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# ROLE OF CONSERVATIVE TREATMENT, STEROID INJECTION AND PLATELET RICH PLASMA IN PLANTAR FASCITIS- COMPARATIVE STUDY

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### Abstract

**Purpose:** This study was undertaken to compare the three different modalities of non operative treatment: Non- invasive conservative methods, local Steroid injection therapy and local platelet rich plasma injection

**Study Design:** Prospective cohort study.

**Methods:** The study group comprised 90 patients divided into 3 groups each of 30 patients with a mean follow-up of 3 months.

Patients were assessed as per Visual Analogue Scale (VAS) and Roles-Maudsley score at the start of treatment and then after 4 week and 12 week duration on follow up.

**Statistical analysis used:** SPSS for Windows (version 10.0) by the Chi-Square test

**Results:** The difference in the distribution of subjects belonging to either of the treatment modalities regarding the treatment outcome at 1 month and 3 month was found to be statistically insignificant.

**Conclusion:** As all three treatment modalities are at par on comparison of their treatment outcome it is better to go for conservative approach because this can save the patients from the complications of steroid therapy and PRP injection.

**Keywords:** *Plantar fasciitis, conservative, steroid, platelet rich plasma*

## Introduction

Plantar fasciitis is the most common cause of heel pain. The pain is often worst when first getting up in the morning, with typical hobbling downstairs, or when first getting up from a period of sitting-the typical start up pain and stiffness<sup>1</sup>. Today it is accepted that plantar fasciitis is a degenerative pathology rather than an inflammatory process<sup>2</sup>. Operative specimens show the histological evidence of degenerative changes in the plantar fascia and chronic inflammatory changes with or without fibroblastic proliferation<sup>2</sup>. The diagnosis is based on the typical history and the finding of localized tenderness in the medial calcaneal tubercle. Planter Fasciitis is considered a self limited condition. However, the long interval is frustrating for both patients and clinicians<sup>3</sup>. A conservative treatment method is usually preferred in the initial treatment of plantar fasciitis. The conservative treatment modalities described for plantar fasciitis include changes in daily activities, orthoses, stretching, taping, and non-steroidal and anti-inflammatory drugs (NSAID) therapy<sup>4</sup>. Local injection modalities are commonly used secondary to conservative therapies in the treatment of patients who have resistant plantar fasciitis. The most preferred method of non-surgical plantar fasciitis treatment is local corticosteroid injection with or without the addition of a local anesthetic. Few randomized controlled trials have discussed the role of corticosteroids in the treatment of fasciitis<sup>5</sup>. Platelet-rich plasma (PRP), which is a natural concentrate of autologous growth factors, is now being widely tested in different fields of medicine for its possibilities in aiding the regeneration of tissue with low healing potential. Local injection

of PRP is a new modality which has recently been discussed<sup>6</sup> for the treatment of plantar fasciitis. In this study, the results of conservative treatment, local injection of PRP and corticosteroids in the treatment of plantar fasciitis are compared.

## Material And Methods

A prospective study was done in period of 1 year from January 2018 till December 2018. Total 90 patients were taken up for the study that completed the follow-up. Patients by random sampling were divided in three groups. Group A as: Conservative group, Group B as Local Steroid Injections group and Group C as PRP injection, 30 patients in each. Consent was taken from all patients.

**Inclusion Criteria:** Patients in the age group of 18 to 65 y with history of pain and tenderness in the sole of the foot, mostly under the heel, with standing or walking for period more than 1 month. Pain is often worst when first getting up in the morning, or when first getting up from period of sitting-the typical start up pain and stiffness. On examination tenderness in the heel on weight bearing and firm pressure with thumb by palpation especially at the medial side of heel.

**Exclusion Criteria:** Patients of plantar fasciitis in presence of other systemic disease like diabetes mellitus, rheumatoid arthritis, gout etc were excluded from study. Patients with history of trauma, Stress fracture calcaneum, and acute planter fascias rupture cases, patients with neurological pathology, Haglund's deformity cases and flat feet cases. Pregnant women, patient's less than 18 y, and those with history of bleeding disorder or on anti coagulant therapy and cases of bilateral planter fasciitis were also excluded.

Group A- 30 Patients were started on NSAID's, Soft Insoles, Stretching and Contrast baths as following: Patients were prescribed paracetamol 500mg twice daily for two week. Soft insoles were placed in the shoes of males. In females soft rubber sole cushioned footwear's were given. Both male and female patients were instructed not to stand or walk bare feet. Patients were simultaneously attended by a qualified physiotherapist who made them to do stretching exercises for planter fascia. They were asked to sit with the knees bent and heel flat on the floor and then to grab all five toes and pull them back toward the knee, hold for 30 sec and repeat five times. They were also advised planter fascia stretches against the wall. Feet was placed against the wall and after gentle leaning forward slowly were asked to hold for 30 sec and repeat the procedure five times. Contrast baths therapy was advised at home. Limb to be placed in a hotter bath at 40-42 Centigrade temperature for 3-4 min and then in a cold water at 15-20 Centigrade, for about 1 min alternatively with an instruction: to practice begin and end with the hotter bath.

Group B- 30 Patients were given local steroid injection in the form of 40 mg methyl prednisone mixed with 1ml of 2% lignocaine at weekly intervals up to three injections after subcutaneous sensitivity test of lignocaine in a sterile atmosphere i.e. minor OT after part preparation.

Group C- 30 patients were injected with 3 mL PRP after 1 mL of 2% lignocaine injection intervals after subcutaneous sensitivity test of lignocaine in a sterile atmosphere i.e. minor OT after part preparation

The baseline characteristics of each group, including age, affected

side, height, weight, body mass index, and the duration of foot pain, were recorded. Patients were assessed as per Visual Analogue Scale<sup>7</sup> and Roles-Mandsley score<sup>8</sup> at the start of treatment and then after 4 wk and 12 week duration on follow up. Results were graded as excellent (0), good (0-30), fair (30-60) and poor (60-100) depending on the VAS score and excellent, good, fair and poor on basis of their pain, movements and restriction of activity. To begin with only those patients who were rated as very poor and there symptom were of more than 4 week duration were taken up for study. A lateral X-ray of both heels was taken to demonstrate the presence or absence of a calcaneal spur in painful heel for all cases. Hb%,

TLC, DLC, ESR, Random Blood Sugar, Serum Uric Acid, and CRP was done in all cases.

#### PRP preparation and application<sup>9</sup>

We used a double centrifugation technique to concentrate platelets from autologous blood and activated them using calcium. 25 cc venous blood was centrifugated at 1,800 rpm for 15 min to separate the erythrocytes, and the second time at 3,500 rpm for 10 min to concentrate platelets to produce a unit of 3 mL PRP. Injection was performed by the same investigator. Injections were performed by palpating the maximally tender point with a medial approach when the patients were in prone position with the ankle in a neutral position. Patients were blind for the agent used in the treatment. After

the procedure, patients were instructed to apply ice to the injected area if needed for pain control in addition to elevation of the limb. Following injection, patients were not allowed weight bearing for 3 days. They were advised to wear comfortable shoes and avoid all running and other high impact activities for 10 days

**Data Analysis:** The data was analysed by using SPSS for Windows (version 10.0) by applying the Chi-Square test and p-values of 0.05 and less were considered as significant.

#### Results

Total 90 patients are included in study. 46 were male and 44 female. 44 patients had complaint in right foot.

Characteristics	Conservative treatment	Steroid injection	PRP injection
Sex M/F	17/13	13/17	16/14
Affected foot R/F	16/14	13/17	15/15

The mean age of all patients was 43.4 (range 22–68 years). The mean body mass index of the patients was 45.84 kg/m<sup>2</sup>. The mean duration of symptoms in all of the groups was 4.42 months. There was no significant difference between groups with respect to mean age, body mass index, and the baseline visual analog scale score ( $P > 0.05$ ).

Characteristics	Conservative treatment	Steroid injection	PRP injection
Age (in years)	42.5	43.5	44.2
Height (in cms)	162.6	170.3	168.3
Weight (kg)	68	64	59
BMI (kg/m <sup>2</sup> )	41.97	59.8	35.75
Duration of foot pain(months)	4.56	3.9	4.8

In both corticosteroid and PRP-injected groups, the

mean VAS score was statistically lower when compared with pretreatment scores ( $P = 0.001$ ). The mean VAS heel pain scores measured 3 months after treatment were 3.2 in conservative management, 3.4 in the steroid group and 3.6 in the PRP group, and the scores in both groups were significantly lowered when compared with pretreatment levels (7.3 in conservative management, 7.5 in the steroid group and 7.99 in the PRP group) (Table 2).

Group	No.	VAS score (mean)		
		Baseline	At 4 weeks	At 12 weeks
Conservative management	30	7.3	5.4	3.2
Steroid injection	30	7.5	4.8	3.4
PRP injection	30	7.9	5.2	3.6

In the evaluation of the patient satisfaction according to the modified criteria of the Roles and Maudsley scores measured 6 months after treatment, it was seen that only four patients (13.3%) had poor results in both injection groups (Table 3).

		Modified Roles-Maudsley score			
		Excellent	Good	Fair	poor
4 Weeks					
	Conservative management (n=30)	2	18	8	2
	Steroid injection (n=30)	3	17	7	3
	PRP injection (n=30)	2	10	15	3
12 weeks					
	Conservative management	6	12	9	3
	Steroid injection	8	14	7	1
	PRP injection	9	12	7	2

There was no significant difference between the steroid and PRP groups in the visual analog scale scores and the modified criteria of the Roles and Maudsley scores measured at 4 weeks and 3 months ( $P > 0.05$ ). No complications attributable to PRP and corticosteroid injections were observed.

## Discussion

Plantar fasciitis is poorly understood and believed to be self limiting pathology. The etiology of this condition is not clearly understood and is probably multi-factorial in nature. Weight gain, occupation-related activity, anatomical variations, poor biomechanics, overexertion, and inadequate footwear are contributing factors<sup>10</sup>.

Ozdemir et al<sup>11</sup> demonstrated direct relationship between duration of heel pain and thickness of heel pad. He also showed As spur size increased, the heel pad compression index value increased.

It is widely believed that plantar fasciitis results from repeated microtrauma due to overuse, which results in microtears of the tissue substance until a macro injury occurs. Lemont et al.<sup>2</sup> concluded that plantar fasciitis is not an inflammatory

process but a degenerative process . It is characterized by microtears and necrosis of the plantar fascial ligament and intrinsic necrosis muscles of the foot at their attachments on the calcaneus. Similarly, a study by Snider et al.<sup>12</sup> showed that the histologic examination of surgical biopsy specimens showed collagen necrosis, angiofibroblastic hyperplasia, chondroid metaplasia, and matrix calcification. Again, no cellular proof of an inflammatory response was cited.

Various method were described for its treatment including change in lifestyle modifications, shoe modification, arch support and orthotics, stretching and strengthening, splinting and walking cast, anti-inflammatory, local steroids injection and extra corporeal shock wave therapy and surgery. Local platelet rich plasma injection recently used in pathology of tendinitis.<sup>10</sup>

Gill et al<sup>13</sup> evaluated efficacy of various conservative treatment in 411 patients. Each patient completed an outcomes assessment survey instrument that ranked effectiveness of various nonsurgical treatment modalities. He listed the treatment modalities with short leg walking cast, steroid injection, rest, ice, runner's shoe, crepe-soled shoe, aspirin or

nonsteroidal anti-inflammatory drug, heel cushion, low-profile plastic heel cup, heat, and Tuli's heel cup in descending order. Dimou, et al.<sup>14</sup>, Basford et al. <sup>15</sup>, Crawford and Snaith <sup>16</sup> demonstrated uses various modalities in conservative treatment and show equivocal effective in treatment.

Although Steroid injection is the mainstay for the management of many hyper inflammatory disorders including plantar fasciitis. Steroids have been described as altering the ultrasound appearance of plantar fasciitis by reducing plantar fascia thickness and decreasing the incidence of hypoechoic tissue, in addition to improving clinical parameters<sup>17</sup>. A number of complications were noted including planter fascial rupture, planter fat pad atrophy, lateral planter nerve injury secondary to injection, and calcaneal osteomyelitis. Fascial rupture and fat pad atrophy are especially serious complications. Fascial rupture interrupts the intrinsic windlass mechanism of the foot and can promote further inflammation in the surrounding tissue, thus promoting pain. In addition planter fat pad atrophy diminishes subcalcaneum cushioning, availing the planter fascia to further insult and, hence, more pain.<sup>18</sup>

PRP is the concentration of platelets derived from the plasma portion of centrifuged filtered autologous blood. It includes various growth factors specially platelet-derived growth factors

(PDGF), epidermal growth factor (EGF), vascular endothelial growth factor (VEGF), and transforming growth factor beta (TGF- $\beta$ ) in high amounts. Addition of autologous concentrations of platelets theoretically augment the healing process.<sup>19</sup>

Barrett et al<sup>9</sup> reported on the use

of injectable PRP for the treatment of plantar fasciitis. They hypothesized that injecting PRP into recalcitrant, symptomatic plantar fascia causes a reparative effect leading to a resolution of symptoms, and this technique was termed plantar fasciorraphy. 6 out of 9 subjects achieved complete resolution of symptoms after 2 months. One subject had resolution after a second injection. After 1 year, 77.9% of the subjects had no symptoms. They also demonstrated that thickness of the plantar fascia was reduced between pre- and postinjection checked by ultrasound.

Lee et al<sup>20</sup> in their prospective, randomized, controlled trial compared steroid injection and autologous blood injection in the treatment of plantar fasciitis. They concluded that corticosteroid is superior in terms of speed and probable extent of improvement than intralesional autologous blood injection although it is also effective in lowering pain and tenderness in chronic plantar fasciitis.

Say et al<sup>21</sup>, Mahindra et al<sup>22</sup> demonstrated that PRP Injection provides better relief in pain and symptoms than local steroid injection.

Ertuğrul Akşahin et al<sup>23</sup> studied 60 patients with plantar fasciitis. They showed that although mean VAS score improves with both steroid and PRP injection, there was no significant difference between steroid and PRP groups in visual analog scale scores and modified criteria of the Roles and Maudsley scores measured at 3 weeks and 6 months.

In our study, we compare the results of patients with chronic plantar fasciitis treated with conservative treatment, local corticosteroid injection and local PRP injection. The evaluation of patient satisfaction rated by the mean VAS score and modified criteria of the

Roles and Maudsley scores measured at 4 weeks and 3 months after treatment and it revealed that six out of ninety patients (6.66%) out of all three groups had poor results. Satisfactory results were achieved with all three treatment methods. Although it also showed that there was no statistically significant difference in outcome of any of the three modalities.

### Conclusion

As all three treatment modalities are at par on comparison of their treatment outcome, there was no preference to what modalities should be preferred over another. Since conservative methods involve less invasive treatment, it should be tried first before shifted to another modalities.

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