

Comparative study for the treatment of plantar fasciitis by corticosteroids versus platelet rich plasma

Tarun Kukreja, Tushar Agarwal, Ashutosh Singh, Himanshu Bhugra

Department of Orthopaedics, Dr DY Patil Medical College, Hospital and Research Centre, Dr DY Patil Vidyapeeth, Pune, Maharashtra, India

ABSTRACT

Purpose: The purpose of this study to compare the efficiency of corticosteroid and platelet rich plasma (PRP) for the treatment of chronic plantar fasciitis. **Materials and Methods:** The present study was conducted in Department of Orthopaedics at Dr. D. Y. Patil Medical College and Hospital, Pimpri, Pune from June 2013 to September 2015. In this series, forty patients having chronic plantar fasciitis were treated with PRP and corticosteroid injection. The results were evaluated prospectively to compare the efficacy of both the procedures. One group of twenty patients received an injection of corticosteroid and the second group of twenty patients received an injection of PRP. Patients were selected if they fit into the inclusion criteria of the study after random selection. **Results:** Both groups initially performed well. The patients were followed up at 3, 6, and 12 months interval and were analyzed with the scoring systems (American Orthopedic Foot and Ankle Society [AOFAS], visual analog scale and Roles and Maudsley system). The average pretreatment AOFAS score at 3 months after treatment in the steroid group was 45 and improved to 82 and in the PRP group was 44 and improved to 90. However, the steroid group scores degraded with a sharp drop in the AOFAS rating to 74 at 6 months and 62 at 12 months after treatment. In stark contrast, the PRP group scores remained high with AOFAS scores of 87 at 6 month and 85 at 12 months after treatment. **Conclusion:** This study confirms the long-term superiority of PRP over corticosteroid injection for chronic plantar fasciitis.

Keywords: Corticosteroid, plantar fasciitis, platelet rich plasma

Introduction

Plantar Fasciitis/Fasciopathy (PF) is a frequent disorder involving the plantar fascia: It has a bimodal distribution and occurs in both athletes and sedentary subjects. Usually, syndromes that involve manifestation of the typical heel pain are called plantar fasciitis, but that term is not correct, because no histological evidence of inflammation is present

Access this article online	
Quick Response Code: 	Website: www.mjdrdypu.org
	DOI: 10.4103/MJDRDYPU.MJDRDYPU_109_16

in this condition; the terms “fasciosis” or “fasciopathy” are most appropriate terms to define heel pain associated with degeneration of the plantar fascia and atrophy of the abductor digiti minimi muscle.^[1,2]

Even though the exact etiology is unknown, collagen degeneration at the origin of the plantar fascia, caused by repetitive micro tears, appears to be the basis of the pain.^[3] In the first phases of the condition, the management should be nonoperative. Several treatment options have been described with variable results, including rest, weight loss, deep massage, heel cups, night splint, anti-inflammatory drugs, and stretching exercises.

However, ~10% of patients do not respond to conservative therapies, necessitating further aggressive procedures such as

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Kukreja T, Agarwal T, Singh A, Bhugra H. Comparative study for the treatment of plantar fasciitis by corticosteroids versus platelet rich plasma. *Med J DY Patil Univ* 2017;10:252-6.

Address for correspondence:

Dr. Tarun Kukreja, Department of Orthopaedics, Dr. DY Patil Medical College, Pune, Maharashtra, India. E-mail: tarun.kukreja@gmail.com

injection therapy, extracorporeal shock wave therapy and, in some cases, surgical release of the plantar fascia.^[4,5] Chronic plantar fasciitis (PF) is one of the most common causes of foot complaints and, makes up to 11%–15% of the foot symptoms requiring professional care among adults.^[2,3] The incidence of PF peaks in people between the ages of 40 and 60 years with no bias toward either sex.^[4] The underlying condition that causes PF is a degenerative tissue condition that occurs near the site of origin of the plantar fascia at the medial tuberosity of the calcaneus.^[5]

When neither rest and neither activity restriction nor conservative treatments result in a satisfactory outcome, the patient is often interested in treatment options other than surgery. Numerous methods have been advocated for treating plantar fasciitis, including rest, nonsteroidal anti-inflammatory medication, night splints, foot orthosis, stretching protocols, and extracorporeal shock wave therapy. If conservative treatment for chronic plantar fasciitis fails, often a corticosteroid injection is given. Steroid injections are a popular method of treating the condition but only seem to be useful in the short term and only to a small degree.^[6] However, the use of corticosteroids is troubling as several studies have linked plantar fascia rupture to repeated local injections of a corticosteroid. Corticosteroid injection gives temporarily pain reduction, but no healing.

Autologous platelet rich plasma (PRP) was proved to improve the early neotendon properties^[3] and improve tissue healing by enhancing cellular chemotaxis, proliferation and differentiation, removal of tissue debris, angiogenesis, and the laying down of extracellular matrix.^[4] Various Growth Factors released from PRP are shown in Table 1.

Plain radiographs may reveal a plantar heel spur, which delineates the presence of abnormal stresses across the plantar fascia for at least 6 months.^[7] Over time, the spur forms in a manner consistent with Wolff's law – that is, “form follows function.”

It is not the cause of the symptoms but, rather, a sequela of the process; thus, it does not require specific treatment or removal. About 50% of symptomatic patients and 20% of asymptomatic patients have heel spurs.^[8,9]

Plantar fasciitis is typically a self-limited condition, and studies have reported a resolution incidence of up to 90% with nonsurgical measures.^[9-11]

Corticosteroid injections involve local, concentrated administration and are generally reserved as a tertiary level of treatment after failure of other primary conservative

measures (e.g., stretching, shoe inserts, or orthoses) in severe recalcitrant cases.^[12,13] Whether or not injected corticosteroids alter the long-term pathology of chronic inflammation; many patients experience acute symptomatic improvement.^[14,15]

One study found that ultrasound (US)-guided steroid injection provided short-term relief from pain in plantar fasciitis for up to 4 weeks and improvement in plantar fascia swelling for up to 12 weeks.^[16] Whether or not the use of US guidance improves the outcome of corticosteroid injections is unknown at this time.^[17] A posterior tibial nerve block before steroid injection was shown to decrease the pain from the injection and to improve compliance with treatment, without any complications.^[18]

Materials and Methods

Selection criteria

Forty patients admitted to our hospital between 2013 and 2015 were enrolled in this study. All patients gave informed onset to participate in the study. Patients were included if they were above 18 years of age, experienced heel pain felt maximally over the planter aspect for at least 6 months continuously and had radiography evidence of calcaneal spur. Examination reveals maximal tenderness at the attachments of the planter fascia on the medial tubercle of the calcaneus.

Patients were treated in the prior three months with conservation therapies, such as ice packs stretching of the Achilles tendon and nonsteroidal anti-inflammatory drug (NSAID) medication which provided an inadequate improvement of pain and functionality.

Exclusion criteria

Including generalized inflammatory arthritis, including ankylosing spondylitis; Reiter syndrome, rheumatoid

Table 1: Various growth factors released from PRP

PDGF	Stimulates cell replication Promotes angiogenesis Promotes epithelialization Promotes granulation tissue formation
TGF	Promotes formation of extracellular matrix Regulates bone cell metabolism
VEGF	Promotes angiogenesis
EGF	Promotes cell differentiation and stimulates Re-epithelialization, angiogenesis, and collagenase activity
FGF	Promotes proliferation of endothelial cells and fibroblasts Stimulates angiogenesis

PDGF: Platelet-derived growth factor, TGF: Transforming growth factor, VEGF: Vascular endothelial growth factor, EGF: Epidermal growth factor, FGF: Fibroblast growth factor

arthritis or psoriatic; any wound or skin lesion at the planter aspect of the foot; pregnancy serve infection; known malignancy; bleeding disorder; previous surgery for heel pain, pathology including Achilles tendon; nerve-related symptoms such as radiculopathy, tarsal tunnel syndrome, or tarsi sinus syndrome; foot and ankle osteoarthritis. Patient with complex regional pain syndrome. Diabetes mellitus, local or systemic, infection, peripheral vascular disease, metabolic disease such as gout, clotting disorder, anticoagulation therapy, and metastatic cancer. We excluded patients who declined to participate in the study. Had heel pain for any other reason (calcaneal fracture, tumors, infection, enthesopathy of rheumatic origin or nerve entrapment) or a painful disorder of the foot that could coexist with planter fasciitis (severe osteoarthritis, Morton's neuroma, or severe hallux valgus) had a systemic disease or server concomitant disease of the heart, liver or kidney; had a history of alcohol or drug abuse or a psychiatric history were pregnant or lactating. If patients had been treated by injection therapy corticosteroid injection in the past 6 months or NSAIDs treatment within the past 7 days.

The Arthrex ACP Double Syringe System was used to obtain PRP. This system includes one outer 10 ml syringe. Within this outer syringe, a commercially available 5-syringe is connected. Ten milliliters of autologous blood were taken from the antecubital vein with the outer syringe and place into the Arthrex centrifuge (Rotofix) and centrifuged for 5 min at 1500 rpm. During the extracorporeal blood processing, 2 ml of anticoagulant citrate dextrose solution was syringe into the 5 ml syringe under aseptic conditions. All patients received three injections at the planter fascia once per week. All injections were performed by one of the authors (SC) on an outpatient's basis. The injection point was at the origin of the planter fascia on the medial tubercle of the calcaneous, the origin of the planter fascia. After injection, all patients were allowed to immediately walk but wide weight-bearing sport activities such as running or jumping for at least 4 weeks after the last injection. After PRP injection, patients remained in the outpatient clinic until pain was considered tolerable and were followed in the outpatient clinic at three intervals or by telephone interview after the last injection to detect possible side effects. Ice packs were allowed for postinjection pain. Physiotherapy treatment was not prescribed during recovery from the injections. Before treatment and during the follow-up visit, patients were asked to rate their pain on a visual analog scale, with zero indicating no pain and ten the worst pain imaginable. Furthermore, modified criteria of the Roles and Maudsley score (14, 24) were used to define the outcome of the procedure. Patients were examined clinically at 3, 6, and 12 months after the index procedure.

The initial American Orthopedic Foot and Ankle Society (AOFAS) score of the PRP group was significantly different from that of the Corticosteroid group ($P < 0.0001$) as shown in Figure 1. However, at 6 months follow-up the AOFAS score of the two groups was again significantly different ($P < 0.0001$). This continued at 12 months follow-up, as AOFAS scores of the two groups was again significantly different from each other ($P < 0.0001$). Group 1 had significantly more AOFAS score than Group 2 at 3, 6, and 12 months follow-up as shown in Table 2.

Results

In this series, forty patients having chronic plantar fasciitis were treated with PRP and corticosteroid injection. The results were evaluated prospectively to compare the efficacy of both the procedures. In this study of forty cases, the majority of the patients were females (67%). The mean age of the patients was 51.4 years, ranging from 40 to 60 years. Among 40 cases, there were 18 cases (45%) with unilateral plantar fasciitis, 12 cases (30%) with bilateral involvement. The twenty cases of the PRP group had significantly better results after the injection at 3, 6, 12 months follow-up. The other twenty cases of the corticosteroid group showed initial good results at 3 months follow-up, but the results declined at subsequent follow-ups and returned to the baseline at 12 months follow-up. In this study, we observed that 17 patients (85%) who received the PRP injection said the

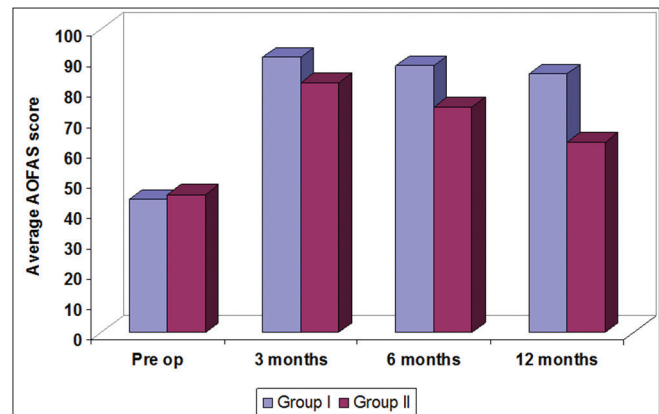


Figure 1: Bar diagram showing comparison of American Orthopedic Foot and Ankle Society score in group I and group II

AOFAS score at	Group I (n=20)		Group II (n=20)		Mann-Whitney test Z	P
	Mean	SD	Mean	SD		
Preoperative	44.05	2.743	45.50	2.585	4.23	<0.0001
3 months	90.70	3.310	82.30	2.677	5.02	<0.0001
6 months	87.90	4.128	74.45	3.103	5.32	<0.0001
12 months	85.25	7.518	62.65	7.903	4.88	<0.0001

SD: Standard deviation, AOFAS: American Orthopedic Foot and Ankle Society

results were excellent at the end of the treatment and about 14 patients (70%) who received corticosteroid injection said the results were acceptable. On the basis of the results in our present study, we suggest that PRP can be a successful procedure for the management of patients, who have chronic plantar fasciitis.

Discussion

The study was conducted for 1 year period, and forty patients were followed up at 3 months, 6 months and 1 year. After 1 year, many patients were noncompliant. A few who complied were called but to keep the study uniform, we kept 1 year follow-up.

Although there are many different techniques to produce PRP from whole blood, however, this study was done at our medical college hospital, and we use this particular technique for the preparation of PRP in the Department of Pathology.

PRP is an efficient way to treat chronic plantar fasciitis when conservative management fails. It is good treatment option compared to other invasive surgical modalities such as fasciotomy as this procedure helps in preserving the anatomy of the foot.

PRP is more effective and durable than corticosteroid injection for the treatment of chronic cases of plantar fasciitis.

In the present study, patients were more frequently females (67%), and their mean age was 51 years. The occurrence of plantar fasciitis is related to activities that require the support of body weight. Most patients in the present study (63%) had standing duties, thus indicating the importance of mechanical factors in this disease. Morning pain, important evaluation criteria, was reported by 85% of the patients, gait pain by 72% and orthostatic pain by 78%.

Conclusion

PRP injection is an efficient and safe therapeutic option for the treatment of chronic plantar fasciitis. However, there is a need for larger, long-term studies to verify the effectiveness of PRP for the treatment of plantar fasciitis.

In this study, we observed that 17 patients (85%) who received the PRP injection said the results were excellent at the end of the treatment and about 14 patients (70%) who received corticosteroid injection said the results were acceptable.

On the basis of the results in our present study, we suggest that PRP can be a successful procedure for the management of patients, who have chronic plantar fasciitis.

However, we need a longer follow-up and more patients to assess the effectiveness of the procedure, long-term outcome in relation to mobility, pain relief, and carrying out daily activities.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Hee HT, Majd ME, Holt RT, Myers L. Do autologous growth factors enhance transforaminal lumbar interbody fusion? *Eur Spine J* 2003;12:400-7.
2. Pfeffer G, Bacchetti P, Deland J, Lewis A, Anderson R, Davis W, et al. Comparison of custom and prefabricated orthoses in the initial treatment of proximal plantar fasciitis. *Foot Ankle Int* 1999;20:214-21.
3. Cole C, Seto C, Gazewood J. Plantar fasciitis: Evidence-based review of diagnosis and therapy. *Am Fam Physician* 2005;72:2237-42.
4. Taunton JE, Ryan MB, Clement DB, McKenzie DC, Lloyd-Smith DR, Zumbo BD. A retrospective case-control analysis of 2002 running injuries. *Br J Sports Med* 2002;36:95-101.
5. Buchbinder R. Clinical practice. Plantar fasciitis. *N Engl J Med* 2004;350:2159-66.
6. Crawford F, Thomson C. Interventions for treating plantar heel pain. *Cochrane Database Syst Rev* 2003;(3):CD000416.
7. Martin RL, Irrgang JJ, Conti SF. Outcome study of subjects with insertional plantar fasciitis. *Foot Ankle Int* 1998;19:803-11.
8. DiMarcangelo MT, Yu TC. Diagnostic imaging of heel pain and plantar fasciitis. *Clin Podiatr Med Surg* 1997;14:281-301.
9. Barrett SL, Day SV, Pignetti TT, Egly BR. Endoscopic heel anatomy: Analysis of 200 fresh frozen specimens. *J Foot Ankle Surg* 1995;34:51-6.
10. 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.
11. McPoil TG, Martin RL, Cornwall MW, Wukich DK, Irrgang JJ, Godges JJ. Heel pain – Plantar fasciitis: Clinical practice guidelines linked to the international classification of function, disability, and health from the orthopaedic section of the American Physical Therapy Association. *J Orthop Sports Phys Ther* 2008;38:A1-18.
12. Theodore GH, Buch M, Amendola A, Bachmann C, Fleming LL, Zingas C. Extracorporeal shock wave therapy for the treatment of plantar fasciitis. *Foot Ankle Int* 2004;25:290-7.
13. Mehra A, Zaman T, Jenkin AI. The use of a mobile lithotripter in the treatment of tennis elbow and plantar fasciitis. *Surgeon* 2003;1:290-2.

14. Quillen WS, Magee DJ, Zachazewski JE. The process of athletic injury and rehabilitation. *Athletic Injuries and Rehabilitation*. Philadelphia, PA: WB Saunders Co.; 1996. p. 3-8.
15. Crawford F, Atkins D, Young P, Edwards J. Steroid injection for heel pain: Evidence of short-term effectiveness. A randomized controlled trial. *Rheumatology (Oxford)* 1999;38:974-7.
16. Yucel I, Yazici B, Degirmenci E, Erdogmus B, Dogan S. Comparison of ultrasound-, palpation-, and scintigraphy-guided steroid injections in the treatment of plantar fasciitis. *Arch Orthop Trauma Surg* 2009;129:695-701.
17. Chen CM, Chen JS, Tsai WC, Hsu HC, Chen KH, Lin CH. Effectiveness of device-assisted ultrasound-guided steroid injection for treating plantar fasciitis. *Am J Phys Med Rehabil* 2013;92:597-605.
18. Porter MD, Shadbolt B. Intralesional corticosteroid injection versus extracorporeal shock wave therapy for plantar fasciopathy. *Clin J Sport Med* 2005;15:119-24.

Copyright of Medical Journal of Dr. D.Y. Patil University is the property of Medknow Publications & Media Pvt. Ltd. and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.