

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2019; 5(4): 293-296
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www.orthopaper.com
Received: 04-08-2019
Accepted: 06-09-2019

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Comparative study between the efficacy of platelet-rich plasma therapy and corticosteroid injection in the treatment of planter fasciitis

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DOI: <https://doi.org/10.22271/ortho.2019.v5.i4f.1687>

Abstract

Background: Planter fasciitis is the common cause of heel pain and is the disabling disease in its chronic form. Various treatment modalities are available including medical therapies and surgical procedures. This study was designed to compare the efficacy of PRP therapy with corticosteroid injection in the treatment of chronic planter fasciitis.

Methods: Total of 40 patients with chronic planter fasciitis were included in the study and were divided into 2 groups. In the PRP group (n=20), 3ml PRP preparation was made from the patient's blood and injected in a single dose. In the steroid group (n=20), a single dose of 2ml (40mg) methylprednisolone was given. Clinical evaluation was made using the American Foot and Ankle Score (AFAS) and the visual analog scale (VAS).

Results: Both groups were similar in terms of age, gender and side involvement. Mean preinjection VAS, AOFAS scores in steroid and PRP group were 8.1 ± 1.2 , 68.1 ± 9.5 and 7.9 ± 1.2 , 67.5 ± 9.2 respectively. Post injection the scores improved in both the groups, with slightly more improvement of scores in PRP group than in steroid group, however no significant difference in scores of VAS and AOFAS could be detected between the two groups.

Conclusion: The local injection with steroid or PRP preparation was equally effective in terms of pain and functional outcomes in the treatment of chronic planter fasciitis.

Level of evidence: II Prospective randomized clinical trial.

Keywords: Planter fasciitis, steroid, platelet rich plasma (PRP)

Introduction

Chronic planter fasciitis is a common orthopaedic problem that affects 10% of the population and is the commonest cause of heel pain in adults [1, 2, 3, 4]. The etiology of planter fasciitis is multifactorial and poorly understood but appears to be caused due to microscopic degenerative injury and local disruption of the collagen matrix rather than a failed healing response [5, 6]. Reduced ankle dorsiflexion, standing for long periods of time at work, obesity, female gender and advancing age are listed as risk factors [1, 3].

Planter fasciitis is generally a self-limiting condition. Symptoms in 80 to 90% of cases recover within 10 to 12 months with conservative treatment [7]. Heel pain is the most common reason for presentation with associated complaints of morning pain and heel discomfort with initiation of ambulation [8, 9]. Clinical findings include local tenderness and associated stiffness due to soft tissue tightness [9].

Available treatments modalities for planter fasciitis, such as planter fascia stretching exercises, strapping, extracorporeal shock wave therapy, nonsteroidal anti-inflammatory drugs (NSAIDs), arch supports, and heel pads [10, 11]. Corticosteroid injections are often reserved for resistant planter fasciitis after failure of conservative non-invasive interventions. They have been shown to effectively reduce the heel pain in patients with planter fasciitis [4, 12, 13]. However, the use of corticosteroid injections for the treatment of planter fasciitis has been shown to be associated with rupture of planter fascia, infection, Change in skin pigmentation, post injection flare, and fat pad atrophy [14, 15].

Local injection of platelet-rich plasma is an emerging concept in treating chronic planter fasciitis. Platelet-rich plasma injection delivers platelets and growth factors in high

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concentrations directly to the site of injury zones to induce and accelerate healing processes [16].

Methodology

This was the prospective clinical study, conducted at Bone and joints surgery hospital, an associate hospital of Government Medical college Srinagar. Approval was granted by the local ethics committee and informed consent was obtained from all patients participating in the study. 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.

Total of 40 patients were included for the study and were randomly allotted into two groups, PRP group (n=20) and Steroid group (n=20).

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 technique¹⁷ (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-Hindfoot 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 Preinjection VAS and AOFAS scores in the steroid and PRP group was 8.1 ± 1.2 , 62.7 ± 9.5 and 8.3 ± 1.2 , 62.6 ± 9.2 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 and figures 1, 2).

Table 1: SD = standard deviation

	Steroid group (Mean \pm SD)	PRP group (Mean \pm SD)	P value
Age (years) (Mean \pm SD)	40 \pm 5.5	39 \pm 5.3	≥ 0.05
Male/female	6 / 14	7 / 13	≥ 0.05
Affected foot-right/left	11 / 9	10 / 10	≥ 0.05

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

	Steroid group (Mean \pm SD)	PRP group (Mean \pm SD)	P value
Pre-injection			
VAS	8.1 \pm 1.2	8.3 \pm 1.2	≥ 0.05
AOFAS	62.7 \pm 9.5	63.6 \pm 9.2	≥ 0.05
Post-injection			
1 month			
VAS	4.2 \pm 1.5	3.3 \pm 0.8	≥ 0.05
AOFAS	80.7 \pm 10.8	82.9 \pm 11.2	≥ 0.05
3 month			
VAS	2.5 \pm 1.2	1.9 \pm 0.8	≥ 0.05
AOFAS	87.7 \pm 12.2	89.3 \pm 13.0	≥ 0.05
6 month			
VAS	2.1 \pm 0.8.1	1.5 \pm 0.5	≥ 0.05
AOFAS	88.9 \pm 12.7	92.5 \pm 12.2	≥ 0.05

Discussion

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 [4, 10, 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, 18]. Corticosteroids act as anti-inflammatory agents and have been shown to inhibit

fibroblast proliferation and expression of ground substance proteins [13]. However, steroid injections have been reported to be related to plantar fascia tear, fat pad atrophy, abscess, and osteomyelitis [14, 15].

Recently, it has been reported that planter fasciitis is a degenerative disorder rather than an inflammatory process [5, 6, 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 [5].

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 [16, 20, 21, 22]. Several studies have reported the use of PRP as safe and effective treatment option in chronic refractory planter fasciitis.

Monto [23] 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.* [24] 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.* [25] compared intralesional corticosteroid and platelet-rich plasma injections for plantar fasciitis, the treatments were found to be equally effective. Lee and Ahmad [26] 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.

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. No local or systemic complications were seen in any patient during the application or follow-up.

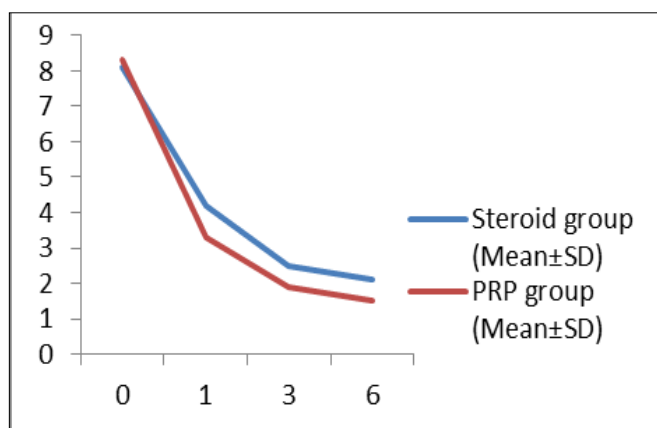


Fig 1: VAS scores

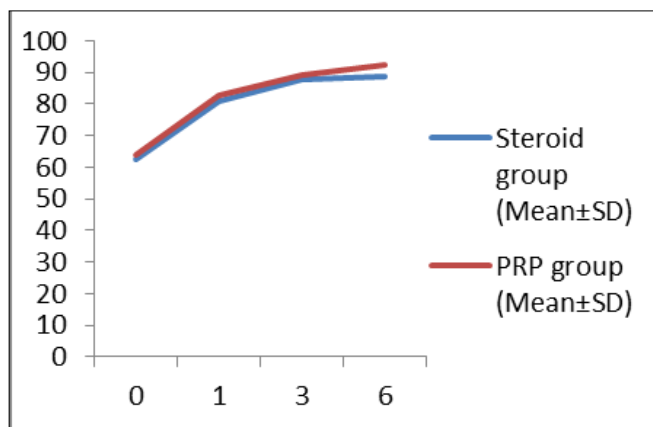


Fig 2: AOFAS scores

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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