



PLATELET RICH PLASMA VERSUS STEROID INJECTION IN PATIENTS WITH TENNIS ELBOW: A RANDOMIZED CLINICAL TRIAL

Orthopaedics

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ABSTRACT

Introduction: Lateral epicondylitis, also known as “tennis elbow”, is one of the most common soft tissue injuries in adults, at the age range of 35 to 55 years. It has an incidence of 4-7 per 1000 per year in general practice, with a peak between the ages of 35 and 54 years, with a mean age of approximately 42 years. Tennis elbow has numerous etiologies including repetitive wrist turning or hand gripping, tool usages, shaking hands, and twisting movements that may exceed tissue capacities and leading to micro-trauma and over usage of wrist extensor musculature leads to injury and enthesopathy usually around the lateral epicondyle that commonly cause the condition. Even if the term epicondylitis or tendinitis are commonly used to describe tennis elbow, histopathological studies have shown that tennis elbow is as such not an inflammatory condition, rather it is a degenerative process characterized by fibroblast proliferation, vascular changes and disorganized collagen, collectively called as angiofibroblastic hyperplasia. **Materials and Methods:** A randomized clinical trial with 82 patients was done. The study population consist of two groups. Group A (n = 41) treated with local corticosteroid injection and Group B (n = 41) treated with autologous PRP. After informed consent taken, eligible patients were allocated into group A (Corticosteroid) and group B (platelet rich plasma injection) using restricted block randomization technique using a block size of four. The base-line evaluation was done using visual analog score (VAS) and modified Mayo performance index for elbow (MAYO). Re-evaluation was after 4 weeks, 8 weeks, and 26 weeks of the procedure. Statistical analysis was done using independent t-test. **Results:** Twenty-six weeks after treatment with PRP, patients with lateral epicondylitis had a significant improvement in their VAS ($P < 0.001$) and MAYO ($P < 0.001$) in contrast to steroid, whereas no statistical difference was found between the two groups at 4 and 8 weeks after intervention. **Conclusion:** Treatment of patients with tennis elbow with PRP shows reduction in pain and significantly increases functional ability, surpassing the effect of corticosteroid injection.

KEYWORDS

lateral epicondylitis, platelet rich plasma, corticosteroids, Visual Analog Score, Mayo Elbow Performance Score.

INTRODUCTION:

Lateral epicondylitis, also known as “tennis elbow”, is one of the most common soft tissue injuries in adults, at the age range of 35 to 55 years.¹ It has an incidence of 4-7 per 1000 per year in general practice, with a peak incidence between the ages of 35 and 54 years, with a mean age of approximately 42 years. The dominant arm has been found to be predisposed to lateral epicondylitis. In an epidemiologic study it was reported that 87% of the cases involved the dominant arm. Tennis elbow has numerous etiologies including repetitive wrist turning or hand gripping, tool usages, shaking hands, and twisting movements that may exceed tissue capacities and leading to micro-trauma and over usage of wrist extensor musculature leads to injury and enthesopathy usually around the lateral epicondyle that commonly cause the condition.² Even if the term epicondylitis or tendinitis are commonly used to describe tennis elbow, histopathological studies have shown that tennis elbow is as such not an inflammatory condition, rather it is a degenerative process characterized by fibroblast proliferation, vascular changes and disorganized collagen, collectively called as angiofibroblastic hyperplasia.^{3,4} Cyriax (1936) noted that the primary site of injury in tennis elbow is the origin of extensor carpi radialis brevis and that one third of the patients has involvement of extensor digitorum communis.⁵ The repeated minimal tear of the extensor tendon origin along with the subsequent failed healing response changes the normal musculotendinous biomechanics leading to the onset of lateral elbow pain.^{6,7} Lateral Epicondylitis is aggravated by wrist and hand movements and can severely restrict job performance at workplace, activities of daily living and leisure activities.⁷

MATERIALS AND METHODS

Before starting the research, ethical approval for the study was obtained from institution ethical committee. Almost one hundred and three cases with primary diagnosis of lateral epicondylitis were recruited in the study for over 24 months after taking informed written consent. After informed consent taken, eligible patients were allocated into group A (Corticosteroid) and group B (platelet rich plasma injection) using restricted block randomization technique using a block size of four.

Eligible patients were allocated into two groups in which Group A (corticosteroid) and Group B (Platelet rich Plasma). Fifty-three patients were assorted into corticosteroid (CS) group and 50 patients in platelet rich plasma (PRP) group. Twelve patients in CS group and 9 patients in PRP group failed to follow up at the end of 6 months. At the end of study we had 82 patients with 41 patients each at both CS and PRP groups. Cases with the following conditions were excluded from the study, age < 18 or > 60 years, diabetes mellitus, cervical radiculopathy, rheumatoid arthritis, pregnancy, platelet count < 1.5 lakh/cumm, patients on NSAIDs for past 48 hours, platelet dysfunction. Patients in the group A received steroid (2ml of Methylprednisolone (40mg) + 1ml Lignocaine 2%) and the Group B patients received (2ml of Platelet rich plasma + 1 ml Lignocaine 2%). Infiltrations were done at presence of senior author with 22G needle at the most tender point of lateral epicondyle. After the injection the patient was kept in lying down position for almost 20 mins and arm was kept in arm sling for about 24 hrs. The patients were followed up for 26 weeks at intervals of 4, 8 and 26 weeks and their visual analogue scale (VAS) score and Mayo elbow performance score (MAYO) were assessed and evaluated eventually.

All data were entered on a personal computer (PC) in Microsoft Excel. The data was analysed using SPSSv.22 software (IBM). Descriptive statistics such as Mean, Standard deviation(SD), Median, Mode, Proportion, Percentages were employed. Inferential statistics such as chi square test was used to test the level of significance.

Preparation of platelet-rich plasma

1. We obtain 10ml Whole Blood by venipuncture in acid citrate dextrose (ACD) tubes
2. We did not chill the blood at any time before or during platelet separation
3. Centrifuged the blood using a 'soft' spin 800 G for 15 minutes
4. We then transfer the supernatant plasma containing platelets into another sterile tube (without anticoagulant)
5. We then centrifuge tube at a higher speed (a hard spin) of 1500G for 10 minutes to obtain a platelet concentrate.
6. The lower 1/3rd is PRP and upper 2/3rd is platelet-poor plasma (PPP). At the bottom of the tube, platelet pellets are formed.
7. We then removed PPP and suspend the platelet pellets in a minimum quantity of plasma about 2 to 4 mL by gently shaking the tube and the final product obtained.

RESULTS

From September 2020 for over 2 years, after exclusion a total of 103 patients with lateral epicondylitis were enlisted. Fifty-three patients were assorted into corticosteroid (CS) group and 50 patients in platelet rich plasma (PRP) group. Twelve patients in CS group and 9 patients in PRP group failed to follow up at the end of 26 weeks. At the end of study we had 82 patients with 41 patients each at both CS and PRP groups. There were 68(82.92%) males and 14 (17.08%) females. Forty (48.78%) patients were between >30–40 years, 24 (29.26%) patients were in the age group of >40–50 years. The right side was involved in 59 patients (71.95%) and correspondingly 23 patients (28.05%) had left sided involvement. No anomaly was detected in plain radiograph of the affected elbow. We didn't come across any patient with bilateral lateral epicondylitis in our study.

Baseline scores and follow up is manifested in Table 1 and 2. On the day of procedure patient treated with corticosteroid had median VAS of 8 and mean MAYO score of 62.4 while PRP treated patients had median VAS of 8 and mean MAYO score of 61.2. A month after the procedure, PRP-treated patients reported a median of 62.5% improvement (8–3) in VAS scores as compared to 75% improvement (8–2) in PRP group. Both had a favourable outcome at 4 weeks with no significant difference ($P = 0.01$). MAYO scores had improved 26.63% (61.2–77.5) in PRP treated patients versus 26.92% improvement (62.4–79.2) in CS group with no statistically significant difference ($P = 0.155$).

Indistinguishable results were noted at the end of 2 months and both the treatment methods were comparable with $p = 0.506$ and 0.415 respectively for VAS and MAYO score.

In our study, at the end of 26 weeks, the PRP-treated patients showed a mean 87.5% improvement (8–1) in VAS score as compared to 37.5% improvement (8–5) in steroid-treated patients, with a significant difference between the two groups ($P = 0.000$). MAYO elbow scores also showed a favourable response in PRP-treated patients with a mean 54.90% improvement (61.2–94.8) as juxtapose to CS group which is 0.8% (62.4–62.9) which manifested a significant difference ($p = 0.0001$).

Table 1: Distribution of respondents by VAS stratified by study groups

VAS	Steroid group Median (mean rank)	PRP group Median(mean rank)	Kruskal Wallis test p-value
Baseline	8 (36.7)	8(46.2)	Z Value=-1.945 p-0.052
4 weeks	2(35.0)	3(47.7)	Z Value=-2.555 p-0.011
8 weeks	2(39.8)	2(43.1)	Z Value=-0.665 p-0.506
26 weeks	5(62.0)	1(21.0)	Z Value=-8.005 p-0.000

Table 2: Distribution of respondents by Mayo Elbow Performance Score(MAYO) stratified by study groups

MAYO	Steroid group Mean $\pm$ SD	PRP group Mean $\pm$ SD	t-test p-value
Baseline	62.4 $\pm$ 5.2	61.2 $\pm$ 3.3	Value=1.256 p-0.213
4 weeks	79.2 $\pm$ 6.3	77.5 $\pm$ 5.1	Value=1.435 p-0.155
8 weeks	87.9 $\pm$ 5.4	88.9 $\pm$ 5.4	Value=-0.819 p-0.415
26 weeks	62.9 $\pm$ 4.9	94.8 $\pm$ 3.9	Value=-32.1 p-0.000

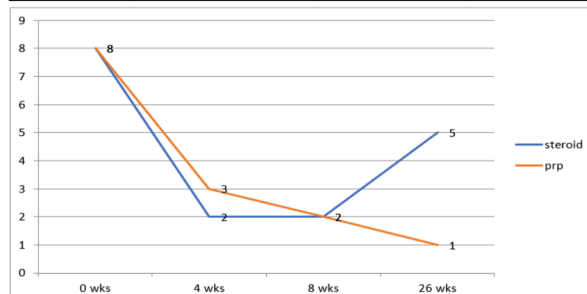


Figure 1: Line diagram of Visual Analog Scale score comparison

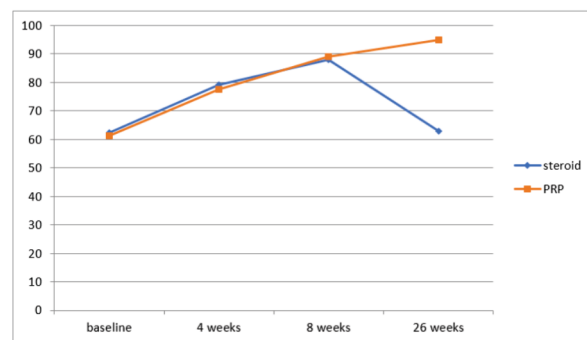


Figure 2: Line diagram of comparison of Mayo Elbow Performance Score

Post procedure exacerbation of pain was present in 14 patients, 4(9.7%) in steroid and 10(24%) in PRP group, which was controlled and managed by oral analgesics for period of 2 days. One patient developed hypo-pigmented discoloration of skin in the elbow region in steroid group which is 1.23% of all the patients. Two other patients, also in the steroid group developed mild lipodystrophy around the lateral elbow region in 2.46% study population.

DISCUSSION

Lateral epicondylitis is a common problem with many treatment methods. Corticosteroid injections was considered the gold standard in the treatment of lateral epicondylitis.⁸ Altay et al., reviewed 13 randomized controlled trials and found that corticosteroid injection is effective in pain relief and improves grip strength as compared to other conventional form of treatment. However, studies show it is not a significant or the best treatment mode in the short term. Poor results are usually seen after 3 months of follow-up. Corticosteroids treatment causes high rate of relapse and recurrence, likely because injection in the tendon may lead to adverse changes within the tendon structure. Patients has tendency to overuse the arm after injection there is direct relief of pain.¹⁰

Smidt et al. in their randomized control trial compared corticosteroid injection, physiotherapy and wait and watch policy for the treatment of tennis elbow and conclude that corticosteroid injections are the best mode of treatment for transient period only. Steroid treatment is prone to significant relapse, probably due to structural changes in the tendon caused by the steroid.¹¹

Nirschl et al.,¹¹ found mainly fibro-elastic tissue and vascular invasion describing this condition as "angiofibroblastic tendinosis". Therefore, local injection of corticosteroid perhaps offers transient symptomatic relief only. Other mode of treatment methods need to be surveyed for long term relief and cure of the disease process. In this regard PRP may be regarded as a better treatment option. Platelet-rich plasma is considered as an archetypal biologic autologous blood-procured

product. It can be exogenously applied to various tissues, causing platelet activation, high concentration of platelet-derived growth factors that are released in the process enhances tissue healing.¹² The activation of the platelets has to occur by the exposure of platelets to the thrombin. The thrombin is induced due to injection of the platelets into the tendon tissue using a peppering technique. The collagen that is exposed may also act as an activator.

Asperberg P, found injection of autologous platelets has been shown to improve reparative process in tendinosis in several animal and in vitro models.¹³ The effect of one injection PRP is shown to last longer than 1 year, while the percentage of success after a single corticosteroid injection drops from 51% at 1 year to 40% after 2 years of follow-up. A feasible explanation for the long-lasting effect of platelets could be that early neotendon properties created by platelet. The cells perceive well and reciprocates to mechanical loading at an early period.

Many other surgical procedures are also available for patients with chronic lateral epicondylitis. Veerhar *et al.* noted a breakthrough development in 60%–70% of the patients after surgical treatment (lateral release of the common extensor origin).¹⁴ Patients however are rarely interested in operative procedures for this and seek an alternative.

Our results are coherent with the results of the study conducted by Mirsha and Pavelko. They reported a significant improvement of symptoms after 8 weeks in 60% of the patients treated with buffered PRP as compared to 16% of the patients treated with a local anesthetic.¹⁵ This randomized clinical trial is done to assess the outcome of PRP in lateral epicondylitis. The procedure is found out to be better option in long term as compare to CS injections as there is only short term improvement in the CS injections.

CONCLUSION

The results revealed that the long term efficacy of PRP treatment is better. Therefore, we concluded PRP injection as a better treatment option than corticosteroid injection in cases of tennis elbow. We also conclude that corticosteroids are good treatment option for short term outcome or relief of pain in lateral epicondylitis patient. However, as there was limited period of follow up in the present study, we recommend longer follow up studies to further incorporate our findings and establish the long term efficacy of PRP in cases of lateral epicondylitis.

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