



Plantar fasciitis: Outcome evaluation of plantar fasciitis treated with PRP against steroid injection

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Abstract

Plantar fasciitis is the most common cause of heel pain which seems difficult to treat in its most chronic and severe forms. Earlier treatments, including orthoses, non steroidal anti-inflammatory drugs, and steroid injections are paucity of supportive clinical evidence but carry the potential for serious complication and permanent disability. Platelet-rich plasma (PRP) has recently been demonstrated to be helpful in managing chronic severe plantar fasciitis when other techniques have failed. The purpose of this study was to assess the safety and preliminary clinical results of platelet-rich plasma injections for treating chronic plantar fasciitis. 163 consecutive patients with chronic plantar fasciitis receiving injections of PRP and 158 patients for steroid injections into the plantar fascia were assessed 12 months after the procedure. The visual analogue scale (VAS) for pain was used to evaluate the clinical results. According to criteria VAS score, at 12 months of follow-up, results were rated as excellent in all PRP injected patients, good and poor in steroid injected patients. In PRP injection, VAS (mean) for pain was significantly decreased from 8.6 before treatment to 0.3 at the last follow-up. PRP injection has safety and efficiency as treatment for plantar fasciitis with no side effects and complications.

Key words

Plantar fasciitis, PRP, Steroids.

Introduction

The plantar fascia is a durable, longitudinal bundle of thick fibrous bands that originate off the medial tubercle of the calcaneus. These bundles condense to form the arch of the foot

before proceeding across the transverse bands of the deep transverse metatarsal ligaments to insert along the proximal phalanges. It functions using a windlass mechanism to support and cushion the foot during gait while efficiently

converting potential energy to kinetic energy during toe-off [1, 2].

Plantar fasciitis is diagnosed on patient history and physical examination. Patients have local point tenderness along the medial tuberosity of the calcaneum, pain on weight bearing and/or pain on first steps. It is especially evident upon dorsiflexion of the patients' metatarsophalangeal joint, which further stretches the plantar fascia or windlass mechanism. So any activity that would increase stretch of the plantar fascia, such as walking barefoot without any arch support, climbing stairs, or toe walking, can worsen the pain. The diagnosis is usually clinical and rarely needs to be investigated by imaging or electromyographically.

Chronic plantar fasciitis is the commonest cause of foot complaints in India. The incidence of plantar fasciitis peaks in people between the ages of 40 to 60 years with no bias towards either sex [3]. The underlying condition that causes plantar fasciitis is a degenerative tissue condition that occurs near the site of origin of the plantar fascia at the medial tuberosity of the calcaneus [4].

According to the World Health Organization (WHO), musculoskeletal injuries are the most common cause of severe long-term pain and physical disability, and affect hundreds of millions of people around the world [5].

The use of autologous PRP was first used in 1987 by Ferrari, et al [6]. Platelet-rich plasma (PRP) is a bioactive component of whole blood with platelet concentrations elevated above baseline and containing high levels of various growth factors [7]. The rationale for PRP benefit lies in reversing the blood ratio by decreasing red blood cells (RBC) to 5%, which are less useful in the healing process, and increasing platelets to 94% to stimulate recovery [8]. An increased

awareness of platelets and their role in the healing process has led to the concept of therapeutic applications. There is emerging literature on the beneficial effects of PRP for chronic non-healing tendon injuries including lateral epicondylitis and plantar fasciitis [9, 10].

The findings of existing clinical trials provided some support for the use of corticosteroid injection in the short term management of plantar fasciitis [11, 12]. However, a recent systematic review concluded that the effectiveness of this treatment has not been sufficiently established [13].

Material and methods

A comparative study was done in 321 patients from June 2013 to December 2014 for PRP and steroid injections for treatment of plantar fasciitis. Patients of plantar fasciitis in presence of other systemic disease like diabetes mellitus, rheumatoid arthritis, gout etc, history of anemia (hemoglobin < 5.0), and physical/occupational therapies within 4 weeks were excluded from this study. Tenderness in the heel on weight bearing and firm pressure with thumb by palpation especially at the medial side of heel were two main criteria for the diagnosis. A lateral X-ray of calcaneum of both heels was taken to demonstrate the presence or absence of a spur in normal and painful heel for all cases. The treatment consisted of steroid injections and PRP injection. The Medical Ethical Committee of The NIMS Medical College and Hospital had approved the study design, procedures and informed consent.

Platelet concentrate preparation

To generate 3 ml of PRP, 20 ml whole blood was drawn. The blood was prepared according to the GPS system instructions (Cell Factor Technologies, Warsaw, Ind). Platelet concentrate was obtained for each patient. Autologous platelet concentrate contained

concentrated white blood cells and platelets which were suspended in plasma. The platelet concentrate must be buffered to increase the pH to normal physiologic levels as an acidic anticoagulant was introduced to the whole blood. The resulting buffered platelet concentrate contained approximately a 6 to 8 times concentration of platelets compared to baseline whole blood. No activating agent was used. The total time from blood draw to injection in the patients was about 30 minutes. No specialized equipment, other than the GPS machine, was required.

Injection technique

Initially, local block was infiltrated into the skin and subcutaneous tissue of both groups. Approximately 0.5 cc was also injected directly into the area of maximum tenderness. Then, 3 ml platelet concentrate prepared or 5 to 6 cc corticosteroid (2 cc steroid + 4 cc normal saline) was injected using a 22 g needle into the plantar fasciitis maximum tenderness point.

Post-procedure protocol

Immediately after the injection, for 15 minutes patient was kept in sitting position. After that patients were sent to physiotherapist to learn stretching exercises. Patients were sent home with instructions to limit their use hydrocodone or acetaminophen for pain of the feet for approximately 48 hours. After 48 hours, patients were given a standardized stretching protocol to follow for 2 weeks. A formal strengthening program was initiated after this stretching. At 4 weeks after the procedure, patients were allowed to proceed with normal sporting or recreational activities as tolerated.

Corticosteroid

The type of steroid that was used during the study was depomedrol (methyl prednisolone) 40 mg/ml. We did use VAS score to evaluate the results of study. The score recorded the

patient's reported pain using a scale of 0-10, where 0 was pain-free and 10 was the worst pain imaginable. The scale was 10 centimeter line beginning with 0 and ending with 10, the score was marked at the point on the line that corresponded with the patient response.

Follow up

All patients had been followed up at 4, 8, 12, 26 and 52 weeks with complete VAS scores.

Results

The results were obtained on mean VAS in both groups. The cortisone group had a pretreatment mean VAS score of 8.5, which initially improved to 1.1 at 12 weeks post treatment but decreased to 4.9 at 26 weeks, and then continuous increased to near baseline levels of 8.4 at 52 weeks. In contrast, the PRP group started with an average pretreatment 8.6 score, which decreased to 3.4 at 12 weeks, remained declining to 1.2 at 26 weeks and 0.3 at 52 weeks. **(Chart – 1)**

Discussion

Surgical treatments for chronic severe plantar fasciitis, including plantar fasciotomy with and without neurolysis of the calcaneal branches of the tibial nerve, have demonstrated conflicting late clinical results with pain and disability persisting in many patients [14, 15].

The most common secondary level treatment for plantar fasciitis is the use of corticosteroid injections. Critical reviews of cortisone injection therapy have yielded equivocal short-term findings and disappointing long-term results [16, 17].

Reported benefits of this include provision of temporary pain relief, dilution of potentially harmful corticosteroid crystals (acetates only), and confirmation of accurate solution deposit

[18]. Hence, Crawford, et al. [19] concluded that steroid injections can provide short-term relief.

However, a number of complications were noted including plantar fascial rupture, plantar fat pad atrophy, lateral plantar nerve injury secondary to injection, and calcaneal osteomyelitis and in iontophoresis, burning of the underlying skin [20].

Long-term sequelae of plantar fascia rupture were found in approximately one half of the patients with plantar fascia rupture, with longitudinal arch strain accounting for more than one half of the chronic complications [21, 22] in steroid injection.

Results of a Cochrane review showed that corticosteroid injection therapy has short-term benefit compared to control, and the effectiveness of treatment is not maintained beyond six months [12].

Ragab and Othman [23] examined a larger group of 25 patients who were injected with PRP and were then followed up for an average of 10.3 months after treatment. VAS scores improved from 9.1 pretreatment to 1.6 post treatment. Before treatment, 72% of patients noted severe activity limitations, whereas 28% were moderately limited. After PRP treatment, 60% had no functional limitations, 32% had mild limitations, and 8% noted moderate limitations. Ultrasonography was completed before and after PRP treatment and demonstrated decreased plantar fascial thickening. By combining eccentric exercise and cyclic plantar fascia-specific stretching with PRP injection, enhanced and accelerated healing with excellent long-term results can be achieved in refractory cases [24, 25].

Initially PRP induces slightly more inflammation, part of the healing process, but then the action

takes place, fibrinocytes move in and start laying down new collagen to heal and reinforce the plantar fascia. Other healing components of the blood, such as stem cells migrate into the area, rebuilding and strengthen the tissue. PRP has none of the side effects as seen in repeated steroid injections, especially no breakdown of tissue and recurrence of plantar fasciitis, as seen in our study. Platelet rich plasma therapy results in tissue regeneration. As with all injection procedures, there can be damage to neurovascular structures, infection and pain but in our study no such side effects were seen.

Conclusion

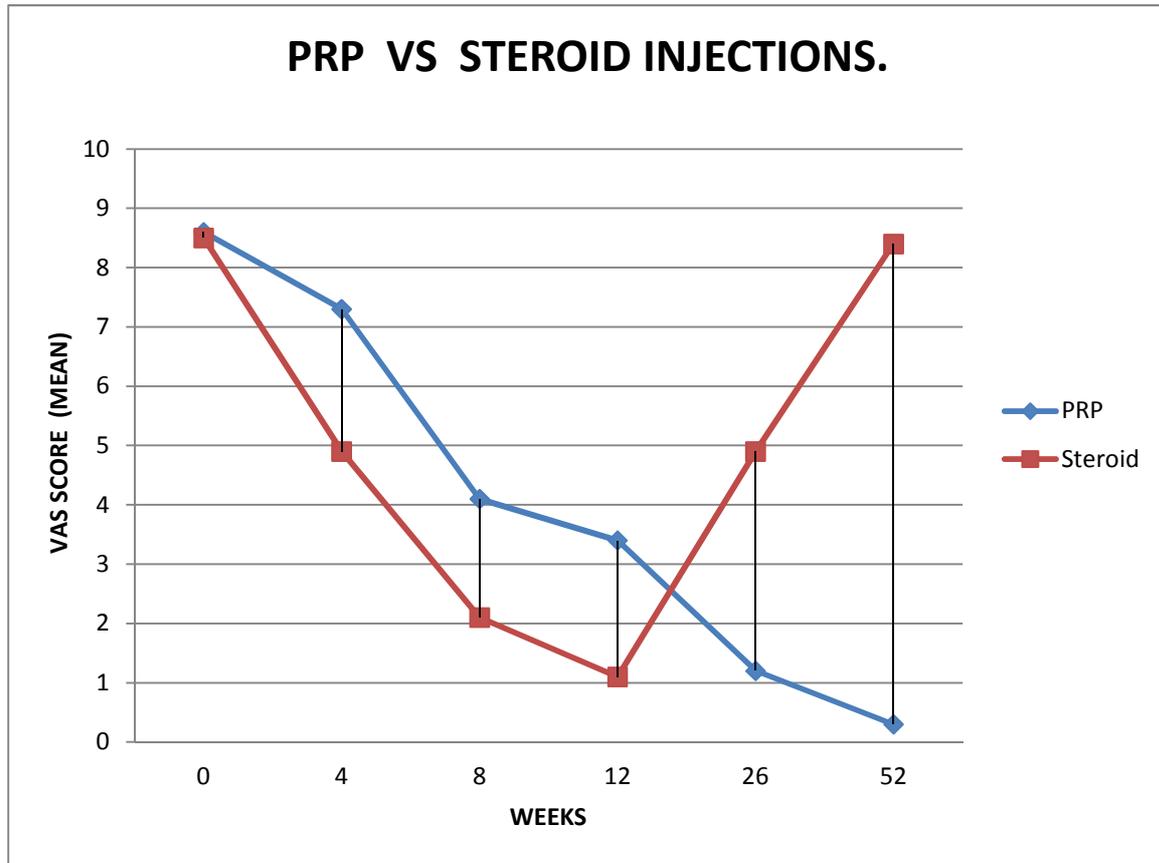
In PRP therapy, healing of the damaged, inflamed plantar fascia. PRP injection has safety and efficiency as treatment for plantar fasciitis with no recurrence, side effects and complications.

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Chart – 1: Follow up v/s mean VAS score of patients treated with PRP and steroid injections.



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