

# Clinical Effects of Autologous Platelet Rich Plasma in Tennis Elbow

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## Abstract

**Background:** Platelet rich plasma has shown a major role in general stimulation for repair of soft tissue inflammatory diseases. Lateral epicondylitis is one of the most common clinical problems responsible for seeking medical advice especially in the sports clinic setting. This study was undertaken to evaluate the efficacy of local infiltration of non-activated Platelet Rich Plasma in chronic Tennis elbow.

**Material and Methods:** This Prospective study for assessment of clinical effect of platelet rich plasma in tennis elbow was conducted from September 2013 to June 2014. Total 46 patients came with the complain of elbow pain in outpatient department were managed with ultrasound guided platelet rich plasma infiltration at the site of pain.

**Results:** Male patients from 2nd and 3rd decade were mostly involved Age wise distribution shows second and third decade to have this data was taken for the patients only included in the current study. Most of our male patients were farmer or laborer whereas female were housewives. Students were also involved in our study. Dominant side was involved in 72% of the patients. Mean VAS score was improved at the end of follow up significantly.

**Conclusion:** Platelet rich plasma can be an effective mode of treatment of chronic lateral epicondylitis.

**Keywords:** Lateral Epicondylitis; Platelet Rich Plasma; Effectiveness

**Abbreviations:** ECRB: Extensor Carpi Radialis Brevis; PDGF: Platelet-Derived Growth Factor; bFGF: Basic Fibroblast Growth Factor

## Introduction

Lateral epicondylitis, or “tennis elbow,” is a frequently reported condition in medical care. The complaint is characterized by pain over the lateral epicondyle of the humerus, which is aggravated with resisted dorsiflexion of the wrist. The incidence in general practice is approximately 4 to 7 per 1000 patients per year with an annual incidence of 1% to 3% in the general population [1].

Although epicondylitis is a term often used to describe this condition, most studies reporting on the histopathologic findings have shown the evidence of common extensor tendinosis or tear.

Affected lesion could be common extensor tendon, extensor Carpi radialis brevis (ECRB), or radial collateral ligament. Although the exact pain generating mechanism of common extensor tendinosis is not clear, it is evident that affected tendons have undergone a process of mucoid degeneration,

tearing. In addition to losing their parallel orientation in disorganized arrays of collagen fibers, angiofibroblastic change and nociceptive proliferations are noted in symptomatic tennis elbow.

Given that the underlying processes are mucoid degeneration of the tendon with infiltration of scar tissue and tendon tearing, it may be that the structural changes in the tendon itself somehow lead to the production of pain. Pain may be due to irritation of mechanoreceptors by traction or shear forces or activation of non-receptive receptors by neurotransmitters such as substance P [1].

PRP is created from an autologous whole blood sample through a platelet separation process, which results in an increased platelet concentration compared with the original whole blood sample [2]. It is theorized that when PRP is injected into an area of tendinopathy, the platelets release a multitude of growth factors and stimulate a healing response [3].

Platelet released supernatants resulted in a stimulation of cell proliferation in periosteal explants. Gel chromatographic analysis revealed the highest mitogenic activity of basic fibroblast growth factor (bFGF) and platelet-derived growth factor (PDGF) factors that released from activated platelets. FGF is pleiotropic in its effects and its clinical effectiveness may depend on other factors present at the implantation site. Like all growth factors in the classic sense, specific sequences of extracellular proteins may also have growth factor-like potential. There is an increasing awareness that structural proteins in the extracellular matrix can directly regulate cell activity in a growth factor-like manner. However, the mitogenic activity of platelet-released supernatants was decreased by anti-PDGF, and anti-bFGF antibodies. This adverse reaction can be overcome by using autologous platelet released supernatants. Some study on equine subjects gave satisfactory results in chronic musculoskeletal inflammatory disorders [4]. A role for endogenously released growth factors including IGF-1, TGF- $\beta$ , VEGF, PDGF and bFGF in tendon and ligament healing is well documented [5].

This study was undertaken to evaluate the efficacy of local infiltration of non-activated Platelet Rich Plasma in chronic Tennis elbow.

## Material and Methods

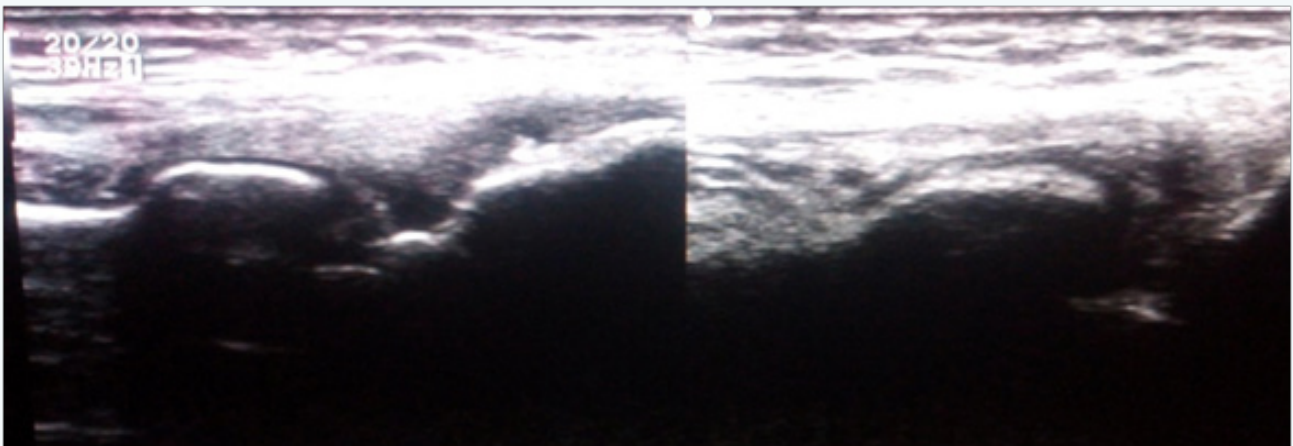
This Prospective study for assessment of clinical effect of platelet rich plasma in tennis elbow was conducted from September 2013 to June 2014. All patients who came to out patient department of Orthopaedics with tennis elbow were

included in the study.

Total 46 patients came with the complain of elbow pain in out patient department out of which 35 patients were diagnosed as tennis elbow on the basis of clinical examination and ultrasonography of elbow. Out of these 35 patients 25 were included for the study who met the inclusion criteria. Patients who did not gave consent for the procedure and who were lost on follow up were excluded from the study. Current proposed study had a sample size of 25 patients between 18 to 65 years of age, having tennis elbow. Independent observer was followed all the cases to eliminate observer related bias.

The procedure only requires the physician and an assistant to aid in preparation of a PRP, maintenance of aseptic technique and a radiologist for identifying the site of pathology and saving images on ultrasound. 20ml of venous blood is obtained containing EDTA solution. Up to six tubes are collected for each patient. The first centrifugation is for 10 minutes at 1,300 rpm and again the centrifuge for a 10-minute rotation at 2,000 rpm.

Immediately after the injection, the patient was kept in a supine position without moving the arm for 15 minutes. Patients were sent home with instructions to limit their use of the arm for approximately 24 hours and use acetaminophen for pain. A 100-mm visual analog pain score (0, no pain; 100, worst pain possible) were used as outcome measures. The patients were examined at 1 weeks, 4 weeks, and 12weekss after the index procedure. A final follow-up overall evaluation was also done at 12<sup>th</sup> week (Figure 1).



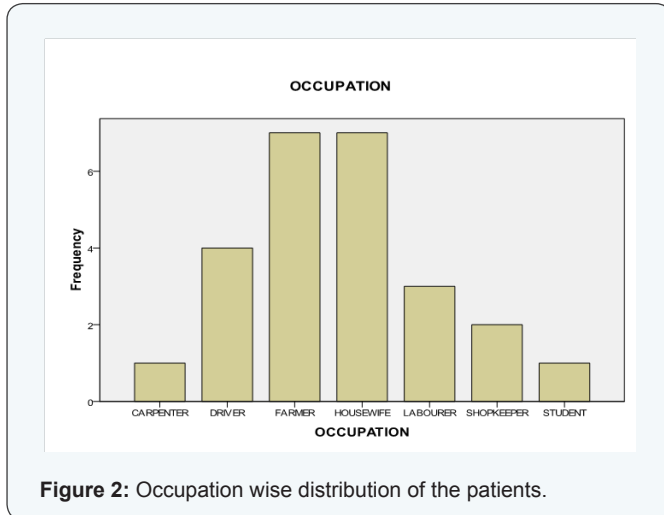
**Figure 1:** USG finding of in tennis elbow.

## Observations and Results

Age wise distribution shows second and third decade to have 16% of total patients, forth decade to have 36 %, fifth decade to have 20 %, sixth decade to have 24%, seventh decade to have 4%. This data was taken for the patients only included in the current study. Gender wise distribution of patients shows 60% males and 40%

females. This data was taken from all the patients included in the current study (Figure 2).

Occupation wise distribution of patient shows that it is more common in farmer (28%) and housewife (28%) than driver (16%), labourer (16%) and others (16%) like carpenter, shopkeeper and student of all patient included in the study.



**Figure 2:** Occupation wise distribution of the patients.

Distribution of the patient according to side of pathology 72% of the patient has right sided pathology and 28% has left

sided pathology of total patient included in study.

Correlation of duration of complain with diagnosis shows that 32% of the patient has complain since 3-6 months, 44% has complain since 7-9 months, 12% has complain since 10-12 months, 8% has complain since 13-15 months and only 4% of the total patients has complain since 16-18 months of the total patients included in this study.

Of all the patients included in the study 3 patients has hypertension. Comparison of VAS score of patient with hypertension at 12<sup>th</sup> week 1<sup>st</sup> patient have VAS score of 4, 2<sup>nd</sup> have VAS score of 1, and 3<sup>rd</sup> have VAS score of 2 at last follow up of the total patient included in the study.

Of all the patients included in the study 2 patients has diabetes. Comparison of VAS score of patient with diabetes at 12<sup>th</sup> week 1<sup>st</sup> patient have VAS score of 2, 2<sup>nd</sup> have VAS score of 4 at last follow up of the total patient included in the study (Table 1).

**Table 1:** Comparison of VAS score at the time of injection.

VAS score	No of patients	Percentage (%)
5-6	7	28
7-8	17	68
9-10	1	4
Total	25	100

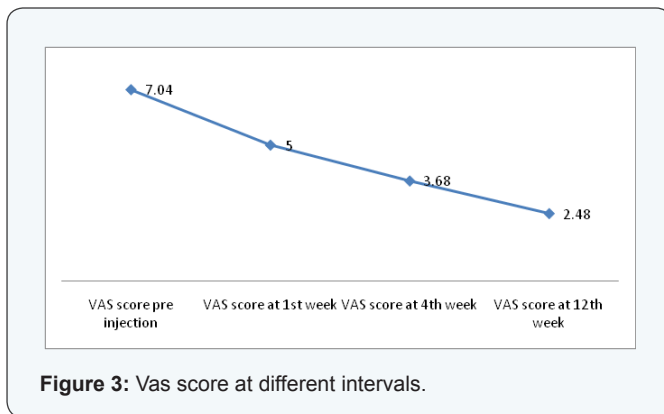
According to distribution of patients on VAS score at the time of injection maximum 68% of the patients have VAS score of 7-8, 28% has VAS score of 5-6, and only 4% of the patient has VAS score of 9-10 of the total patients included in this study (Table 2) (Figure 3).

**Table 2:** Mean base line comparison at 1 week, 4week and 12 week shows significant improvement in VAS score.

Paired Samples Statistics					
		Mean	N	Std. Deviation	
Pair 1	VAS SCORE	7.04	25	1.098	.000
	1st WEEK	5.00	25	1.323	
Pair 2	VAS SCORE	7.04	25	1.098	.000
	4th WEEK	3.68	25	1.314	
Pair 3	VAS SCORE	7.04	25	1.098	.000
		2.48	25	1.085	

Comparison of mean VAS score of all patients included in study. The mean vas score of all patient at the time of PRP injection was 7.04, which decreases to 5.00 at the 1<sup>st</sup> follow up at

the 1<sup>st</sup> week, at the 2<sup>nd</sup> follow up at the 4<sup>th</sup> week it was 3.68 and the last follow up at the 12<sup>th</sup> week it was found to be 2.48.



The mean difference of vas score at 1<sup>st</sup> week was 2.040, at the 4<sup>th</sup> week it was 3.360, and at the last follow up that is at 12<sup>th</sup> week of injection it was 4.560.

## Discussion

Elbow epicondylar tendinosis is a common problem with many possible treatments. Quick cessation of symptoms is important to patients and is economically advantageous. If neither rest nor simple treatment provides a satisfactory remedy, a patient may pursue several other options.

In our study maximum age group within which the patients were diagnosed were of fourth decade. The mean age group was 42.4 years. The reason for the peak incidence in this mid-life group is a matter for speculation. There may be changes in the tendons which predispose this group to injury. It could be postulated that in mid-life there is some deterioration in elasticity of the tendons at a time when levels of activity appropriate to the younger age groups are maintained.

In our study this was most commonly found in farmer and housewife who were mostly involved with repetitive overhead abduction activities and rather less common in shopkeeper, carpenter and student. Association of this being common in housewives can be attributable since they are liable for various house hold activities which requires excessive use of forearm supinator's and wrist extensors making them more prone for this pathology.

Male predominance was present as far as sex ratio of this tendinopathy was concerned with 15 males (60%) having this pathology compared to 10 females (40%).

Gruchow HW and Pelletier D [6] reported the incidence of lateral epicondylitis varied from 31% to 41%. Lateral epicondylitis is perhaps one of the most common insertional tendinopathy of the human body.

Ciccotti MG and Lombardo SJ [7] stated that the cause of lateral epicondylitis is excessive, monotonous use of the wrist extensors and forearm supinators. Gruchow and Pelletier [6] studies also reported that the incidence of tennis elbow was 2

to 3.5 times higher in the over-40 age group than in those under 40. In the general population, the incidence is equal among men and women, and in tennis players, male players are more often affected than female players.

Alissa R et al. [8] suggests single stage centrifugation for preparing PRP and used autologous thrombin prepared by means of thrombin processing device for activation of PRP. Complication like inflammation was reduced and improved healing of soft tissue postoperatively were the benefits seen in this study. However, we used inactivated fresh platelet rich plasma.

Out of all patient included in the study 5 patient have co morbidity like hypertension and diabetes. These patients also shows the significant improvement in there VAS score at the last follow up at the 12<sup>th</sup> week of injection.

Comparison of the mean VAS Score with each follow up showed decrease in mean VAS score at the 1st week of injection from 7.04 to 5, at the 4th week of injection the mean VAS score was 3.68, and at the last follow up at the 12<sup>th</sup> week of injection the mean vas score was 2.48. These findings were found to be significant with other authors who compared the VAS scores. At the final follow up at three months post injection, cases reported 65% improvement in their VAS pain score.

Mishra A and Pavelko T [9] eight weeks post injection the PRP patients reported 60% improvement in visual analogue scale (VAS) pain score. At six months post injection, cases reported 81% improvement in their VAS pain score and at final follow-up patients reported 93% reduction in their VAS pain score. Jonathan T. Finnoff et al. [10] found the mean pain improvements of 58%.

Ragab EM and Othman AM [11] in their study found the VAS to improve from 9.1 to 1.6. Kenneth Mautner et al. [12] patients perceived decrease in visual analogue scale score was 75%.

## Conclusion

The current investigation represents clinically based outcome study to evaluate the effectiveness of treating tennis elbow with USG guided PRP injection. Our results suggest that this treatment may be an effective and safe treatment option for patients presenting with tennis elbow.

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