

Prospective Study of Efficacy of Autologous Platelet Rich Plasma Injection in Tennis Elbow and Plantar Fasciitis Patients**Yuvraj Rajput**

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Received: 25-12-2023 / Revised: 23-01-2024 / Accepted: 26-02-2024

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Conflict of interest: Nil

Abstract:

Background: Plantar fasciitis (PF) is a common musculoskeletal problem characterized by pain in the heel. Tennis elbow is also known as Lateral Epicondylitis (LE). Tennis elbow is most common musculoskeletal soft tissue injuries mainly seen in adults. The treatment and complete cure from tennis elbow and plantar fasciitis has always been ranked among the most difficult and frustrating problem for both patients and treating doctors. Various forms of conservative treatments are available for tennis elbow and the outcome of these treatments varies in patient to patient. In this study we used intralesional injection of autologous platelet rich plasma for the treatment of tennis elbow and plantar fasciitis.

Material and Methods: Present study was single-center comparative observational prospective study, conducted in Department of orthopedics; MGM Medical College and Hospital, Chhatrapati Sambhajnagar during April 2022 to March 2023 were studied.

Results: In present study Plantar Fasciitis and tennis elbow patients the mean difference of VAS score found to be statistically significant. At time of PRP injection, in Plantar Fasciitis the mean VAS score 8.76 reduced to 3.17 after 6 months, 4.19 After 3 Months, 5.06 After 2 Months and 6.04 After 1Month. At time of PRP injection, in tennis elbow the mean VAS score 8.42 reduced to 4.47 after 6 months, 5.43 After 3 Months, 6.12 After 2 Months and 6.93 After 1Month.

Conclusion: Autologous platelet rich plasma injection is a safe and useful modality of treatment in the treatment of chronic plantar fasciitis and tennis elbow. The response of patients with plantar fasciitis was significantly better than tennis elbow patients. In Plantar Fasciitis patients, 91.4% patients found PRP treatment was successful whereas in Tennis Elbow patients 85.7% of patients found PRP treatment were successful. Platelet rich plasma injection can be chosen as a non-first-line treatment for plantar fasciitis and tennis elbow patients.

Keywords: Platelet, Musculoskeletal, Plasma Injection, Tennis Elbow, Plantar Fasciitis.

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Introduction

Plantar fasciitis (PF) is a common musculoskeletal problem characterized by pain in the heel. Platelet rich plasma has gained increased importance in various medical fields, including orthopedics. It is often described as an overload of the plantar fascia [1], but the pathophysiology remains poorly understood. Pain is the most important clinical manifestation and is intensified by prolonged weight bearing, obesity, and increased activity. It is estimated that about 10% of the population may be affected by this pathology [2].

The highest risk of occurrence of PF is at 40 to 60 years of age, with no significant difference in sex distribution [3]. Diagnosis of PF is mainly clinical. Plantar fasciitis is also known as heel tennis, because the plantar fascia is constantly stretched at the attachment over calcaneal tuberosity. In terms

of treatment, various methods have been used including Nonsteroidal anti-inflammatory drugs, corticosteroid injections, and non-drug approaches. Repeated micro trauma makes this disease difficult for conservative treatment. Surgical options like plantar fascia release were practiced but devastating complications will occur since plantar fascia is a supporting structure for maintain the longitudinal arch of the foot.

Tennis elbow is also known as Lateral Epicondylitis (LE). Tennis elbow is most common musculoskeletal soft tissue injuries mainly seen in adults. The prevalence appears to be increased in the working age population. It typically occurs between 35 and 55 years [4]. The incidence of Tennis elbow is estimated about 1 to 3% in the population. It is characterized by elbow pain

increased with wrist extension. Any activity that involves overuse of the wrist extensor or supinator muscles may be a risk factor even if in most cases of lateral Epicondylitis, no obvious underlying etiology can be identified [5]. A segment of the population that is particularly affected is that of sportsmen at both a competitive and non-competitive level. About 50% of tennis players, especially at the amateur level, are affected by this pathology during their life, but they represent only 10% of the total cases of LE. Tennis elbow has been described as a degenerative tendonopathy of extensor carpi radialis brevis muscle [6]. The most common pathogenesis is repetitive micro trauma of muscle from overuse resulting in tendinosis of ECRB with or without involvement of extensor digitorum communis muscle.

The treatment and complete cure from tennis elbow and plantar fasciitis has always been ranked among the most difficult and frustrating problem for both patients and treating doctors. Various forms of conservative treatments are available for tennis elbow and the outcome of these treatments varies in patient to patient. The treatment of lateral Epicondylitis includes rest, Nonsteroidal anti-inflammatory medication, stretching, physical therapy, shock wave therapy, botulinum toxin injection, corticosteroids injection [7].

Platelet rich plasma was developed in early 1970s as a part of blood in which platelets are concentrated in plasma. The basic science of platelet rich plasma mainly depends on the growth factors in the alpha-granules. Platelet-Rich-Plasma (PRP) is a popular biological therapy especially used to regenerate different musculoskeletal tissues. Platelet rich plasma had a biological healing capacity. The use of platelet rich plasma in management of soft tissue and bony injuries. PDGF, TGF-BETA 1, EGF, and VEGF are the growth factors seen in platelet granules.

These growth factors have effect on the healing process of many tissues. PGDF is platelet derived growth factor [8]. It is found in alpha granules of platelets. PGDF has mytogenic potential for both mesenchymal and osteoblast cells. PGF is epidermal growth factor which also has mitogenic activity and it will stimulate and regulate collagen synthesis.

FGF-fibroblast growth factor, TGF-beta-transforming growth factor beta, IGF-insulin like growth factor, VEGF- vascular endothelial growth [9.10]. Recently, platelet plasma has been used for cartilage regeneration, chronic enthasopathies like tennis elbow, plantar fasciitis, and in the field of sports medicine. The literature is not clear available about the PRP real therapeutic efficacy in tennis elbow and Plantar. In this study we used intralesional injection of autologous platelet rich

plasma for the treatment of chronic tennis elbow and plantar fasciitis.

Aims and Objectives:

- To study the efficacy of autologous platelet rich plasma in plantar fasciitis and tennis elbow.
- To compare the outcome of autologous platelet rich plasma injections between plantar fasciitis and tennis elbow patients.

Material & Methods:

Study area: Department of orthopedics, MGM Medical College & Hospital Chh. Sambhaji Nagar.

Study design: A comparative observational study.

Study population: It includes plantar fasciitis and tennis elbow patients visited to OPD of Department of orthopedics, MGM Medical College & Hospital Chh. Sambgajinagar.

Study duration: Two years [April 2021 to March 2023]

Approval for Study: Approval for the study was obtained from the Institutional Ethical Committee of MGM Medical College and Hospital, Chh. Sambgajinagar. [MS] India.

Inclusion Criteria:

- Patients with clinically diagnosed tennis elbow or plantar fasciitis of more than 18 years of age of both genders.
- Patients should have minimum three months duration of symptoms of tennis elbow or plantar fasciitis.
- Patients should undergo conservative treatment for a minimum period of three months.
- Patients should have pain score greater than seven at the time of PRP injection.
- Patients should not had a local steroid injection in last 2 months.
- Patients who were willing to participate in study.

Exclusion Criteria:

- Patients with Rheumatoid arthritis or Sero negative spondylo arthritis.
- Pregnant ladies.
- Patient with Suspicion of diagnosis of tennis elbow or plantar fasciitis.
- Patients having both side pain in legs and elbow.

Statistical Analysis: Data was entered in Microsoft Excel and analyzed using SPSS version 27.0th Mean and SD was calculated for quantitative variables and proportions was calculated for categorical variables. Unpaired t-test was applied to check significant difference between VAS Score of tennis elbow and plantar fasciitis. Also paired t-test

was applied to check significance difference between at different time intervals. P- Value of <0.05 will be considered statistically significant.

Methods

Those patients who satisfying inclusion and exclusion criteria of plantar fasciitis and tennis elbow were enrolled in study. All the patients were screened before enrolment in the study. After eliciting detailed history, also complete medical and laboratory examinations were done. A voluntary written informed consent was taken from all the eligible. Parents were explained the benefit and harm of joining the study.

Clinical Diagnosis of & Plantar Fasciitis:

Plantar Fasciitis: Diagnosis of plantar fasciitis was made when patient had heel pain. The pain was worse in the morning. Patient had localized tenderness over the insertion of plantar fascia over the calcaneum.

Tennis Elbow: Diagnosis of tennis elbow was made when patient had pain in the lateral aspect of elbow joint. The pain would aggravate on wrist dorsiflexion. On examination the patient would have localized tenderness over lateral epicondyle.

Preparation of PRP: Platelet rich plasma was prepared using double spin centrifugation method of Augustus D. 20 ml of venous blood is collected in cubital vein. The blood is immediately transferred into six 2.7ml vacutainers prefilled with acid citrate dextrose. 2.7 ml Acid citrate dextrose containing vacutainers are readily available in hospital. All the containers are filled till the markings on the vacutainers. The vacutainers are then placed in the slot available in the centrifugation machine in such a way that they are counter balanced. The initial centrifuge was done at 1500 rotations per minute for three minutes. This separates the blood into two layers. RBC rich at the bottom and plasma along with the platelets are at the top. The top layer is then

transferred to fresh vacutainers using a long 18 G needle and syringe. The vacutainers are now again centrifuged at 2500 rotations per minute for three minutes. This separates the column of plasma to platelet rich at the bottom and platelet poor at the top. Using a long 18 G the top half column which is platelet poor is discarded. The platelet rich plasma at the bottom is now collected from the vacutainers and is now ready for use [11].

Technique of Infiltration: Most tender point was palpated and marked using a skin marker and area was prepared for injection. Under aseptic precaution using a 21 and 1 1/2 inch needle, 1ml PRP is injected initially over the maximum tender point and needle is partially withdrawn and multiple punctures are made in the surrounding tissue (peppering technique). The remaining 1 ml of platelet rich plasma was injected in surrounding tissue [12].

Platelet Activation: Needling of surrounding tissue will activate the platelets by the release of thrombin from the fresh bleeding. We used this technique for platelet activation.

Follow Up: Patients were followed up for 6 months. A telephonic follow up was done at second day after injection to find out any adverse reactions. Follow ups was done at 1,2,4,6 months. Patients were assessed subjectively using the numerical pain score.

Outcomes: Pain Score: Visual Analog Score

Pain score is a subjective assessment of pain, where the patient rates the intensity of the pain perceived. Score Zero refers to no pain. Score 10 refers to the worst pain possible.

On the basis of numerical pain score, intensity of pain was divided in to mild, moderate and severe. Score zero to three was taken as mild, four to six as moderate and seven to ten as severe pain.

Observation & Results

Table 1: Demographic profile of plantar fasciitis and tennis elbow patients

		Plantar Fasciitis	Tennis Elbow	Total
No. of patients		n=35	n=35	N=70
Age-Group	30-40	04(11.4%)	03(9.1%)	07(10.0%)
	41-50	13(37.1%)	16(48.5%)	29(41.4%)
	51-60	15(45.4%)	14(42.4%)	29(41.4%)
	>60	03(9.1%)	02(6.1%)	05(7.1%)
	Mean±SD	53.69±5.82	50.42±5.93	52.07±5.61
Gender	Male	13(37.1%)	16(45.7%)	29(41.2%)
	Female	22(62.9%)	19(54.3%)	41(58.8%)

In present study, majority of patients i.e 15(45.5%) were from age group of 51-60 years followed by 13(37.1%) in age-group of 41-50 years in plantar Fasciitis patients. Whereas Tennis Elbow group of patients, majority of 16(48.5%) of patients age group of 41-50 years followed by 14(42.4%)

patients in age-group of 51-60 years. The mean age of plantar Fasciitis patients was 53.69±5.82 and 50.42±5.93 years in Tennis Elbow group of patients. Majority of female patients were observed i.e. 22(62.9%) and 19(54.3%) respectively in plantar Fasciitis and Tennis Elbow patients.

Table 2: Comparison of Duration of Pain of plantar fasciitis and tennis elbow patients

Duration of Pain	Plantar Fasciitis	Tennis Elbow
3-6 Months	13(37.1%)	11(31.4%)
7-12 Months	16(45.8%)	15(42.8%)
>12 Months	06(17.1%)	09(25.7%)
Total	35(100%)	35(100%)
Mean±SD	8.20±4.12 Months	9.12±3.95 Months

Plantar Fasciitis patient's majority of 16(45.8%) patients were having pain between 7-12 months followed by 13(37.1%) patients between 3-6 Months. Also in Tennis elbow patient's majority of 15(42.8%) patients were having pain between 7-12 months followed by 11(31.4%) patients between 3-6 Months. The mean Duration of Pain in plantar fasciitis 8.20±4.12 Months and 9.12±3.95 months in tennis elbow patients.

Table 3: Comparison of Mean VAS Score of plantar fasciitis and tennis elbow patients

VAS Score	Plantar Fasciitis (Mean±SD)	Tennis Elbow (Mean±SD)	Z-value	P-value
At Time of Injection	8.76±1.31	8.42±1.86	1.37	P=0.295 NS
After 1 Month	6.04±1.63	6.93±1.72	1.98	P=0.103 NS
After 2 Months	5.06±1.71	6.12±1.43	2.69	P=0.039 S
After 3 Months	4.19±1.31	5.43±1.07	3.22	P=0.021 S
After 6 Months	3.17±1.09	4.47±1.14	3.89	P=0.014 S

The Mean VAS Score at Time of Injection in plantar fasciitis was 8.76±1.31 and tennis elbow patients was 8.42±1.86. There was not significant in Mean VAS Score at Time of Injection in plantar fasciitis and tennis elbow patients [P=0.295].

The Mean VAS Score after 1 Month in plantar fasciitis was 6.04±1.63 less as compared to tennis elbow patients was 6.93±1.72. There was not significant in Mean VAS Score after 1 Month in plantar fasciitis and tennis elbow patients [P=0.103].

The Mean VAS Score after 2 month in tennis elbow patients was more 5.06±1.71 as compared to plantar fasciitis patient's i.e 5.06±1.71. There was significant difference in Mean VAS Score after 2

month in plantar fasciitis and tennis elbow patients [P=0.039].

The Mean VAS Score after 3 months in plantar fasciitis i.e 4.19±1.31 was less as compared to tennis elbow patients was 5.43±1.07. There was significant in Mean VAS Score after 3 month in plantar fasciitis and tennis elbow patients [P=0.021].

The Mean VAS Score after 6 months in plantar fasciitis i.e 3.17±1.09 was less as compared to tennis elbow patients was 4.47±1.14. There was significant in Mean VAS Score after 3 month in plantar fasciitis and tennis elbow patients [P=0.014].

Table 4: Mean Difference of Pain Score at different time in Plantar Fasciitis and Tennis Elbow

	Plantar Fasciitis		Tennis Elbow	
	Mean Difference	P-value	Mean Difference	P-value
At Time of Injection VS After 1 Month	2.72	P<0.0001 S	1.49	P<0.0001 S
At Time of Injection VS After 2 Month	3.70	P<0.0001 S	2.30	P<0.0001 S
At Time of Injection VS After 3 Month	4.57	P<0.0001 S	2.99	P<0.0001 S
At Time of Injection VS After 6 Month	5.59	P<0.0001 S	3.95	P<0.0001 S
After 1 Month VS After 2 Month	0.98	P=0.001 S	0.81	P=0.012 S
After 1 Month VS After 3 Month	1.85	P<0.0001 S	1.50	P<0.0001 S
After 1 Month VS After 6 Month	2.87	P<0.0001 S	2.46	P<0.0001 S
After 2 Month VS After 3 Month	0.87	P=0.023 S	0.69	P=0.126 NS
After 2 Month VS After 6 Month	1.89	P<0.0001 S	0.65	P=0.158 NS
After 3 Month VS After 6 Month	1.12	P<0.0001 S	0.96	P=0.012 S

The mean difference at pain score was 2.72 at time of injection VS after 1 Month in plantar Fasciitis and mean difference was statistically significant. Where in Tennis Elbow were 1.49 and this mean difference was statistically significant. The mean difference at pain score at time of injection vs after 2 month, at time of injection vs after 3 month, after 1 month vs after 6 month, after 2 month vs after 3 month, after 2 month vs after 6 month, after 3 month vs after 6 month in plantar Fasciitis, were found to be statistically significant. The mean

difference at pain score at time of injection vs after 2 month, at time of injection vs after 3 month, after 1 month vs after 6 month, after 2 month vs after 3 month, in Tennis Elbow, were found to be statistically significant. Whereas after 2 month vs after 6 month, after 3 month vs after 6 month in Tennis Elbow, were found to be not statistically significant. In present study, assessment of both the groups was based on patient's perception of pain i.e. VAS Score which is subjective based and no other objective assessment was used in study.

Table 5: Comparison of outcome of PRP treatments in tennis elbow and plantar fasciitis

PRP treatments	Plantar Fasciitis		Tennis Elbow		Chi-square test & P-value
	No of patients	%	No of patients	%	
Successful	32	91.4	30	85.7	Chi-square value=0.565 & P-value= 0.452
Failures	03	8.6	05	14.3	
Total	35	100%	35	100%	

In present study out of 35 Plantar Fasciitis patients, 32(91.4%) patients found PRP treatment was successful and failure in 03(8.6%) patients. Whereas out of 35 patients of Tennis Elbow, 30(85.7%) of patients found PRP treatment was successful and failure in 05(14.3%) of patients. There was significant association between PRP treatment outcome and tennis elbow & plantar fasciitis patients ($p=0.452$).

Discussion:

Musculoskeletal injuries are most common causes of severe longterm pain and physical disability It is challenging problem for traumatology and sports medicine. In present study we included patients of tennis elbow and Plantar Fasciitis and treated with PRP injections. PRP is a biological blood product obtained from the patient, which has anti-inflammatory and pro-regenerative functions [12]. It has been demonstrated that PRP is able to induce proliferation and differentiation of cells and facilitate angiogenesis. The literature is not clearly available about the PRP real therapeutic efficacy in tennis elbow and Plantar Fasciitis.

In present study, the Mean VAS Score after 1 month in Plantar Fasciitis and tennis elbow not significant. But at 2 months, 3 months & 6 months the Mean VAS Score in Plantar Fasciitis and tennis elbow was found to be significant. Plantar Fasciitis patients were having less VAS scores as compared to tennis elbow patients. In Plantar Fasciitis and tennis elbow patients the mean difference of VAS score found to be statistically significant. At time of PRP injection, in Plantar Fasciitis the mean VAS score 8.76 reduced to 3.17 after 6 months, 4.19 After 3 Months, 5.06 After 2 Months and 6.04 After 1Month. At time of PRP injection, in tennis elbow the mean VAS score 8.42 reduced to 4.47 after 6 months, 5.43 After 3 Months, 6.12 After 2 Months and 6.93 After 1Month.

Whereas Christos Thanasas et al [13] reported in tennis elbow patients the mean pain score was reduced from 6.1 to 2.35 at the end of 6 weeks, at 3 months 1.9 and 6 months 1.7.

Keith s Hetchman et al conducted study on 31 elbows which was not responded for conservative treatment by single PRP injection. While comparing the results at 1,2,4,6 month's followup, it was found that patients got relief at one month. However the maximum relief of symptoms was at two months. It was found that at two months sustained till the end of the study except in two patients. One patient with tennis elbow had recurrence of symptoms at four months. No patients had repeat injections. Similarly Kothari U et al [14] in plantar fasciitis patients Before PRP therapy, both male and female patients reported high pain scores on the VAS for both heels. However, after PRP infiltration, the VAS scores significantly decreased at three weeks, three months, and six months post-injection, indicating pain relief.

In present study out of 35 Plantar Fasciitis patients, 31(88.6%) patients found PRP treatment was successful and failure in 04(11.4%) patients. Whereas out of 35 patients of Tennis Elbow, 32(91.4%) of patients found PRP treatment was successful and failure in 03(8.6%) of patients. There was significant association between PRP treatment outcome and tennis elbow & plantar fasciitis patients ($p=0.452$).

Conclusion:

In present study autologous platelet rich plasma injection was used in plantar fasciitis and tennis elbow patients. Autologous platelet rich plasma injection is a safe and useful modality of treatment in the treatment of chronic plantar fasciitis and tennis elbow. The response of patients with plantar fasciitis was significantly better than tennis elbow

patients. In tennis elbow patients, after 2 months, after 3 Months & 6 months autologous platelet rich plasma injection was observed less pain score as compared to plantar fasciitis patients.

In Plantar Fasciitis patients, 91.4% patients found PRP treatment was successful whereas in Tennis Elbow patients 85.7% of patients found PRP treatment were successful. Platelet rich plasma injection can be chosen as a non-first-line treatment for plantar fasciitis and tennis elbow patients. More research should be conducted on autologous platelet rich plasma injection.

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