	8.5 ± 2.2	59 ± 11.1
Steroid	7.1 ± 1.2	55.5 ± 10.7
Control	7.3 ± 1.7	53 ± 11.1

Table 2 At 4 wks

Group	VAS	PFPS
Blood	6.2 ± 1.3	51.2 ± 12.1
Steroid	4.4 ± 2.3	42.2 ± 14.3
Control	5.3 ± 2.2	41.1 ± 18.1

Table 3 At 12 wks

Group	VAS	PFPS
Blood	3.9 ± 1.3	39.4 ± 13.1
Steroid	3.1 ± 2.3	33.4 ± 14.3
Control	6.1 ± 3.2	45.3 ± 18.1

Discussion

Local corticosteroid injection led to an early sharp response at short term (4 week follow-up), and then a more gradual drop in average pain level, also improvement in function in 12 week, whereas AWB injection made steady gradual

improvement. Patients in control group had also improvement in pain and function, which was not significant. The use of injections as a treatment modality for chronic or Refractory plantar fasciitis is common, and multiple types of injections have been proposed^{11,18,19}. The efficacy of corticosteroid in treating chronic inflammation has been well demonstrated³⁴⁻³⁶. Intralesional injection of corticosteroid in chronic PF (defined as persistence of symptoms more than 8 weeks in spite of conservative care) has been shown to be effective³⁷. Recently, the level 2 and 3 evidence shows that corticosteroids are more effective than placebo injections but probably less effective than platelet-rich plasma treatment.

In a review by Ang TW³⁸, the effectiveness of corticosteroid injection in the treatment of PF was evaluated. All placebo-controlled RCTs showed a significant reduction in pain with the use of corticosteroid injections. However, it is evident from these studies that the effects of corticosteroid injections are usually short-term, lasting 4–12 weeks in duration.

The findings of the current study demonstrated an almost similar trend; the corticosteroid group showed an early sharp drop in VAS and then reached plateau in average pain levels as early as 4 weeks, and this was maintained for at least

3 months. AWB contains platelets with strong growth factors that may help the healing process of chronic injuries. Known platelet growth factors stimulate the healing process and lead to partial modification of the damaged tissue^{24-26,29}.

AWB and PRP induce angiogenesis, increase growth factor expression and cell proliferation²²⁻²⁴. In a study by Vahdatpour and his colleagues, intralesional injection of PRP and AWB had similar effectiveness for the treatment of chronic PF in short term³¹. In a meta-analysis by Hsiao MY et al., the effectiveness of ABPs, shockwave therapy, and corticosteroids for treatment of PF were compared. In conclusion, they reported that ABPs were favored over corticosteroids regarding VAS reduction at 3 months³⁷. Shockwave therapy and ABPs had similar effectiveness for providing

pain relief at 6 months, and were better than corticosteroids at that time³⁷.

PRP as a blood product richer in platelets than AWB has been shown to be more effective and durable than cortisone injection for the treatment of chronic recalcitrant cases of PF in long-term follow-up studies.

Conclusion

Based on the findings of the present study, the effect of local AWB injection in chronic PF was superior to conservative treatment and comparable to corticosteroid injection, while its efficacy lasted longer. However, improvement was also noticed in the control group to a lesser extent. Hence, noninvasive and conservative treatment would be the appropriate first-line choice for this condition. Corticosteroid or AWB injection have comparable efficacy regarding pain and function improvement and can be used as second-line treatment alternatives. Regarding cost analysis of using injection versus conservative treatments in chronic PF, despite the cost of corticosteroid or AWB injection being slightly higher than conservative treatment, they can be considered a readily available, well-tolerated, and safe choice of therapy in chronic PF. Corticosteroid injections have been reported to carry a risk of complications such as fat pad atrophy, pain, bleeding, bruising, infection, contact allergic dermatitis due to the preservative, skin atrophy, osteomyelitis of the calcaneus, and rupture of the plantar fascia. Higher doses of corticosteroids may be contraindicated for certain patients with comorbidities such as uncontrolled diabetes mellitus or severe hypertension. As such, there is a clinically recommended limit for corticosteroid doses per person over time in order to avoid these potential side effects, whereas AWB injection may not have the same limitation. Although we did not observe any complications related to steroid injection, AWB injection seems to be safer in this regard.

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