Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2018/326

Original Article

Comparison of Steroid Injection and Platelet-rich Plasma Injection in the Treatment of Chronic Plantar Fasciitis

Kanika Arora[1], Dhaval Gotecha[2]

[1]Senior Resident, Department of Anaesthseiology, Kailash Hospital, Dehradun, Uttarakhand, India, [2]Senior Resident, Department of Orthopedics, Government Doon Medical College, Dehradun, Uttarakhand, India

Abstract

Objective: The aim of this study was to evaluate the therapeutic effect of corticosteroid injections and platelet-rich plasma (PRP) injections in the treatment of chronic plantar fasciitis. **Materials and Methods:** The study group comprised 50 patients divided into two equal groups. In the corticosteroid group (Group A; *n* = 25), 2 ml of methylprednisolone (40 mg/ml) was injected along with 1 ml of 0.5% bupivacaine. In the PRP group (Group B; *n* = 25), PRP was obtained from the patients' blood and injected in a single dose. Peppering technique was used for injecting the doses in both the groups. Results were calculated using pre-injection and post-injection visual analog scale (VAS), America orthopedic foot and ankle society (AOFAS), and foot and ankle disability index (FADI). **Results:** All patients enrolled in the study completed a 3 months follow-up. There were no complaints of any side effects to the administered corticosteroid or PRP. No infection or any other complications were reported at the end of 3 months. The outcome between the 2 groups was comparable in terms of VAS, AOFAS, and FADI scores. **Conclusion:** PRP therapy proves to be more effective in relieving pain than corticosteroid injections in the treatment of plantar fasciitis.

Key words: Corticosteroid, Growth factor, Heel pain, Plantar fasciitis, Platelet-rich plasma

INTRODUCTION

Plantar fasciitis is the most common cause of heel pain in orthopedic practice. A typical patient complains of sharp pain along the heel that is maximum on taking the first step in the morning and also after periods of rest.[1] It is most commonly seen in the age group of 40–60 years with equal sex preponderance.[2] The underlying pathological process that leads to plantar fasciitis is essentially a degenerative condition with myxoid degeneration, collagen necrosis, and angiofibroblastic hyperplasia.[3-5]

A large number of treatment options have been considered in treating plantar fasciitis including nonsteroidal anti-inflammatory drugs (NSAIDs), physiotherapy, ultrasonic therapy, plantar fascia stretching exercises, modified footwear, customized insoles, and also extracorporeal shock-wave therapy. Corticosteroid injections locally have also been used over the past. Recently, platelet-rich plasma (PRP) injections have also been used with promising results.[6-8]

The purpose of this study was to evaluate the therapeutic effect of corticosteroid injections and PRP injections in the treatment of chronic plantar fasciitis.

MATERIALS AND METHODS

The present retrospective study includes 50 consecutive patients diagnosed with chronic plantar fasciitis between December 2016 and September 2017. The diagnosis was done clinically by the same orthopedic team as characteristic heel pain lasting for more than a period of 6 months, localized along the medial aspect of the heel. All the patients had symptoms non-responsive or recurrence of symptoms following conservative and physical therapy. Patients with previous history of fracture or surgery on the affected heel,

Access this article online

www.ijss-sn.com

Month of Submission : 10-2018
Month of Peer Review : 11-2018
Month of Acceptance : 12-2018
Month of Publishing : 12-2018

Corresponding Author: Dr. Dhaval Gotecha, Pushpadwar, Betsy Apartment, Bandra Wing, Row House, Marve Road, Opp. HDFC Bank, Malad West, Mumbai – 400 064, Maharashtra, India. Phone: +91-9769474848. E-mail: drdhavalgotecha@gmail.com

those with previous history of steroid injections, infections or systemic diseases, arthritis, radiculopathy, and patients on anti-platelet medication and oral steroids were excluded from the study. All patients were instructed to stop taking NSAIDs 3 weeks before the procedure.

Patients were randomly divided into two groups. The study was explained to every patient, and informed consent was obtained from them before the procedure. Patients in Group A were administered steroids whereas in Group B were subjected to PRP therapy. The procedure was performed in the operative room under all sterile aseptic precautions. The patient was made to lie prone with the heel hanging from the ankle on the inferior end of the table. The injection area was cleaned with Povidone-iodine and normal saline.

In Group A, a 22-gauge needle connected to a 5 cc syringe containing 2 ml of methylprednisolone (40 mg/ml) with 1 ml of 0.5% bupivacaine was prepared. The maximally tender spot on the medial heel was identified by palpation. The injection was done using the peppering technique, where multiple punctures were done on the plantar fascia.

In Group B, 30 ml of patients' blood was withdrawn and inserted into pre-packed PRP kits (Tricell) along with 5 ml of anticoagulant 10% sodium citrate. The PRP sample was prepared by a double centrifugation process. The first centrifuge was done at 3200 rpm for 4 min. The cellular component was separated from the fluid component and a second centrifuge was them performed at 3300 rpm for 3 min. Following this, approximately 3–4 ml was obtained. The injection was done with the same peppering technique.

After the procedure, all patients were advised non-weight bearing for the first 48 h and gradual return to activities after 1 week of the procedure. Ice fomentation on the injection site was encouraged, and patients were advised to wear comfortable footwear.

Pre-procedure and on final follow-up, patients were assessed for their symptoms using visual analog scale (VAS), America Orthopedic Foot and Ankle Society (AOFAS), and foot and ankle disability index (FADI).

RESULTS

The present study included 50 patients equally divided into two groups. The mean age of patients in Group A was 43.16 years and in Group B was 44.44 years. Group A had 9 males and 16 females, whereas Group B comprised 11 males and 14 females, comprising a total of 20 males (40%) and 30 females (60%). In Group A, the right heel was affected in 11 patients whereas the left heel was affected in 14 patients, whereas in Group B, the right heel was involved in 13 patients and the left heel was involved in 12 patients, comprising a total right heel involvement in 23 patients (46%) and left heel involvement in 27 patients (54%). Table 1 illustrates the demographic distribution of the patients in this study.

At the end of 3 months follow-up, 3 patients from Group A and 2 patients from Group B were lost to follow-up. There were no complaints of any side effects to the administered corticosteroid or PRP. No infection or any other complications were reported at the end of 3 months. An important fact to note that while all patients in Group B showed a steady decline in symptoms, 3 patients from Group A showed initial improvement in the first 4 weeks, and then later on the symptoms showed recurrence, however, not as debilitating as in pre-procedure records.

Figures 1-3 compare the pre-procedure and post-procedure records of VAS, AOFAS, and FADI scores.

DISCUSSION

The present study aimed to compare the efficacy of corticosteroid versus PRP in the treatment of chronic plantar fasciitis. In our study, we found significant differences between both groups relative to VAS, AOFAS, and FADI scores before and 3 months after treatment.

Table 1: Demographic distribution of patients

Group A (Corticosteroid)			Group B (PRP)		
Age (years)	Sex	Side affected	Age (years)	Sex	Side affected
35	F	Left	42	F	Right
41	F	Left	44	M	Left
45	M	Right	47	F	Right
46	F	Left	40	M	Left
39	M	Right	48	F	Right
52	F	Left	38	M	Left
39	M	Right	40	F	Right
44	M	Left	44	M	Right
49	F	Left	48	F	Right
42	F	Right	46	M	Left
43	F	Left	42	F	Left
40	M	Right	46	M	Right
50	F	Left	45	M	Right
42	F	Right	45	F	Left
48	M	Right	45	F	Right
42	F	Left	48	F	Left
39	F	Left	42	M	Right
44	M	Right	40	F	Left
46	M	Left	39	F	Right
32	F	Right	51	M	Left
45	F	Left	45	M	Right
48	M	Right	50	F	Right
47	F	Left	45	F	Left
41	F	Left	49	F	Left
40	F	Right	42	M	Left

PRP: Platelet-rich plasma

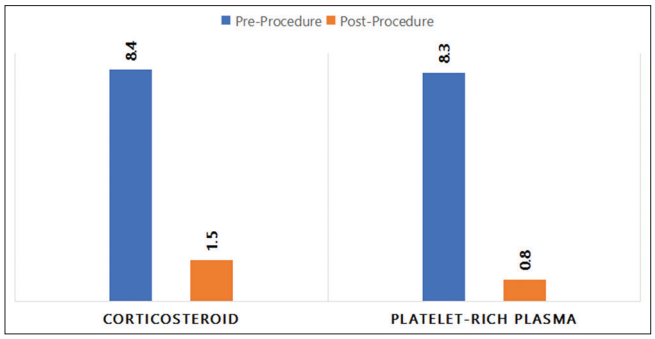

Figure 1: Comparison of pre-procedure and post-procedure visual analog scale scores

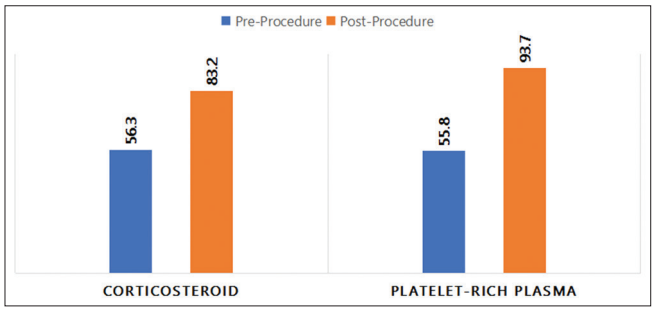

Figure 2: Comparison of pre-procedure and post-procedure America Orthopedic Foot and Ankle Society scores

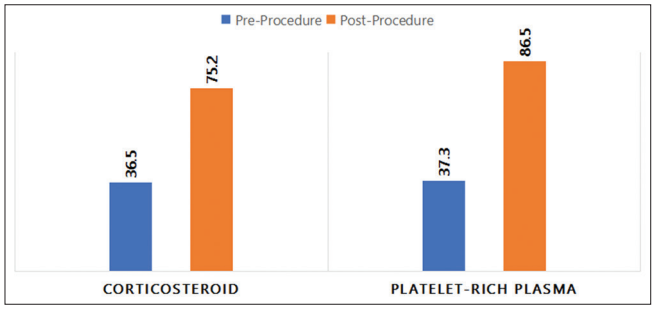

Figure 3: Comparison of pre-procedure and post-procedure foot and ankle disability index scores

The etiopathology of plantar fasciitis is debatable; histologic findings have suggested an etiology of degenerative changes, subsequent to repetitive microtrauma due to overuse injuries causing subsequent micro-tears and degeneration.[9-11] In a study performed by Lemont *et al.*, the authors termed this condition as plantar fasciosis, suggesting it to be a degenerative process rather than an inflammatory one with micro-tears and necrosis of the plantar fascia.[12] Snider *et al.* performed histological examinations of specimens obtained from the affected plantar tissue, wherein no inflammatory markers were found, rather it was significant for degenerative changes in terms of necrosis, metaplastic changes, and dystrophic calcification.[13]

Corticosteroid injections have been in use for a long time in treating plantar fasciitis. In a study performed by Saba and El-Sherif they found corticosteroid injections to be an effective method for treating plantar fasciitis with significant symptomatic relief at 4 weeks follow-up.[14] Similar results were seen in a study performed by McMillan *et al.*, where dexamethasone was shown to have good treatment response when compared to the placebo group at 4 weeks follow-up. However, at 12 weeks follow-up, to significant difference was seen in both corticosteroid and control groups.[15] This is consistent with the study performed by Tatli and Kapasi, where corticosteroid was found to have a high frequency of recurrence and relapse.[16] A more serious complication associated with the use of corticosteroids is that steroids may predispose the tissue to fragility and subsequent rupture. In a study performed by Acevedo and Beskin, they studied a total of 765 patients with plantar fasciitis. From these, 51 patients suffered a rupture of the plantar fascia and 44 of these were directly attributed to corticosteroid injection.[17]

PRP has been used to treat plantar fasciitis over the past decade. PRP, being rich in growth factors and platelets, has been hypothesized to help in the healing of the plantar tissue.[18-21] Martinelli *et al.* performed a study on 14 patients diagnosed with chronic plantar fasciitis treated with ultrasound-guided PRP having significant improvement in their symptoms.[22] A similar study was performed by Ragab and Othman, where ultrasound-guided PRP was found to be effective in treating plantar fasciitis.[23] Many have argued the use of ultrasound guidance for delivering PRP to the target tissue in plantar fasciitis. However, in a study performed by Kane *et al.*, no significant difference was seen in the results of ultrasound-guided versus palpation method for treatment of plantar fasciitis with PRP.[24]

Muto *et al.* performed a study on the effect of PRP and corticosteroids on human rotator-cuff derived cells. In their study, they showed that while PRP and corticosteroids both show a progressive decrease in inflammatory markers on the target tissue, corticosteroids have shown to have an increase in degenerative markers in contrast to PRP which shows a decrease in the degenerative markers on the target tissue.[25] This may explain the predisposition of corticosteroids to rupture of the plantar fascia and also to recurrence of symptoms. Treatment with PRP has not known to have any significant long-term complications nor incidences of relapse or recurrences.

In our study, 3 patients from the corticosteroid group had given a history of recurrence of symptoms 4 weeks after the procedure. This could be consistent with the findings of Muto *et al.*, with a subsequent increase in the degenerative markers and decrease in overall therapeutic effect.

Our study had a few limitations. First, we did not have a control group. Peppering technique was used to administer

corticosteroids as well as PRP to the target tissue; hence, the response obtained could be attributed to the technique itself. We did not use ultrasound guidance to administer the injections; hence, we were not aware of the pre-procedure thickness of the plantar fascia. Hence, there were no definite guidelines to the dose of the steroid to be administered. With the use or PFP, we did not measure the pre-centrifuge and post-centrifuge platelet concentration in any of the samples; hence, no standard dose of administration could be quantified. Furthermore, our study had a short follow-up period of 3 months. Hence, the long-term effects therapeutic effect, as well as the drawbacks of the therapy, could not be studied. Another notifiable drawback of our study was the exclusion of patients previously treated with corticosteroids. It has been long argued whether patients refractory to corticosteroids can be treated with PRP injections, but such patients were excluded from our study.

CONCLUSION

Although limited by many factors, our study showed that corticosteroid and PRP both have a significant therapeutic effect in treating plantar fasciitis; however, PRP has been proven to be superior to corticosteroid. Our study design could be useful in larger clinical trials to determine the long-term potency and comparison among the two treatment modalities.

REFERENCES

1. Cole C, Seto C, Gazewood J. Plantar fasciitis: Evidence-based review of diagnosis and therapy. Am Fam Physician 2005;72:2237-42.
2. Gill LH. Plantar fasciitis: Diagnosis and conservative management. J Am Acad Orthop Surg 1997;5:109-17.
3. Gerritsen ME, Tomlinson JE, Zlot C, Ziman M, Hwang S. Using gene expression profiling to identify the molecular basis of the synergistic actions of hepatocyte growth factor and vascular endothelial growth factor in human endothelial cells. Br J Pharmacol 2003;140:595-610.
4. Gautham P, Nuhmani S, Kachunathu SJ. Plantar fascitis: A review of literature. Saudi J Sports Med 2014;14:69-73.
5. Goff JD, Crawford R. Diagnosis and treatment of plantar fasciitis. Am Fam Physician 2011;84:676-82.
6. Buchbinder R. Clinical practice. Plantar fasciitis. N Engl J Med 2004;350:2159-66.
7. Tsai WC, Wang CL, Tang FT, Hsu TC, Hsu KH, Wong MK, *et al.* Treatment of proximal plantar fasciitis with ultrasound-guided steroid injection. Arch Phys Med Rehabil 2000;81:1416-21.
8. Crawford F, Thomson C. Interventions for treating plantar heel pain. Cochrane Database Syst Rev 2003;3:CD000416.
9. Kalaci A, Cakici H, Hapa O, Yanat AN, Dogramaci Y, Sevinç TT, *et al.* Treatment of plantar fasciitis using four different local injection modalities: A randomized prospective clinical trial. J Am Podiatr Med Assoc 2009;99:108-13.
10. Wong MW, Tang YY, Lee SK, Fu BS. Glucocorticoids suppress proteoglycan production by human tenocytes. Acta Orthop 2005;76:927-31.
11. Shi Y, Massagué J. Mechanisms of TGF-beta signaling from cell membrane to the nucleus. Cell 2003;113:685-700.
12. Lemont H, Ammirati KM, Usen N. Plantar fasciitis: A degenerative process (fasciosis) without inflammation. J Am Podiatr Med Assoc 2003;93:234-7.
13. Snider MP, Clancy WG, McBeath AA. Plantar fascia release for chronic plantar fasciitis in runners. Am J Sports Med 1983;11:215-9.
14. Saba EK, El-Sherif SM. Ultrasound-guided versus palpation-guided local corticosteroid injection therapy for treatment of plantar fascitis. Egyp Rheumatol 2016;38:123-31.
15. McMillan AM, Landorf KB, Gilheany MF, Bird AR, Morrow AD, Menz HB, *et al.* Ultrasound guided corticosteroid injection for plantar fasciitis: Randomised controlled trial. BMJ 2012;344:e3260.
16. Tatli YZ, Kapasi S. The real risks of steroid injection for plantar fascitis, with a review of conservative therapies. Curr Rev Musculoskeletal Med 2009;2:3-9.
17. Acevedo JI, Beskin JL. Complications of plantar rupture associated with corticosteroid injection. Foot Ankle Int 1998;19:91-7.
18. Andia I, Sanchez M, Maffulli N. Tendon healing and platelet-rich plasma therapies. Expert Opin Biol Ther 2010;10:1415-26.
19. Filardo G, Kon E, Della Villa S, Vincentelli F, Fornasari PM, Marcacci M, *et al.* Use of platelet-rich plasma for the treatment of refractory jumper's knee. Int Orthop 2010;34:909-15.
20. Sánchez AR, Sheridan PJ, Kupp LI. Is platelet-rich plasma the perfect enhancement factor? A current review. Int J Oral Maxillofac Implants 2003;18:93-103.
21. Bosch G, van Schie HT, de Groot MW, Cadby JA, van de Lest CH, Barneveld A, *et al.* Effects of platelet-rich plasma on the quality of repair of mechanically induced core lesions in equine superficial digital flexor tendons: A placebo-controlled experimental study. J Orthop Res 2010;28:211-7.
22. Martinelli N, Marinozzi A, Carnì S, Trovato U, Bianchi A, Denaro V, *et al.* Platelet-rich plasma injections for chronic plantar fasciitis. Int Orthop 2013;37:839-42.
23. Ragab EM, Othman AM. Platelet rich plasma for treatment of chronic plantar fascitis. Arch Orthop Trauma Surg 2012;132:1065-70.
24. Kane D, Greaney T, Shanahan M, Duffy G, Bresnihan B, Gibney R, *et al.* The role of ultrasonography in the diagnosis and management of idiopathic plantar fasciitis. Rheumatology (Oxford) 2001;40:1002-8.
25. Muto T, Kokubu T, Mifune Y, Inui A, Sakata R, Harada Y, *et al.* Effects of platelet-rich plasma and triamcinolone acetonide on interleukin-1ß-stimulated human rotator cuff-derived cells. Bone Joint Res 2016;5:602-9.

How to cite this article: Arora K, Gotecha D. Comparison of steroid injection and platelet-rich plasma injection in the treatment of chronic plantar fasciitis. Int J Sci Stud 2018;6(9):1-4.

Source of Support: Nil, **Conflicts of Interest:** None declared.