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Clinical Findings Of Corticosteroid Therapy With Platelet-Rich Plasma Therapy ToTreatment Of Intractable Plantar Fasciitis.

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ABSTRACT

Plantar fasciitis (PF) is a debilitating degenerative condition of the plantar fascia follow- on from repetitive microtrauma and excessive strain on the plantar surface of the foot. It occurs mostly due to the biomechanical stress on the plantar fascia. This study assessed Clinical findings of corticosteroid therapy with platelet-rich plasma therapy to treatment of intractable plantarfasciitis. After approval from the local institutional review board, we performed a prospective cohort study from a single institution. Patients in group one were treated with a PRP injection while patients in group two were treated with a partial plantar fasciotomy (PPF) surgery, with all procedures performed by a single foot and ankle fellowship-trained specialist surgeon. The study was conducted in the outpatient department of Sri Lakshmi Narayana Institute of Medical sciences. The majority, 79 (75.2%), were female, and 26 (24.7%) were male. The mean ± SD age of theparticipants was 43.8 ± 10.9 years (42.9 ± 10.3 in the PRP group and 44.7 ± 11.6 in the steroidgroup).Approximately equal proportions (48.9% and 51.1%) were from advantaged anddisadvantaged ethnic groups, respectively. Most of the participants 76 (72.3%) had the problem ofplantar fasciitis on the right foot, and only 29(27.6%) had the occurrence on the left side. Similarly,the presence of calcaneum spur was found in 58.0% of participants, while it was absent in 41.9%of participants. PRP injections are effective in treating PF, reducing pain and improving function.Longitudinal follow-up studies are needed to investigate sustained efficacy of this safer alternative.

Keywords: Plantar fasciitis, Platelets-Rich Plasma, Corticosteroid (CS) injections, calcaneal tuberosity.

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INTRODUCTION

Plantar fasciitis (PF) is a debilitating degenerative condition of the plantar fascia follow- on from repetitive microtrauma and excessive strain on the plantar surface of the foot. It occurs mostly due to the biomechanical stress on the plantar fascia [1]. It is a thin elastic fibrous band of connective tissue aligned in a longitudinal orientation with a rich extracellular matrix predominantly in the Hyaluronan [2]. which is the most common cause of plantar heel pain, and its frequency is predictable up to 7% in the general population [3]. Indeed, up to 12.7% of runners have experienced plantar fasciitis at some point in their career.

Plantar fasciitis can be divided into three groups according to the onset of pain: Acute PF (4–6 weeks), Sub Acute PF (6–12 weeks) and Chronic PF (>3 months). Chronic Plantar Fasciitis (CPF) can be further divided into the refectory and recalcitrant periods, with the latter consisting of symptoms presiding more than six months without improvement after appropriate treatment.Typically, the first-line treatment for plantar fasciitis is nonoperative therapy with anti inflammatory medication, shoe inserts, and physical therapy providing relief. Nowdays no operative treatment is successful in up to 90% of patients with the condition [4].

Platelets-Rich Plasma (PRP) injection is an emerging therapy to treat persistent joint inflammation through anti-inflammatory vascularization as well as angiogenesis derived from platelets [5]. It has strong anti-inflammatory properties, but without known adverse effects on the plantar fascia structure. which contains high levels of growth factors and anti-inflammatory cytokines, which basic science studies have shown to potentially ameliorate degenerative conditions. While PRP has been shown to be beneficial for other degenerative conditions, there is no consensus on its use for plantar fasciitis.

Corticosteroid (CS) injections have served as the traditional method of injection therapy for many years. It injections are effective because of their inherent anti-inflammatory properties; however, they are also associated with a risk of plantar fascia rupture and fat pad atrophy. In addition, CS may provide short-term pain relief, its long-term benefit in plantar fasciitis is uncertain. Therefore, this study aimed to Clinical findings of corticosteroid therapy with platelet- rich plasma therapy to treatment of intractable plantar fasciitis.

MATERIAL AND METHODS

After approval from the local institutional review board, we performed a prospective cohortstudy from a single institution. Patients in group one were treated with a PRP injection whilepatients in group two were treated with a partial plantar fasciotomy (PPF) surgery, with all procedures performed by a single foot and ankle fellowship-trained specialist surgeon. The studywas conducted in the outpatient department of Sri Lakshmi Narayana Institute of Medical sciences.The patients aged 25 to 60 years with a history of heel pain of more than six weeks with tenderness on palpation over medial calcaneum tuberosity and diagnosed as PF, those patients with failure of conservative treatment with physiotherapy, splints, and NSAIDs, those patients who were mentally fit, and those patients who provided written informed consent were included in the study.

The patients with lumbar radiculopathy, existing trauma, previous surgery or any foot pathology, under aspirin treatment, bleeding disorders with low platelet counts, and systemic diseases like diabetes and rheumatoid arthritis were excluded.

One twenty patients diagnosed with plantar fasciitis by clinicians were randomized either into thesteroid group or PRP group by the principal author and intervened by other research team members. Local skin sterilization and light sedation preceded the surgery followed by an ankle block. A partial medial fasciotomy was performed by a foot and ankle specialist. The plantar fascia was palpated medially and distally to the calcaneal spur, followed by an oblique incision of 3 cm and a blunt dissection to separate the plantar fascia from the surrounding subcutaneous fat. The fasciawas then fully dissected through a small transverse stab incision 3 cm in length just distal to the calcaneal fat pad, which minimizes scarring since it is in line with the skin tension lines. The digitswere dorsi flexed, and one-third of the medial plantar fascia was released. At the end of the procedure, the medial fascia was plucked to verify adequate release. The skin was then closed using non-absorbable sutures.

In the steroid group, 2ml of injection Depo-Medrol 80 mg (Methylprednisolone) along with1 ml lignocaine (0.25%) were loaded in a 5 cc syringe. Then the cocktail was injected into the medial calcaneal tuberosity at the most tender point using an aseptic technique.

The 30 ml blood of participants was collected into an acid citrate dextrose tube under aseptic conditions and subjected to centrifugation at 2000 rpm (soft spin) through a digital centrifuge machine speed control (REMI, R-8 C PLUS). There were three layers of blood; amongthem, the supernatant layer and buff coat of plasma were again subjected to centrifuge at 3000 rpm(hard spin). The upper two-thirds of the tube containing platelet-poor plasma were discarded, and the lower one-third of concentrated platelet plasma superficial buffy coat was injected into medial calcaneal tuberosity at the most tender point. At that point, a single ultrasound-guided PRP injection was injected into the insertion of the plantar fascia at the anterior-middle aspect of the heel [6].

After the injection in both groups, the participants were advised not to engage in any rigorous activity with the affected foot for at least two days and then gradually return to their regular activities. All participants were counselled to follow up in the next visit at three months and six months. The midline and end-line data were recorded at three and six months, respectively.

The collected data were entered in Epi-Data version 3.2 and analyzed based on the intention-to-treat (ITT) principle using Stata/MP version 14.1 (StataCorp LP, College Station, Texas). The normality of data was assessed using Shapiro–Wilk test. Socio-demographic data were analyzed using descriptive analysis. Since the data were normally distributed, the mean and standard deviation (SD) were calculated. Comparisons were made using the Student's two-samplet-test. The Box and whisker plot was also used to display the PRP and steroid group outcome measures. All values less than 0.05 were considered statistically significant.

RESULTS

A total of one twenty participants were included in this study 60 participants in the PRP and 60 in the steroid group after six months of follow-up, a total of 105 participants completed thestudy such as 57 participants in the PRP group and 48 participants in the steroid group), whereas twelve participants lost follow in the steroid group, and three of the participants discontinued the trial in the PRP group.

The majority, 79 (75.2%), were female, and 26 (24.7%) were male. The mean ± SD age ofthe participants was 43.8 ± 10.9 years (42.9 ± 10.3 in the PRP group and 44.7 ± 11.6 in the steroidgroup). Approximately equal proportions (48.9% and 51.1%) were from advantaged and disadvantaged ethnic groups, respectively. Most of the participants 76 (72.3%) had the problem ofplantar fasciitis on the right foot, and only 29(27.6%) had the occurrence on the left side. Similarly,the presence of calcaneum spur was found in 58.0% of participants, while it was absent in 41.9%of participants.

The mean ± SD VAS scores for pain at baseline were 7.22 ± 1.34 and 4.77 ± 0.95 in PRP and SI groups, respectively with a group difference of 0.66 (95% CI: -0.06 to 0.93). The mean baseline pain scores were changed to 6.22 ± 2.04 in the PRP group and 5.14 ± 0.91 in the SI group in three months follow-ups with a group difference of 2.07 (95% CI: 0.76 to 1.47). Similarly, the baseline pain score was significantly decreased in the PRP group than the SI group (3.97 ± 2.13 versus 5.71 ± 0.98) with a group difference of -0.83 (95% CI: -1.20 to -0.28) in six months follow-up.

The functional mobility measured with the AOFAS scores were 63.53 ± 15.87 and 61.14 ± 13.47 in PRP and SI groups, respectively with a difference of 0.77 (95% CI: -0.04 to 0.93) at thebaseline study. The mean AOFAS score was improved to 70.80 ± 18.04 in the PRP group and 82.76 ± 9.15 in the SI group in three months with a group difference of -13.96 (95% CI: -19.22 to -9.69). Similarly, the AOFAS score was significantly increased in PRP than SI group (98.04 ± 7.45 versus 89.23 ± 9.60) with a group difference of 7.80 (95% CI: 1.15 to 9.45) in six months.

The plantar fascia thickness between PRP and steroid groups was comparable (7.66 ± 0.98mm versus 7.69 ± 0.99 mm) with the group difference of -0.15 (95% CI: -0.59to 0.35) at baselinedata which was decreased to 3.69 ± 0.87 mm and 4.59 ± 1.02 mm in six months, respectively witha difference of -1.04 (95% CI: -1.44 to -0.65).

DISCUSSION

Steroids performed better than PRP in the present study's outcomes after three months, butafter six months, PRP also reduced the severity of the severe pain and had a higher AOFAS scorethan steroids. According to Yang et al., [7] there was no discernible difference between short- and intermediate-term effects, but PRP was superior to steroid injection for long-term pain relief in plantar fasciitis. At three months, it was discovered that the steroid group performed better than our study participants in terms of pain and functional mobility; however, at six months, the PRP group achieved long-lasting pain relief and higher mobility function because PRP contains growth factors and many other molecules with biological regenerative properties for the healing. After 10minutes of PRP injection, roughly 70% of the growth factors are released within an hour, which then synthesize and produce further growth factors for about eight days until the platelets die. After injection, it needs six to eight weeks to resume normal activities.

However, the short-lived immunological and inflammatory cascade is not interrupted by steroids. Due to the corticosteroid's short half-life, which Li A, Wang H, et al [8] noticed in their study, lateral epicondylitis pain is temporarily relieved but not permanently.

The PRP group saw a considerable reduction in plantar fascia thickness over the course ofsix months compared to the steroid group, which was clinically and statistically significant. These findings are consistent with Kalia et al [9] study, which showed that PRP does not significantly reduce plantar fascia thickness at one or three months after receiving a steroid injection. It has not been well investigated how the injection of steroids and PRP reduces the thickness of the plantar fascia. But it may be justified by the fact that the inflammation episode and plantar fascia thickening are connected, and that PRP and steroids both have anti-inflammatory effects that helpto lessen the inflammation.

Due to its regeneration-promoting properties—which steroids lack and are thus short- lived—PRP may be advantageous over steroid injection in that it may control the degradation of the plantar fascia. Rather than being predominantly an inflammatory illness, plantar fasciitis is a degenerative pathology. While momentarily reducing pain, steroids have little bearing on recovery [10]. By encouraging the creation of new blood cells and so providing nutrients and increasing blood flow to the damage site, the bioactive components of PRP aid in tissue regeneration and wound healing.

Growth factors and cytokines included in PRP boost hyaluronan production, which has anti-inflammatory properties and improves gliding between deep fascia and muscle, hence lowering plantar fascia thickness. Additionally, PRP is thought to be an alternative to surgery sinceit has a greater platelet concentration and larger percentages of lymphocytes and monocytes than whole blood, which enhances safe and natural healing [11].

CONCLUSION

PRP injections administered locally have proven to be an effective treatment for PF. It is risk-free and efficient in reducing pain and enhancing function. Patients with PF who had PRP treatment significantly improved as compared to those who received steroid treatment, demonstrating greater effectiveness. However, longitudinal follow-up studies should be used to further investigate the sustained efficacy of this intriguing and safer therapy alternative.

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