

**Comparison of local injection of autologous platelet rich plasma (PRP) and local steroid in reducing pain and improving function in patients with chronic plantar fasciitis**

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**Abstract**

**Background:** Comparison of local injection of autologous platelet rich plasma (PRP) and local steroid in reducing pain and improving function in patients with chronic plantar fasciitis

**Methods:** The present study includes subjects with a primary diagnosis of chronic plantar fasciitis .The recruited subjects were randomly allocated into two treatment groups . One is PRP group :-These patients were treated with single injection of 3ml autologous PRP injection locally and another is Steroid group. These patients were treated with single injection of methylprednisolone acetate 40 mg/ml ,2 cc locally. All the patients were evaluated for pain relief and functional status at 4 weeks, 3 months and 6 months on the basis of Visual Analogue Scale (VAS), Roles-Maudsley Subjective Pain scale (RMSPS) and Ankle-Hind Foot Scale (AHFS). Additionally, a clinical history and examination was conducted to asses for local and systemic complications.

**Results:** Initial scores were taken before the intervention and then the patients were evaluated at one, three and six months interval with the same scoring system. Pre intervention VAS, AHFS and RMSPS scores showed no statistically significant difference. At six months follow-up there was statistically significant difference between the two groups on the basis of VAS, AHFS and RMSPS score. It was found that autologous PRP had better results as compared to steroid group at long term follow-up.

**Conclusion:** We conclude that local injection of autologous platelet rich plasma is found more effective and durable in relieving pain and improving function than local injection of steroid in treatment of chronic plantar fasciitis.

**Keywords:** Autologous platelet rich plasma, Steroids, Plantar fasciitis.

**Introduction**

Plantar fasciitis is an inflammation and degeneration of the plantar fascia at the bottom of foot which is most

common cause of plantar heel pain<sup>(1)</sup>. Heel pain is the most common cause for presentation<sup>(2)</sup>. Approximately 10% of the population will experience heel pain in their life<sup>(3)</sup>. The pain is generally localized at the medial calcaneal tubercle. In the beginning the pain is sharp and typically on the first step of the day or after a period of rest. In the chronic phase, pain is continuous and dull in nature<sup>(4)</sup>. It is probably initiated by repeated micro trauma. The inflammation is never acute and in chronic cases, in fact, there is a loss of inflammatory response and a scar formation<sup>(5)</sup>.

Plantar fasciitis is generally a self limiting condition. Symptoms in 80 to 90% of cases recover within 10 months<sup>(6)</sup>. However, this process may be problematic for both patient and the physician. Due to the natural course of the disease, the majority of treatment alternatives are nonsurgical. Numerous methods have been advocated for treating plantar fasciitis including rest, NSAIDs, night splints, foot orthosis, stretching protocols and ESWT (Extra Corporeal Shock Wave Therapy) and steroid injections. Local steroid injections are a popular method of treating the condition<sup>(5)</sup>. Today, there is no effective non-surgical treatment option for plantar fasciitis. Ideal nonsurgical treatment for plantar fasciitis should be as effective as other treatment options with minimal complications<sup>(7)</sup>.

Platelet rich plasma (PRP) is promoted as an ideal autologous biological blood-derived product, which can be exogenously applied to various tissues. When platelets become activated, growth factors are released and initiate body's natural healing response<sup>(5)</sup>. PRP applied to the wound area accelerates the physiological healing process, provides support for the connection of cells, reduce pain and has anti inflammatory and antibacterial effects<sup>(6)</sup>.

## **Materials And Methods**

**Study Area:** Dept. Of Orthopedics, Sawai Man Singh Hospital, Jaipur

**Study Design:** Prospective randomized comparative study

**Study duration-** One year, April 2018 or approval by ethical committee to June 2019 or till the sample size is achieved (whichever is earlier).

**Study Universe:** Patients who attended Department of Orthopaedics in SMS Medical College & attached Hospital, Jaipur with chronic plantar fasciitis.

### **Inclusion Criteria**

1. Patients between age group of 18 to 60 years presenting with complaints of plantar heel pain, worse with rising in morning and/or after periods of sitting or lying presenting for 3 months or more .
2. Patients with maximal tenderness at the attachment of the plantar fascia on the medial tubercle of the calcaneum.
3. Willingness to participate in an investigational technique and follow-up with written consent.
4. Willingness to forgo any other concomitant conservative treatment modality; NSAIDS and orthotic devices during the study period.

### **Exclusion Criteria**

1. Previous surgery for heel pain.
2. Hb value less than 11 gm/dl and thrombocyte count less than 150000/mm<sup>3</sup>.
3. Previous treatment: Corticosteroid injection in the last 6 months or NSAIDS treatment within last 7 days.
4. Achilles tendon pathology.
5. Systematic diseases like inflammatory or degenerative polyarthritis, diabetes mellitus, local or systematic infection, peripheral vascular

diseases, metabolic disease, such as gout, clotting disorder, anticoagulation therapy.

6. Pregnant or breastfeeding female patients.

### Method

After taking clearance from ethical committee, patients were selected according to inclusion and exclusion criteria. Informed written consent were taken from every patient who agreed to follow instructions and recommendation given by the clinician. Patient biography, detailed history, and clinical examination were obtained.

All the fresh cases were initially treated with contrast bath, foot stretching exercises, silicon heel pad and NSAIDs for 3 months. The patients who were not improved with initial treatment, were explained about the autologous PRP injection and steroid injection.

Patients were be randomly (chit and box methods) allocated in two groups.

Group PRP :-These patients were treated with single injection of 3ml autologous PRP injection locally.

Group Steroid : -These patients were treated with single injection of methylprednisolone acetate 40 mg/ml, 2 cc locally.

### Platelets-Rich Plasma

#### Preparation Method

A total of 20 ml of a patient own venous blood was taken from the anticubital region under aseptic conditions and collected in centrifuge vials. These vials were preloaded with anticoagulant acid citrate dextrose.

This blood was centrifuged at 1600 rpm for 6 minutes. The blood was separated into lower part [RBC rich] and upper part [plasma and buffy coat]. Lower RBC rich part was discarded and upper part centrifuge at 2000 rpm for 6 month, the blood was then separated into platelet poor plasma (PPP) [upper 2/3<sup>rd</sup>] and PRP

[lower 1/3<sup>rd</sup>]. The PPP was extracted and discarded. The resulting platelets concentrate contains approximately 4 to 6 times the concentration compared to baseline whole blood. The PRP samples were (in some case) send to pathology lab to know the concentration of platelets.

### Statistical Analysis

The data was compiled in MS Excel in the form of master chart. The data was analysed using SPSS PASW 22.0 trial version as per aim & objective. Inference were be drawn with the use of appropriate statistical test and method (chi square test for qualitative data & unpaired t test for quantitative data). For significance 0.05 was considered as cut off point.

### Observations and Results

The present study includes subjects with a primary diagnosis of chronic plantar fasciitis .The recruited subjects were randomly allocated into two treatment groups . One is PRP group :-These patients were treated with single injection of 3ml autologous PRP injection locally and another is Steroid group. These patients were treated with single injection of methylprednisolone acetate 40 mg/ml ,2 cc locally. All the patients were evaluated for pain relief and functional status at 4 weeks, 3 months and 6 months on the basis of Visual Analogue Scale (VAS), Roles-Maudsley Subjective Pain scale (RMSPS) and Ankle-Hind Foot Scale (AHFS). Additionally, a clinical history and examination was conducted to asses for local and systemic complications. This study was conducted in the Department of Orthopaedics, Sawai Man Singh Medical Collge and attached Hospitals, Jaipur. The study comprised of 118 patients with 59 patients in Steroid group and 59 patient in PRP group.

**Table 1: Sex wise distribution of patients of plantar fasciitis**

		Group				Total
		Steroid		PRP		
		N	%	N	%	
Sex	Male	31	53%	29	49%	60
	Female	28	47%	30	51%	58
Total		59	100%	59	100%	118
P value (chi sq)		0.713				

Out of 118 patients evaluated, 58 patients were female and 60 patients were male .Sex ratio was found statistically similar (p value =0.713 in both the groups).

**Table 2: Comparison of patients of Chronic Plantar Fasciites on basis of VAS score of PRP and Steroid group**

Parameter	Steroid group (n=59)		PRP group (n=59)		P-Value	Interpretation
VAS (0-10)	Mean ± SD		Mean ± SD			
Pre-injection	9.14	0.832	9.20	0.776	0.637	Not significant
At one month	4.59	1.194	5.46	1.046	0.0001*	Significant
At three month	3.15	1.273	3.05	0.891	0.622	Not significant
At Six month	2.81	1.383	1.15	0.798	0.0001*	Significant

VAS: Visual Analogue Scale

The VAS score was calculated for the both study group prior to the intervention and after the intervention at three different time frames at one month, three months and six months. The VAS score mean ± SD were compared using the t-test of independent means at four time frames. The p-value was found 0.637 at pre intervention in VAS score. This p value was not statistically significant. The p value was statistically significant (p value=0.0001) when the mean ± SD of the VAS score was compared at six month of followup

which proved that PRP is better analgesic as compared to steroid on long term follow up. The p value was found 0.0001 at one month follow up and p value was 0.622 at three month follow up. At one months of follow up steroid provide better pain relief as compared to PRP and at three months follow up there was no statistically difference in both groups.

**Table 3: Comparison of patients of Chronic Plantar Fasciites on basis of AHFS score of PRP and Steroid group**

Parameter	Steroid group (n=59)		PRP group (n=59)		P-Value	Interpretation
AHFS Score	Mean ± SD		Mean ± SD			
Pre-injection	52.83	3.599	53.71	4.606	0.251	Not significant
At one month	77.39	2.951	77.68	3.346	0.619	Not significant
At three month	83.63	4.977	86.74	4.564	0.0001*	Significant
At Six month	85.25	8.410	95.37	5.683	0.0001*	Significant

AHFS: Ankle Hind Foot Scale

The AHFS score was calculated for the both study group prior to the intervention and after the intervention at three different time frames at one month, three month and six months. The AHFS score mean ± SD were compared using the t-test of independent means at four time frames. The p value was found 0.0001 at three and six months. The p value was statistically significant when the mean ± SD of the AHFS score was compared at six months of follow up which proved that PRP has better results as compared to steroid on long term follow up.

Table 4: Comparison of patients of Chronic Plantar Fasciites on basis of RMSPS score of PRP and Steroid group

Parameter		Steroid group (n=59)				PRP group (n=59)				P-Value
RMSPS Score		E	G	F	P	E	G	F	P	
Pre-injection	No. of Patients	0	0	2	57	0	0	3	56	0.501
	Percentage	0.00%	0.00%	3.39%	96.61%	0.00%	0.00%	5.08%	94.92%	
At Six month	No. of Patients	15	28	16	0	40	19	0	0	0.001
	Percentage	25.42%	47.46%	27.12%	0.00%	67.80%	32.20%	0.00%	0.00%	

RMSPS: Roles Maudsley Subjective Pain Scale. E=Excellent, G=Good, F= Fair, P=Poor

On comparison of patients of Chronic Plantar Fasciitis on basis of RMSPS score of PRP and Steroid group, initially in steroid group 96.61% patients had poor functional status and in PRP Group 94.92 % patients had poor functional status and p value was 0.501 that was not statistically significant. After 6 months follow-up 25.42% patients had excellent functional status in steroid group and 67.80 % patients had excellent functional status in PRP group and p value was 0.001 and value of chi square test was 29.087. p value was statistically significant so its proved that PRP group has shown significant pain relief and better functional status than the steroid group.

**Discussion**

The present study entitled “Comparison of local injection of autologous platelet rich plasma with corticosteroids in management of chronic plantar fasciitis in term of clinical and functional outcome” was conducted in the Department of Orthopaedics, Sawai Man Singh Medical College & attached Hospital, Jaipur. A total of 118 patients were included in this study. Patients were randomly allocated into two interventional group –Steroid group and PRP group. Both groups were similar in terms of age, gender, side, residence, type of footwear and baseline VAS, AHFS and RMSPS scores.

In this study pre injection pain and function scores of two groups i.e. steroid and PRP were found to be comparable .The mean VAS before intervention in the steroid group was 9.14±0.832 while in PRP group was 9.20±0.776 with a p value of 0.637 which was not significant. Similar observation was made by Say Ferhat et al., in their study pre intervention mean VAS was 8.7±0.9 and 8.8±1 in steroid and PRP group respectively.<sup>(7)</sup>

Mean AHFS score pre intervention in steroid and PRP group were 52.83±3.599 and 53.71±4.606 respectively with a p value of 0.251 which was not significant . Similar observation was made by Say Ferhat et al. mean AHFS was 60.1±5.7 and 62.9±8.5 in steroid and PRP group respectively.<sup>(7)</sup>

Prior to intervention on RMSPS score 96.61% patients had poor functional status and 3.39% patients had fair functional status in steroid group and 94.92 % patients had poor functional status and 5.08 % patients had fair functional status in PRP group with p value of 0.501 (chi square test =0.209) which was not significant.

At the first follow- up i.e. at one month the mean VAS in the steroid group was 4.59±1.194 while in PRP group was 5.46±1.046 with a p value of 0.0001 which

was significant but at this stage results of steroid group is better than PRP group.

At the second follow-up i.e. at three months, the mean VAS in the steroid group was  $3.15 \pm 1.273$  while in PRP group was  $3.05 \pm 0.891$  with a p value of 0.622 which was not significant. This showed that both steroid and PRP group had similar response in short term follow-up. Similar result was obtained by Dr. Paresh Vilasrao Patil et. al. They found that at three month follow-up the mean VAS in the steroid group was  $0.90 \pm 1.53$  while in PRP group was  $0.76 \pm 0.85$  with p value of more than 0.05 which was not significant.<sup>(5)</sup>

At the six months of the intervention the mean VAS in the steroid group was  $2.81 \pm 1.383$  while in PRP group was  $1.15 \pm 0.798$  with p value of 0.0001 which was statistically significant. Similar results was found by Say Ferhat et.al., they found that the mean VAS in the steroid group was  $2.61 \pm 0.9$  while in PRP group was  $1 \pm 0.8$  with a p value of less than 0.0001 which was significant<sup>(11)</sup> and by Dr. Paresh Vilasrao Patil et. al. they found that the mean VAS in the steroid group was  $1.03 \pm 1.77$  while in PRP group was  $0.33 \pm 0.71$  with p value of less than 0.05 which was statistically significant.<sup>(5)</sup>

At six month follow-up on RMSPS score, 27.12% patients had fair, 47.46% patients had good, 25.42% patients had excellent functional status in steroid group and 32.20 % patients had good and 67.80 % patients had excellent functional status in PRP group with p value of 0.0001 ( chi square test =29.087) which was statistically significant. The similar results was found by Patil P.V. et. al. at one year follow-up, they found on RMSPS score, 6.67% patients had fair, 20% patients had good, 73.33% patients had excellent functional status in steroid group and 3.33 % patients had good and 96.67 % patients had excellent functional status in

PRP group with p value of less than 0.05 (chi square test =6.53) which was statistically significant.<sup>(5)</sup>

### Conclusion

There was gradual improvement in both the groups post interventionally and 67.80% patients who received the PRP injections got excellent results at the end of treatment and 25.42% patients who received the Steroid injections got excellent results at the end of treatment. At the end of six months the scores (VAS, RMSPS, AHFS) of the two groups were statistically significant. We conclude that local injection of autologous platelet rich plasma is found more effective and durable in relieving pain and improving function than local injection of steroid in treatment of chronic plantar fasciitis.

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