ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

INNOVARE ACADEMIC SCIENCES
Knowledge to Innovation

Vol 15, Issue 10, 2022

Online - 2455-3891
Print - 0974-2441

Research Article

PLANTAR FASCIITIS TREATMENT WITH PLATELET-RICH PLASMA INJECTION VERSUS STEROID INJECTION

VASU SRIVASTAVA*, VISHWAS, RAHUL RATHI, LAXMI NARAYAN MEENA*, B. L. KUMAR

Department of Orthopaedic, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, India. Email: drlaxminarayan097@gmail.com

Received: 12 August 2022, Revised and Accepted: 20 September 2022

ABSTRACT

Objective: Plantar fasciitis is characterized by heel pain that worsens when you bear weight after a long period of rest. Injections of steroids are one of the numerous therapeutic techniques that are frequently used to control plantar fasciitis. Numerous studies demonstrate that short-term pain alleviation with steroid injections is not long-lasting. According to recent studies, autologous platelet-rich plasma (PRP) injections encourage healing, which improves both short- and long-term pain alleviation. To compare the effects of local PRP injection and corticosteroid in the management of chronic plantar fasciitis, the current study was conducted.

Methods: Sixty patients who met the criteria for this prospective double-blind trial were randomly assigned to one of two groups. Patients in Group I received an injection of steroid, whereas those in Group II received an injection of PRPs. The PNS numerical pain score (NPS) and a visual analog scale (VAS) were used to evaluate the patients. An evaluation was conducted before the injection as well as at 6 weeks, 3 months, and 6 months after the injection.

Results: The mean VAS in Group I reduced from 7.00 before injection to 2.31 and that in Group II decreased from 7.81 before injection to 1.12. At the 6-month follow-up, the mean NPS score in Group I increased from 7.05 to 1.41 and in Group II from 7.86 to 1.02. The VAS and NPS improvements were statistically significant. In both groups, the plantar fascia thickness had decreased at the conclusion of the 6-month follow-up period (5.88 mm in Group I to 4.03 mm and 5.96 mm to 3.27mm in Group II), and the difference was statistically significant.

Conclusion: When compared to steroid injection, local PRP injection is an excellent therapeutic option for persistent plantar fasciitis with long-lasting positive effects.

Keywords: Plantar fascia, Platelet-rich plasma, Steroid injection, Visual analog scale score, Numerical pain score score.

 DOI: http://dx.doi.org/10.22159/ajpcr.2022v15i10.46342. Journal homepage: https://innovareacademics.in/journals/index.php/ajpcr

INTRODUCTION

A frequent pathological ailment that affects the back foot, plantar fasciitis can be difficult for specialists to adequately treat [1]. It is a repetitive micro trauma overuse injury that causes inflammation and localized tissue damage [2]. There are non-surgical management alternatives, such as NSAID prescription, physiotherapy, night splints, and steroid injection, as well as surgical intervention. Instead of using one treatment at a time to cure plantar fasciitis, a combination of treatment modalities may be necessary [3].

The gold standard for the treatment of chronic plantar fasciitis has not been established by any one therapy. For the treatment of chronic plantar fasciitis, local injections of steroids were frequently utilized in the past. At 1 month, symptoms of plantar fasciitis improved according to a Cochrane analysis; however, they did not stay long. Platelet-rich plasma (PRP) has been utilized successfully in recent years to treat a variety of chronic tendon conditions, including chronic plantar fasciitis. Although there is a dearth of evidence comparing the efficacy of steroid injection to PRP in the treatment of persistent plantar fasciitis, earlier outcomes of using PRP to treat plantar fasciitis have been favorable [4].

In this study, the effectiveness of PRP and steroid injection in the treatment of chronic plantar fasciitis was evaluated, and their effects on the thickened plantar fascia were also examined.

METHODS

This study was conducted at the Orthopaedic Department, Pacific Institute of Medical Sciences, Udaipur. Rajasthan, India, from August 2021 to July 2022. It was a randomized, double-blind trial. Based on the patient's medical history and physical examination, the diagnosis of plantar fasciitis was made. All individuals having a clinical diagnosis of plantar fasciitis (heel discomfort lasting more than 6 weeks) and sonographic evidence were included in the study (plantar fascia thickness of more than 4 mm).

The study excluded patients with hypothyroidism, diabetes mellitus, active bilateral plantar fasciitis, vascular insufficiency, neuropathy associated with heel discomfort, and prior plantar fasciitis surgery. The university granted the study ethical clearance after receiving consent from each study participant.

Sixty patients with persistent plantar fasciitis participated in this study. PRP (3 ml) was injected into Group A patients, while Group B patients received a steroid injection (Depomedrol [80 mg] in 2 ml with 0.5 ml of xylocaine [2%]), respectively. One week before to the injection, NSAID therapy was stopped in both groups. Exercises to stretch the plantar fascia were recommended to all of the patients in both groups.

Blood was taken from the cubital vein into six vacutainer tubes, each of which contained 0.35 ml of 3.2% sodium citrate, in order to prepare PRP. Vacutainer was centrifuged in a Routine 380 R centrifuge model for 10 min at 1200 rpm. Three layers were found after centrifugation: The bottom layer, which was made up of red blood cells; the middle layer, which was made up of white blood cells; and the top layer, which was made up of plasma, platelets, and some white blood cells. A 10 cc syringe was used to properly collect the concentrate in the top layer. Each vacutainer held a collection volume ranging from 1 to 1.25 ml. One empty 6 ml tube received approximately 1 ml of the sample's top layer, which had undergone the first spin stage. For 10 more spins, this tube was centrifuged.

Platelet-poor plasma, which made up the upper half of the plasma volume, was eliminated. The remaining PRP was injected using the remaining volume.

Random PRP samples were sent for an autoanalyzer to estimate the platelet count. The majority of the samples showed platelet counts that were 5 times higher than the baseline or more than 1,000,000/ul in 5 ml of volume.

All patients had a random blood sugar level measurement before receiving the PRP or steroid injection. Before the injection, the subjects received the required counseling. Under aseptic circumstances, injections were given. After the initial injection of local anesthetic (1 ml of 2% plain xylocaine) in the PRP group, the injection was administered using peppering maneuver with a 20-gauge needle at the region of greatest soreness.

The patients in the corticosteroid group received 2 ml (80 mg) of Depomedrol and 0.5 ml of ordinary 2% xylocaine with a 20 G wide bore needle at the site of greatest soreness. before injection and during follow-up visits at 6 weeks, 3 months, and 6 months, the patients were evaluated. The numerical pain score (NPS) and the visual analog scale (VAS) for pain were used in the assessment. Without access to the treatment/injection data, physiotherapy col leagues scored. At the follow-up appointment after 6 months, ultrasonography was used to measure the thickness of the plantar fascia.

Microsoft Excel 2013 and graph pad online software was used for the statistical analysis. The mean difference between the two groups was compared using an independent t-test, and the mean difference between the before and after paired data was compared using a paired t-test. The effectiveness of intra lesion corticosteroids and autologous PRP injections in the therapy of chronic plantar fasciitis were compared using the correlation for continuous variables.

RESULTS

Out of 60 patients 30 patients were included in Group I (the steroid group) and 30 in Group II (the PRP group), and the outcomes were analyzed. The final study group included 26 male and 24 female patients. The patients in Groups I and II had respective mean ages of 43.90 and 40.32 years. Thirty patients' right heels (16 were in Group I and 14 in Group II) and 30 patients' left heels (14 were in Group I and 16 in Group II) were both impacted. The results are shown in Table 1.

The mean VAS score in Group I and Group II before injection was 7.45 and 7.86, respectively. At 6 weeks, 3 months, and 6 months of follow-up, Group I's mean score decreased to 3.95, 1.84, and 1.31, respectively. In Group II, the mean VAS increased to 2.76 at the 6-week mark, 2.76 at the 3-month mark, and 2.34 at the 6-month mark (Table 2 and Fig. 1). A statistically significant difference existed between the two groups at 6 weeks (p=0.007), 3 months (p=0.001), and 6 months (p=0.001).

Before injection, the mean NPS for Groups I and II were 7.05 and 7.87, respectively. At 6 weeks, 3 months, and 6 months after the intervention, the score reduced to 3.27 in Group I and 2.65 in Group II, respectively (Table 3 and Fig. 3). At the 3 months and 6-month follow-up, the difference between the two groups was statistically highly significant (p=0.0001 in 3 months and p=0.004 in 6 months follow-up of patients).

Before injection, both groups had comparable ultrasound-measured average plantar fascia thickness (5.88 mm in Group I and 5.96 mm in Group II, respectively). The thickness of the plantar fascia was significantly reduced in Group I (mean 4.03 mm, 31%) at the post-treatment sonographic test 6 months after the injection as compared to Group II (mean 3.27 mm, 45%) (Table 4). At 6 months, there was a statistically significant difference between the two groups (p=0.0001).

DISCUSSION

Corticosteroid injections were among the numerous therapeutic approaches tested, although they only appeared to be beneficial in the short term and to a limited extent. The positive effect of steroid injection, however, might be explained by corticosteroids' reduction of fibroblast growth and expression of ground substance proteins [5,6].

In the study, the finding were that the VAS and NPS scores were significantly improved after one injection in both the PRP and the steroid injection groups, and the steroid group showed greater improvement in pain than the PRP group at the initial follow-up visit. Both the VAS and the NPS score in the PRP group continued to rise on later follow-ups, and at the end of a 6-month follow-up, the PRP group had improved more than the steroid group had, and the rise in score was statistically significant. After 6 weeks, the pain scores of the steroid group started to rise, which suggests that the steroid injection is only more effective for temporary relief. Hepatocyte growth factor (HGF) and other growth factors are present in PRP. HGF inhibits the nuclear factor kappa B (NF-kB) trans

Table 1: Demographic characters of patients

Demographic parameters	Steroid Group I (n=30), n (%)	PRP Group II (n=30), n (%)
Male	12 (40)	14 (46)
Female	18 (60)	16 (54)
Age (years)	43.9	40.32
Right side	16 (53)	14 (46)
Left side	14 (47)	16 (54)

PRP: Platelet-rich plasma

Table 2: The visual analog scale score in platelet-rich plasma and steroid treated patients

VAS	Group I (Steroid group) (n=30)	Group II (PRP group) (n=30)	p
Pretreatment	7.00±1.1	7.86±1.21	0.0016
6 weeks	3.95±0.87	2.76±1.02	0.0001
3 months	2.84±0.94	2.26±0.72	0.009
6 months	2.31±0.43	1.12±0.54	0.0001

PRP: Platelet-rich plasma, VAS: Visual analog scale

Table 3: The numerical pain score in steroid treated and platelet-rich plasma treated patients

NPS	Group I (Steroid group) (n=30)	Group II (PRP group) (n=30)	p
Pre treatment	7.05±1.1	7.87±1.21	0.05
6 weeks	3.27±0.84	2.65±0.68	0.02
3 months	2.56±0.89	1.43±0.76	0.0001
6 months	1.41±0.56	1.02±0.45	0.004

NRS: Numerical pain score, PRP: Platelet-rich plasma

Table 4: Thickness of plantar fascia pre- and post-treatment with steroid and PRP

Variables	Average plantar fascia thickness in each group, mean±SD		Percentage reduction of thickness in plantar fascia
	Group I (steroid)	Group II (PRP)	
Before injection	5.88±0.55	5.96±0.53	31% in Group I
6th month post-injection	4.03±0.43	3.27±0.39	45% in Group II
p	<0.0001	<0.0001	

PRP: Platelet-rich plasma, SD: Standard deviation

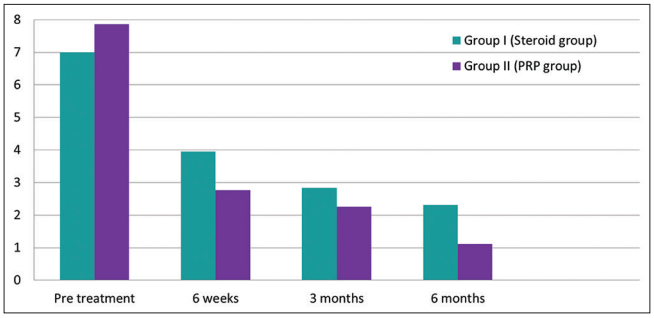

Fig. 1: The VAS score in PRP and steroid treated patients

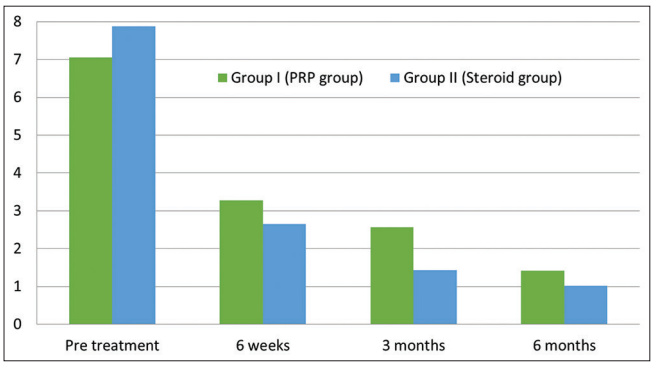

Fig. 2: The numerical pain score in steroid treated and PRP treated patients

activating activity, which decreases the production of the COX-1 and COX-2 genes and has an anti-inflammatory effect. HGF is known to protect tissues from inflammatory damage through this mechanism. Therefore, PRP's anti-inflammatory effect is mediated via HGF. This demonstrates the early rise in VAS score and decrease in pain after PRP injection [7,8].

PRP injections significantly reduce the thickness of the plantar fascia. Before injection, the plantar fascia thickness in our study's PRP group and corticosteroid group were comparable. The thickness of the plantar fascia was significantly reduced in the PRP group at the 6-month follow-up (45%) compared to the corticosteroid group (31.16%). It was statistically significant that the two groups differed from one another. Lee and Ahmad discovered that the corticosteroid group had considerably lower VAS than the autologous blood group when steroid injection was contrasted with autologous blood injection. After comparing PRP with corticosteroid injection in the treatment of plantar fasciitis that failed non-surgically, Monto came to the conclusion that PRP injections improved pain and function more than steroid injections and lasted longer [9,10].

CONCLUSION

When compared to steroid injection, local PRP injection is an effective and long-lasting therapy option for chronic plantar fasciitis.

ACKNOWLEDGMENTS

The authors acknowledge the substantial assistance provided by the academics whose publications are cited and listed in the manuscript's references.

COMPETING INTERESTS

No conflict of interest has been reported.

AUTHORS' FUNDING

No funding sources are available.

ETHICS CLEARANCE

The Institutional Ethics Committee provided the ethical clearance certificate.

REFERENCES

1. Cornwall MW, McPoil TG. Plantar fasciitis: Etiology and treatment. J Ortho Sports Phys Ther 1999;29:756-60.
2. Young CC, Rutherford DS, Niedfelt MW. Treatment of plantar fasciitis. Am Fam Physician 2001;63:467-74, 477-8.
3. Wolgin M, Cook C, Graham C, Mauldin D. Conservative treatment of plantar heel pain: Long-term follow-up. Foot Ankle Int 1994;15:97-102.
4. Crawford F, Thomson C. Interventions for treating plantar heel pain. Cochrane Database Syst Rev 2003;20:CD000416.
5. Yang WY, Han YH, Cao XW, Pan JK, Zeng LF, Lin JT, *et al.* Platelet-rich plasma as a treatment for plantar fasciitis: A meta-analysis of randomized controlled trials. Medicine (Baltimore) 2017;96:e8475.
6. Barrett SL, Erredge SE. Growth factors for chronic plantar fasciitis? Conference highlights from 2022 western foot and Ankle conference Podiatry today. Healthcare Made Pract 2004;17;36-42.
7. Vahdatpour B, Kianimehr L, Moradi A, Haghighat S. Beneficial effects of platelet-rich plasma on improvement of pain severity and physical disability in patients with plantar fasciitis: A randomized trial. Adv Biomed Res 2016;28:179.
8. Bendinelli P, Matteucci E, Dogliotti G, Corsi MM, Banfi G, Maroni P, *et al*. Molecular basis of anti-inflammatory action of platelet-rich plasma on human chondrocytes: Mechanisms of NF-κB inhibition via HGF. J Cell Physiol 2010;225:757-66.
9. Lee TG, Ahmad TS. Intra lesional autologous blood injection compared to corticosteroid injection for treatment of chronic plantar fasciitis: A prospective, randomized, controlled trial. Foot Ankle Int 2007;28:984-90.
10. Monto RR. Platelet-rich plasma efficacy versus corticosteroid injection treatment for chronic severe plantar fasciitis. Foot Ankle Int 2014;35:313-8.