

## Comparison of Tennis Elbow Injected With Corticosteroids Vs Platelet Rich Plasma

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### ABSTRACT

**Background:** Lateral elbow epicondylar tendinosis or tennis elbow (TE) is a common condition. This prospective study compared the efficacy of local injection of corticosteroid vs platelet rich plasma (PRP) in the treatment of lateral epicondylitis.

**Methods:** Study subjects were systematically and randomly allocated into two groups of 30 each (Group A and Group B). Patients in group 'A' was subjected to local corticosteroid injection and in group 'B' to autologous platelet rich plasma injection. Pain and elbow function was assessed by VAS (Visual analogue scale) and Modified Mayo Performance Index for Elbow. Efficacy of both the interventions was compared at three different time frame s i.e. 1, 2 and 6 months.

**Results:** Post injection there was a significant improvement of visual analog score (VAS) and MAYO elbow score. However base line VAS and MAYO scores when compared showed no statistically significant difference at 1 and 2 months follow up. Both the treatment modalities were equally effective at short term follow up, but after 6 months of follow up there was statistically significant decrease in pain (VAS) and increase in elbow function (MAYO Score) in PRP group when compared with steroid group. It was found that autologous PRP had better results as compared to steroid at long term follow up.

**Conclusion:** We found that in the treatment of lateral epicondylitis with injection of concentrated autologous platelets improves pain and function more so than corticosteroid injection. More importantly these improvements were profound and sustained over longer periods of time as compared to corticosteroid injection.

**Keywords:** Lateral Epicondylitis, Platelet Rich Plasma (PRP), Corticosteroid Injection.

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### INTRODUCTION

Lateral elbow epicondylar tendinosis or tennis elbow (TE) is a common condition occurring at the common extensor tendon that originates from the lateral epicondyle in patients whose activities require strong gripping or repetitive wrist movements. It causes pain and functional impairment in daily activities.<sup>1-3</sup> Even though it has been termed tennis elbow and called the same routinely; it is seen to affect non-athletes rather than athletes. 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. Various findings have been reported in the literature with respect to gender prevalence; however no distinct prevalence is evident. 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. The presentation of TE can be in the form of acute, intermittent, sub-acute or chronic pains and accompanied possibly with weakness in the forearm and on physical examination, there is tenderness without swelling along the extensor tendons at or just below the lateral epicondyle. Elbow range of motion (ROM) is normal. Grip strength on the affected side is diminished.<sup>7</sup>

Histologic findings in chronic cases confirm that tendinosis is not an acute inflammatory condition but rather a failure of the normal

tendon repair mechanism associated with angiofibroblastic degeneration. Numerous methods have been advocated to treat tennis elbow, including rest, NSAIDS bracing, physical therapy, iontophoresis, extra corporal shockwave and botulinum toxin. Injections of corticosteroids, dry needling and various surgical techniques have been incorporated in refractory cases.

However, these traditional therapies do not alter the tendon's poor healing properties secondary to poor vascularization. Modalities such as local corticosteroid injection have focused on suppressing inflammatory process that does not actually exist.

A recent review article concluded that short term outcome (6 weeks) with corticosteroid injection was better as compared to placebo, local anesthetics and other conservative treatments. For intermediate (6 weeks to 6 months) and long term outcomes (more than 6 months), no statistically significant or clinically relevant results in favor of corticosteroid injections were found. So it is not possible to draw a firm conclusion on the effectiveness of corticosteroid injection.

Given the inherent nature of the tendon, new treatment options including Platelet Rich Plasma (PRP), autologous blood, prolotherapy, and extracorporeal shockwave therapy are aimed at inducing inflammation rather than suppressing it. Platelet rich plasma (PRP) contains important growth factors like Platelet derived growth factor, Transforming growth factor  $\beta$ 1, Basic.

## METHODS

### Study Tools

Structured study instruments (case reporting form) was developed, and used to generate data and assessment was done by:

- I. Standard elbow examination system: Modified Mayo Clinic Performance Index for the Elbow.
- II. Visual Analogue Scale (VAS) for pain.

### Inclusion Criteria

- Pain over the lateral epicondyle with
  - I. Tenderness on direct palpation over the lateral epicondylar region
  - II. Pain around the elbow on resisted wrist extension and supination with duration of symptoms more than 3 months.
- Pain severity with minimum score of 5 (based on 10 scale Visual Analogue Scale)
- Age > 18 years and < 60 years.
- Provided informed consent
- Failure of conservative treatment (NSAIDS, Stretching exercises, brace for 6 weeks)

### Exclusion Criteria

- Age, 18 yrs and. 60 yrs
- Any local infection at the site of procedure.
- Cervical radiculopathy.
- Systemic disorders like Diabetes, Rheumatoid arthritis, any platelet dysfunction syndrome or coagulopathy.
- Any recent history of aspirin or aspirin like drug intake.
- Platelet count < 1.5 lakh/cu mm.
- Patients not willing to participate in study.
- Any previous history of trauma or surgery to the concerned elbow.

### Study Protocol

1. Two groups, A (corticosteroid) and B (platelet rich plasma) were made.
2. Subjects were randomly and systematically allocated into the two groups and baseline scoring was done.
3. Procedure: The procedure was carried out under all aseptic precautions. Elbow was prepared with povidone iodine scrub and spirit and then draped.

**Corticosteroid Group: (A):** Patients in this group were injected with 2 ml of methyl prednisolone acetate (40mg) with 1ml of 2% lignocaine hydrochloride. The injection was administered with a standard 20-gauge needle into the tenderest area around the epicondyle.

**Platelet Rich Plasma Group: (B):** 3 ml of the extracted platelet rich plasma was injected into the tenderest area around the epicondyle with a standard 20- gauge needle.

### Preparation of Autologous Platelet rich Plasma

Under aseptic precautions 27ml of peripheral whole blood was obtained by phlebotomy. 3 ml of anticoagulant (Sodium citrate) was added to the collected blood (in ratio of 1:9). About 3 ml of Platelet rich plasma was extracted by centrifugation at a 3200 rpm for 15 minutes. No activator was used. Activation takes place in vivo after contact of platelets to the collagen. Platelet enrichment was found to be 4-5 times of the base whole blood platelet counts. Volunteers were examined whose blood parameters were within normal limit. To estimate the concentration of the PRP extraction, samples of two healthy Patients in the steroid treatment group were treated with 2ml of methylprednisolone.

### Position

Injection was administered in sitting position with arm directed at patient's side and elbow flexed and forearm supinated with the surgeon's thumb on the tenderest point. Immediately after the injection the patient was kept in a supine position for 15 minutes, and then sent home with instructions to limit their use of the arm for at least 24 hrs and an arm sling was provided. Procedure was performed and the patient was called for follow up after 1st, 2nd and 6th month and was assessed through the same examination system and scores (Modified Mayo Clinic Performance Index For The Elbow and Visual Analogue Scale For Pain) were recorded.

### Evaluation of Outcome

Clinical assessment was done prior to the injection and at t 1 month, 3 months, 6 months following the injection. Clinical evaluation included pain assessment using visual analog scale (VAS) from 0 to 10 (0 reflects absence of pain and 10 indicates the worst imaginable pain). The functional outcome score was measured by MAYO elbow score.

### Data Management and Statistical Analysis

Patients were randomized, after they were deemed eligible and had provided informed consent, by a computer using block randomization. Interpretation and analysis of data was done by analytical method. SPSS-16.0 (SPSS Inc Chicago, Illinois, United States of America) was used for data analysis. The qualitative data was represented in the form of frequency and percentage. The quantitative data was expressed in terms of Mean  $\pm$  SD. Independent t-test was used to compare the means of the study groups. The level of statistical significance was set at  $P < .05$ . The assessors filling out the questionnaire of Modified Mayo scores and assessing VAS scores, also the statistician were same and blinded to the group of the patient.

Table 1: Comparison of the pain score (VAS) in the study groups.

|                           | Group A (Steroid)<br>Mean±SD | Group B (PRP)<br>Mean±SD | p Value  |
|---------------------------|------------------------------|--------------------------|----------|
| 1 Month FU(t = 1 month)   | 2.36 ± 1.18                  | 2.46±0.93 7              | 0.608NS  |
| 2 Months FU(t = 2 months) | 1.33 ± 0.80                  | 1.56±0.93 5              | 0.535NS  |
| 6 Months FU(t = 6 months) | 4.60 ± 1.54                  | .76± 1.63                | <0.001HS |

NS-not significant; HS-highly significant; FU-follow up.

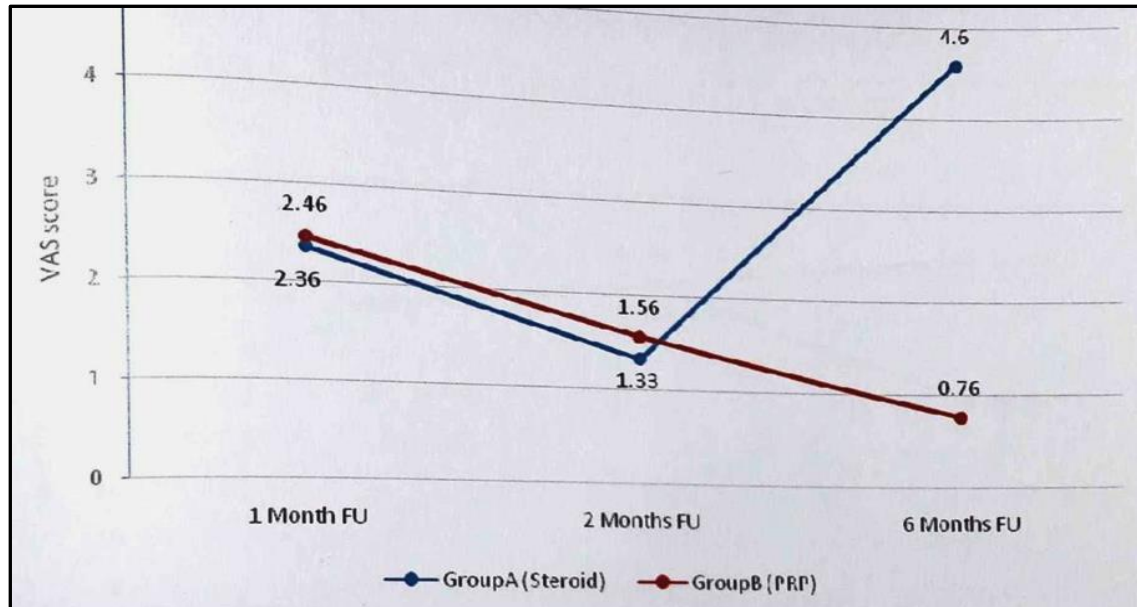


Figure 1: Comparison of the pain score (VAS) in the study groups

Table 2: Comparison of MAYO Elbow scores in the study groups.

|                           | Group A (Steroid)<br>Mean±SD | Group B (PRP)<br>Mean±SD |
|---------------------------|------------------------------|--------------------------|
| 1 Month FU (t = 1 month)  | 78.90 ± 4.57                 | 79.08 ± 4.96             |
| 2 Months FU(t = 2 months) | 86.91 ± 10.41                | 87.06 ± 6.35             |
| 6 Months FU(t = 6 months) | 62.65 ± 7.26                 | 94.58 ± 9.82             |

NS-not significant; HS-highly significant; FU-follow up

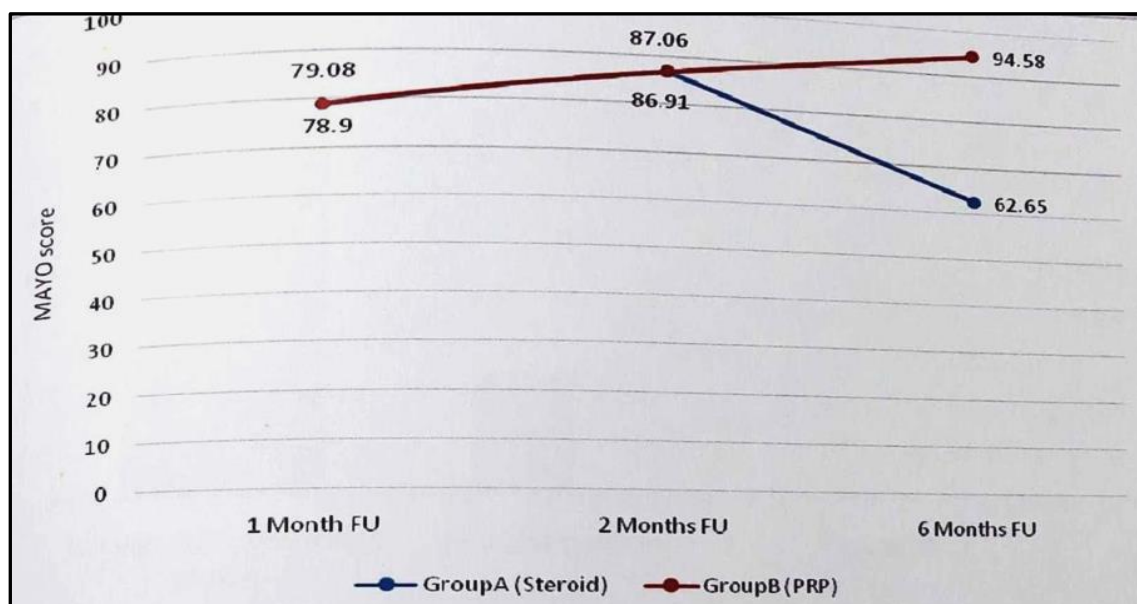


Figure 2: Comparison of the MAYO Elbow scores in the study groups

## RESULTS

The mean  $\pm$  SD of the MAYO Elbow score was compared at three different time frames. On short term follow up i.e.  $t = 1$  month and  $t = 2$  months, the  $p$  value was 0.781 and 0.597 respectively. Both the  $p$  values were not statistically significant. However at  $t = 6$  months, the  $p$  value was  $< 0.05$ , this was statistically significant. Hence PRP proved to be a better mode of treatment for lateral epicondylitis on long term follow up when compared to steroid (Fig-1)

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## DISCUSSION

Lateral 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.

Corticosteroid injections have also been used extensively for this problem, but studies show that there is conflicting evidence about their efficacy.

Jobe and Ciccotti also concluded that superficial injection of corticosteroid may result in subcutaneous atrophy and that intratendinous injection may lead to permanent adverse changes within the ultrastructure of the tendon. Despite these issues, corticosteroid is still widely used. Platelet-rich plasma (PRP) is promoted as an ideal autologous biological blood-derived product that can be exogenously applied to various tissues where it releases high concentrations of platelet-derived growth factors that enhance wound healing, bone healing and tendon healing. In addition, PRP possesses antimicrobial properties that may contribute to the prevention of infections. When platelets become activated, growth factors are released and initiate the body's natural healing response.

The present study entitled "A comparative study to evaluate the results of corticosteroid versus autologous platelet rich plasma injection locally for the treatment of lateral epicondylitis (Tennis Elbow)" was conducted in the Department of Orthopaedics, Hindu Rao Hospital, Delhi.

A total of 60 patients were included in our study. Patients were randomly allocated into two intervention groups i.e. Group A- Corticosteroid and Group B- Platelet Rich Plasma. 2 patients in the steroid group had local skin atrophy after the injection which required no treatment. No other complications such as elbow stiffness, infection, reflex sympathetic dystrophy, post injection flare, facial flushing, neurovascular damage or tendon rupture were observed.

In this study baseline pain and function scores of the 2 groups i.e. corticosteroid and platelet rich plasma were found to be comparable. The mean VAS score before intervention in the steroid group was  $7.86 \pm 1.22$  while in Platelet rich plasma group was  $8.36 \pm 1.09$ , with a  $p$  value of 0.117 which was not significant. Similar observation was made by Peerbooms et al. In their study

the mean VAS score prior to intervention was  $65 \pm 13.8$  and  $70.1 \pm 15.1$  (on a scale of 0-

100) in control and PRP group respectively. In a similar study by Mishra et al initially the patients had a Pre VAS score of 80.3.

Mean MAYO elbow score before intervention in steroid and PRP group were  $64.88 \pm 6.95$  and  $61.75 \pm 7.01$  respectively with a  $p$  value of 0.085 which was also not significant. Pre MAYO score in the study conducted by Mishra et al was 50.3.

At the first follow up i.e. 1 month, there was no statistically significant difference between the two groups with respect to Visual Analogue Scale score. The mean VAS score at 1 month follow up was  $2.36 \pm 1.18$  in steroid group while that in PRP group was  $2.46 \pm 0.935$ , with a  $p$  value of 0.608. The observation was not statistically significant.

At the end of 2 months, the mean VAS score in steroid and PRP group was  $1.33 \pm 0.80$  and  $1.56 \pm 0.935$  respectively with a  $p$  value of 0.535 which was not statistically significant. This showed that both steroid and autologous PRP showed similar response in short term follow up. Similar observations were made in the study conducted by Omar et al which showed a significant difference in VAS scores at first and second visit between both groups relative to the baseline scores but comparison of scores changes among two groups of patients showed insignificant difference relative to the outcome measures evaluated.<sup>18</sup> Comparable observations were also made in studies conducted by Peerbooms et al and Mishra et al, who observed that both steroid and autologous PRP showed good response for pain resolution in short term follow up.<sup>19,20</sup> When pain was assessed after 6 months of intervention, it was found that the mean VAS score in steroid group was  $4.60 \pm 1.54$  while that in the PRP group was  $0.76 \pm 1.63$ . The  $p$  value came out to be  $< .001$  which was statistically highly significant.

When elbow function was assessed in the present study, it was found that, at 1 month follow up there was no significant difference between the two groups. Mean MAYO score of steroid group after 1 month was  $78.90 \pm 4.57$  while that of PRP group was  $79.08 \pm 1.66$  with a  $p$  value of 0.781.

After 2 months of intervention the mean MAYO score in steroid and PRP group was  $86.91 \pm 10.41$  and  $87.06 \pm 6.35$  respectively. The  $p$  value was 0.535, which was not statistically significant.

At the end of 6 months statistically significant difference was observed between the MAYO scores of the two groups. Mean MAYO score in steroid group was  $62.65 \pm 7.26$  while that in the PRP group was  $94.58 \pm 9.82$ . The  $p$  value came out to be  $< .001$  which is highly significant. Similar results were obtained by Mishra et al in their prospective study where they compared the efficacy of local corticosteroid injection versus buffered platelet rich plasma in chronic elbow tendinosis. They concluded that treatment with buffered platelet rich plasma offered long term results when compared to corticosteroid.<sup>20</sup>

Complications were also associated with this study. Post injection exacerbation of pain was seen in 3 patients treated with steroid and 8 patients treated with autologous PRP which was relieved by oral analgesics for 5-7 days. 2 patients in the steroid group had local skin atrophy after the injection which required no treatment. No other complications such as elbow stiffness, infection, reflex sympathetic dystrophy, post injection flare, facial flushing, neurovascular damage or tendon rupture were observed.

## CONCLUSION

This study demonstrates that a single injection of concentrated autologous platelets improves pain and function more so than corticosteroid injection. More importantly these improvements were profound and sustained over longer periods of time as compared to corticosteroid injection.

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