

A Comparison of the Effectiveness of Platelet-Rich Plasma Therapy and Corticosteroid Injection in the Treatment of Plantar Fasciitis

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Conflict of interest: Nil

Abstract

Aim: The aim of this study to compare the efficacy of platelet-rich plasma therapy and corticosteroid injection in the treatment of planter fasciitis. **Methods:** The present prospective clinical study was conducted in the Department of Orthopaedics, All India Institute of Medical Science, Patna, Bihar, India for 15 months. Total of 50 patients were included for the study and were randomly allotted into two groups, PRP group (n=25) and Steroid group (n=25). For preparation of platelet-rich plasma, 27 ml of blood was withdrawn from the cubital vein and placed in a glass tube containing 3 ml of citrate dextrose solution (ratio 9:1). Citrate dextrose solution was used to prevent clotting. The blood was centrifuged at 3200 rpm for 12 minutes. 3ml PRP preparation was obtained from the upper buffy coat. **Results:** Both groups were similar in terms of age, gender and side involvement as shown in table 1. The mean initial or Pre injection VAS and AOFAS scores in the steroid and PRP group was 7.9 ± 1.5 , 61.2 ± 10.5 and 8.1 ± 1.5 , 62.4 ± 9.9 respectively and were comparable ($p \geq 0.05$). Post injection, the score improved considerably in each group on each follow-up; however, no significant difference could be detected between the scores of the two groups at the 1, 3 and 6-month follow-ups. **Conclusion:** The observations made in the present study suggest that the treatment of plantar fasciitis with steroid or PRP injection is equally effective.

Keywords: Plasma Therapy, Corticosteroid, Planter fasciitis.

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Introduction

Chronic plantar fasciitis is the most common cause of foot complaints, making up 11–15% of the foot symptoms requiring medical care among adults[1]. As well, it is a common problem that affects sport participants as well as inactive middle-aged individuals[2]. The diagnosis is grounded

on typical history and the finding of localized tenderness in the middle calcaneal tubercle[3]. Over pulling and stretching of plantar fascia either from excessive exercise or overuse, recurrent trauma, ageing, obesity, poor fitting footwear, or poor foot alignment while running or extended standing produce microscopic

tears of collagen or cystic degeneration in the origin of plantar fascia causing pain and inflammation. The classic presentation of PF is pain on the sole of foot at the inferior region of the heel which is particularly worse with the first step taken on rising in the morning. Increasing knowledge of the pathology has led to the widespread application of a large number of conservative treatments for recalcitrant PF including physiotherapy, plantar fascia stretching exercises, ice packs, night splints, prefabricated and custom-made insert shoe modification, and nonsteroidal anti-inflammatory drugs (NSAIDs)[4]. Local injection modalities are commonly used secondary to conservative therapies in the treatment of patients who have resistant PF. Corticosteroid injections have been used to treat plantar heel pain since the 1950s[5]. The advantages of corticosteroid injections include low cost, low complexity, and rapid pain relief. However, many are concerned about the potential complications associated with this treatment modality, which may offset its benefits. PRP, which is a natural concentrate of autologous growth factors, is now being widely tested in different fields of medicine for its possibilities in aiding the regeneration of tissue with low healing potential[6]. In Europe and the United States; there is an increasing prevalence of the use of autologous blood products to facilitate healing in a variety of applications. New data exist about specific growth factors, which play a crucial role in the healing process. With that knowledge, there is abundant enthusiasm in the application of concentrated platelets, which release a supra maximal quantity of these growth factors to stimulate recovery in non-healing injuries[7]. Autologous PRP was proved to improve the early neotendon properties and improve tissue healing by enhancing cellular chemotaxis, proliferation and differentiation, removal of tissue debris, angiogenesis, and the laying down of extracellular matrix.

Material and Methods

The present prospective clinical study was conducted in the Department of Orthopaedics, All India Institute of Medical Science, Patna, Bihar, India for 15 months. Patients, who had been diagnosed with plantar fasciitis, treated for minimum of 3 months duration and showed no benefit from conservative treatment were included in the study. Diagnosis of planter fasciitis was made by clinical examination and radiographs of ankle were examined to rule out other heel pathologies.

Methodology

Total of 50 patients were included for the study and were randomly allotted into two groups, PRP group (n=25) and Steroid group (n=25). For preparation of platelet-rich plasma, 27 ml of blood was withdrawn from the cubital vein and placed in a glass tube containing 3 ml of citrate dextrose solution (ratio 9:1). Citrate dextrose solution was used to prevent clotting. The blood was centrifuged at 3200 rpm for 12 minutes. 3ml PRP preparation was obtained from the upper buffy coat.

In both groups, injection was given under strict aseptic precautions. The patients were kept in supine position with eyes covered to ensure blinding. The area to be injected was prepared with 10% povidone iodine scrub. The maximum tender spot over the medial aspect of heel was marked and was anaesthetised by using 2 to 3ml of 2% lignocaine. 3ml PRP preparation was injected in the PRP group and 2ml (40mg) of methylprednisolone was injected in steroid group using peppering technique⁸ (single skin portal and 4-5 penetrations of the plantar fascia) in both groups.

After the injection, patients were advised to apply ice for pain relief if required and to continue to wear comfortable shoes with cushions and were instructed not to use NSAIDs after the procedure. All patients had physical therapy to stretch the calf muscle and plantar fascia.

Clinical assessment was made prior to the injection and at 1 month, 3 months and 6 months following the injection. Clinical evaluation included pain assessment using visual analog scale (VAS) from 0 to 10 (0 reflects absence of pain, 10 indicates the worst imaginable pain) and the functional outcome score was measured by the American Orthopaedic Foot & Ankle Society (AOFAS) ankle-Hind foot scale.

Results were stated as mean \pm standard deviation (SD). The comparison of normally distributed continuous variables between the groups was performed by using the student *t* test. Nominal categorical data between the groups were compared using chi-square test or Fisher exact test as appropriate and non-nominal distributed

continuous variables were compared using the Mann-Whitney U test. A value of $p < 0.05$ was accepted as statistically significant.

Results

Both groups were similar in terms of age, gender and side involvement as shown in table 1. The mean initial or Pre injection VAS and AOFAS scores in the steroid and PRP group was 7.9 ± 1.5 , 61.2 ± 10.5 and 8.1 ± 1.5 , 62.4 ± 9.9 respectively and were comparable ($p \geq 0.05$). Post injection, the score improved considerably in each group on each follow-up; however, no significant difference could be detected between the scores of the two groups at the 1, 3 and 6-month follow-ups (Table 2).

Table 1: SD = standard deviation

	Steroid group (Mean\pmSD)	PRP group (Mean\pmSD)	P value
Age (years) (Mean \pm SD)	41 \pm 5.7	40 \pm 5.1	≥ 0.05
Male/female	8 / 17	9 / 16	≥ 0.05
Affected foot-right/left	13 / 12	12 / 13	≥ 0.05

Table 2: SD= standard deviation, VAS= visual analog scale, AOFAS= American Orthopaedic Foot & Ankle Society (AOFAS) ankle-Hind footscale.

	Steroid group (Mean\pmSD)	PRP group (Mean\pmSD)	P value
Pre-injection			
VAS	7.9 \pm 1.5	8.1 \pm 1.5	≥ 0.05
AOFAS	61.2 \pm 10.5	62.4 \pm 9.9	≥ 0.05
Post-injection			
1 month			
VAS	3.9 \pm 1.7	3.1 \pm 0.6	≥ 0.05
AOFAS	79.5 \pm 11.8	81.8 \pm 11.6	≥ 0.05
3 month			
VAS	2.3 \pm 1.2	1.7 \pm 0.6	≥ 0.05
AOFAS	86.7 \pm 12.7	88.3 \pm 11.5	≥ 0.05
6 month			
VAS	2.2 \pm 0.8.4	1.6 \pm 0.8	≥ 0.05
AOFAS	87.1 \pm 11.7	90.5 \pm 10.2	≥ 0.05

Discussion

The current study found that local platelet-rich plasma and corticosteroid injections were effective at 1, 3 and 6 months of follow-up, with significant improvement in

visual analog scale and AOFAS scores. Comparison of platelet-rich plasma and corticosteroid injections showed no significant difference at each follow up, however, platelet-rich plasma injection had

better VAS and AOFAS scores compared with corticosteroid injection.

Chronic refractory planter fasciitis is the disabling condition. Non-invasive treatment options like planter fascia stretching exercises, extracorporeal shock wave therapy, arch supports, heel pads and nonsteroidal anti-inflammatory drugs (NSAIDs) are usually less effective in chronic refractory cases[9-11]. The use of steroid injections for plantar fasciitis has been reported in literature and is found to be useful in both short and long term basis[12,13]. Corticosteroids act as anti-inflammatory agents and have been shown to inhibit fibroblast proliferation and expression of ground substance proteins[14]. However, steroid injections have been reported to be related to plantar fascia tear, fat pad atrophy, abscess, and osteomyelitis[15,16].

Recently, it has been reported that planter fasciitis is a degenerative disorder rather than an inflammatory process[17-19]. Degeneration of collagen occurs at the site of the lesion because of micro tears of the fascia that do not heal. This observation was further supported by histological examination of the plantar fascia obtained during surgery of chronic planter fasciitis patients, which shows no inflammatory cell invasion at the site of the lesion, the normal fascia and surrounding tissue was replaced by Angiofibroblastic hyperplastic tissue[17]. PRP, being a concentrate of platelets that are a source of autologous growth factors such as insulin like growth factor-1 (IGF-1), transforming growth factor β (TGF- β), vascular endothelial growth factor (VEGF), platelet derived growth factor (PDGF) and fibroblast growth factor (FGF), helps in cellular migration, synthesis of collagen, and angiogenesis and thus helps in tendon and ligament healing[20-23]. Several studies have reported the use of PRP as safe and effective treatment option in chronic refractory plantar fasciitis.

Monto[24] found that platelet-rich plasma injection was more effective and durable than corticosteroid injection at 2 years of follow-up in a study of 40 patients. Shetty *et al.*[25] compared the effectiveness of platelet-rich plasma and corticosteroid injections in 60 patients and found no significant difference at 6 months of follow-up. Aksahin *et al.*[26] compared intralesional corticosteroid and platelet-rich plasma injections for plantar fasciitis, the treatments were found to be equally effective. Lee and Ahmad[27] compared intralesional autologous blood injection with corticosteroid injection in patients with chronic plantar fasciitis. At 6 weeks and 3 months of follow-up, the corticosteroid group had significantly lower visual analog scale scores than the autologous blood group, but the difference was not significant at 6 months.

Conclusion

The observations made in the present study suggest that the treatment of plantar fasciitis with steroid or PRP injection is equally effective.

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