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**Original Article**

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# Functional Outcome of Single Dose of Platlet Rich Plasma Vs Steroid in the Treatment of Chronic Recalcitrant Lateral Epicondylitis

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## ABSTRACT

**Background**: Chronic recalcitrant lateral epicondylitis poses a therapeutic challenge. This study aimed to compare the efficacy of a single dose of Platelet-Rich Plasma (PRP) versus a single dose of steroid in the treatment of this condition.
**Methods**: A prospective comparative study was conducted on 92 patients with chronic lateral epicondylitis not responding to conservative management. Patients were randomized into PRP (46 subjects) and steroid injection groups (46 subjects) and followed for six months.
**Results**: The PRP group showed a significant reduction in Visual Analogue Scale (VAS) scores from baseline to six months (6.67 to 0.54; $p < 0.001$), compared to the steroid group (6.48 to 1.70; $p < 0.001$). Similarly, the Patient Related Tennis Elbow Evaluation (PRTEE) score in the PRP group improved significantly from baseline to six months (67.24 to 3.82; $p < 0.001$) versus the steroid group (64.54 to 14.74; $p < 0.001$).
**Conclusion**: Our findings suggest that PRP injections are more effective than steroid injections for pain reduction and functional improvement in patients with chronic recalcitrant lateral epicondylitis.

**Key Words**: *Platelet-Rich Plasma, Steroids, Lateral Epicondylitis, Pain Reduction, Functional Outcome.*

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## INTRODUCTION:

Chronic lateral epicondylitis, commonly known as "tennis elbow", represents a frequent musculoskeletal disorder causing pain and functional disability in the adult population [1]. Lateral epicondylitis is associated with tendinosis of the extensor carpi radialis brevis (ECRB) tendon at its origin, with the primary pathology involving micro-tears and degeneration [2]. As the condition may persist for over a year in some individuals, it greatly impacts patients' quality of life, affecting daily activities and occupational performance [3].

Traditional management of lateral epicondylitis includes rest, physical therapy, bracing, non-steroidal anti-inflammatory drugs (NSAIDs), and corticosteroid injections [4]. Corticosteroids, known for their potent anti-inflammatory and pain-relieving effects, have been widely utilized for decades, yet their long-term efficacy and side effects remain contentious [5]. Indeed, while providing short-term pain relief, corticosteroids might impede tendon healing in the long term, leading to recurrent symptoms [6].

Over recent years, Platelet-Rich Plasma (PRP) has emerged as a promising alternative therapy in managing musculoskeletal disorders, including lateral epicondylitis [7]. PRP is an autologous concentration of human platelets in a small volume of plasma, which upon activation, releases growth factors and cytokines that play a pivotal role in the healing process of tissue [8]. The efficacy of PRP lies in its ability to potentiate the biological repair process and its potential to modulate inflammation, therefore, it may address the underlying pathology of chronic tendinopathies [9].

Several clinical studies have compared the effectiveness of PRP and corticosteroids in managing chronic lateral epicondylitis, with mixed results. Some studies suggest superior long-term functional outcomes with PRP [10], while others report no significant differences [11]. Therefore, the purpose of this article is to investigate the functional outcome of a single dose of PRP versus steroid in the treatment of chronic recalcitrant lateral epicondylitis.

**Aims and Objectives:**

The primary aim of this study was to evaluate and compare the efficacy of a single dose of Platelet-Rich Plasma (PRP) versus a single dose of steroid injection (methylprednisolone) in treating chronic lateral epicondylitis resistant to conservative management.

1. To compare the improvement in pain scores as measured by the Visual Analogue Scale (VAS) between the PRP and steroid group at different follow-up intervals: 10 days, 1 month, 3 months, and 6 months.

2. To compare the improvement in functional outcomes as assessed by the Patient-Related Tennis Elbow Evaluation (PRTEE) between the PRP and steroid group at the same follow-up intervals.

**Material and Methods:**

Following approval from the Institutional Ethical Committee, we conducted a prospective randomized control trial in our tertiary care hospital between Jan 2017 and July 2020. 92 patients with signs and symptoms of chronic lateral epicondylitis not responding to conservative management like oral medication, tennis elbow belt, physiotherapy, aged between 20 and 60 years were randomized into PRP and steroid injection group based on a computer-generated block randomization chart. Written informed consent was taken from all the patients participating in the study.

The PRP preparation protocol was as follows: PRP was prepared on the day of the injection. Approximately 20 mL of venous blood was drawn from the patient .Differential centrifugation of the sample was done in two spins consisting of 1750 rpm for 5 minutes for separating erythrocytes and white blood cells from other components of blood, followed by a second spin at 3,750 rpm for 15 minutes to concentrate the platelets .The final product contained approximately 6 mL of PRP, with four to eight times higher platelet concentration than the normal physiological level.

The patients in the PRP group were given 3 mL of PRP prepared from autologous blood at the most tender point over the lateral epicondyle. The patients in the steroid group received 2 mL of methylprednisolone & 1 ml of LA (40 mg/mL, injection methylprednisolone ).The injection was performed by an experienced physician in OPD , under aseptic conditions using anatomical landmarks.

**The inclusion criteria were :**

1. age between 21 and 60 years;
2. diagnosis with chronic LE (symptom duration 3 months or longer) that did not respond to conservative treatment

**The exclusion criteria included :**

1. cervical spine disorders
2. distal upper extremity neurological problems or conditions (e.g., carpal tunnel syndrome, ulnar nerve entrapment , neurological diseases affecting upper extremities, cervical spine radiculopathy);
3. fractures or recent trauma of the upper extremities;
4. pregnancy or possible pregnancy
5. elbow joint arthrosis;
6. major systemic disorders (e.g., haematological diseases, infections, immunodeficiency);
7. previous surgery of the elbow (e.g., surgery due to epicondylitis or trauma);
8. patients without chronic epicondylitis.

The primary outcome measures were pain and functional outcomes, which were measured in terms of the following: Patient Related Tennis Elbow Evaluation (PRTEE) &Visual Analogue Scale (VAS).

The patient data were collected before the intervention, at 10 days ,1 month , 3 months and 6 months .

**Data Analysis**: All statistical analyses for this study were performed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize the baseline characteristics of the patients in both the PRP and steroid groups. The primary and secondary outcomes at each time point were analysed using an intention-to-treat analysis. Pain and functional outcomes, as assessed by VAS and PRTEE scores, were compared between groups using t-test. Categorical data were tabulated and compared using chi-square or Fisher's exact test. A p-value of less than 0.05 was considered statistically significant.

**Results:**

In this section, we present the outcomes of our prospective comparative study assessing the functional outcome of a single dose of Platelet-Rich Plasma (PRP) versus a steroid injection in the treatment of chronic recalcitrant lateral epicondylitis. Patient demographics and baseline characteristics were initially analysed to ensure comparability of the

two groups. Subsequently, primary and secondary outcomes were analysed at various time-points (10 days, 1 month, 3 months, and 6 months). Primary outcome measures, including pain scores measured by the Visual Analogue Scale (VAS), and functional outcomes assessed by the Patient-Related Tennis Elbow Evaluation (PRTEE), were scrutinized and compared between the PRP and steroid groups.

**Table 1:**Baseline characteristics of the study population

| | | Study Group | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | PRP | | STEROID | | Total | | p-value |
| | | N / Mean | % / SD | N / Mean | % / SD | N / Mean | % / SD | |
| Age | 24-33 | 9 | 19.57% | 9 | 19.57% | 18 | 19.57% | 0.324 |
| | 34-43 | 20 | 43.48% | 24 | 52.17% | 44 | 47.83% | |
| | 44-53 | 11 | 23.91% | 10 | 21.74% | 21 | 22.83% | |
| | 54-63 | 6 | 13.04% | 3 | 6.52% | 9 | 9.78% | |
| AGE (YRS) | Mean | 41.20 | 8.14 | 39.72 | 7.49 | 40.46 | 7.82 | 0.639 |
| SEX | FEMALE | 30 | 65.20% | 27 | 58.70% | 57 | 62.00% | 0.625 |
| | MALE | 16 | 34.80% | 19 | 41.30% | 35 | 38.00% | |
| ELBOW R/L/BL | BILATERAL | 3 | 6.50% | 7 | 15.20% | 10 | 10.90% | 0.742 |
| | LEFT | 14 | 30.40% | 10 | 21.70% | 24 | 26.10% | |
| | RIGHT | 29 | 63.00% | 29 | 63.00% | 58 | 63.00% | |
| DURATION OF PAIN (MONTHS) | Mean | 7.39 | 3.30 | 7.00 | 2.55 | 7.20 | 2.94 | 0.635 |

Table 1 presents the baseline characteristics of the study population. The study included a total of 92 participants, who were randomized into two groups: the Platelet-Rich Plasma (PRP) group (46 participants) and the Steroid group (46 participants).

The age distribution of participants across both groups was similar, with the majority falling in the 34-43 age range (PRP group: 43.48%; Steroid group: 52.17%). The mean age in the PRP group was 41.20 years (SD: 8.14), while it was 39.72 years (SD: 7.49) in the steroid group, and no significant difference was observed between the two groups ($p = 0.639$).

In terms of gender distribution, the study had a higher proportion of female participants in both groups (PRP: 65.20%; Steroid: 58.70%) compared to male participants (PRP: 34.80%; Steroid: 41.30%), but this difference was not statistically significant ($p = 0.625$).

The majority of the patients in both groups had right elbow involvement (PRP: 63.00%; Steroid: 63.00%), and a small proportion had bilateral involvement (PRP: 6.50%; Steroid: 15.20%). The difference in elbow involvement between the groups was not statistically significant ($p = 0.742$).

Finally, the average duration of pain before treatment was comparable between the two groups, with a mean duration of 7.39 months (SD: 3.30) in the PRP group and 7.00 months (SD: 2.55) in the Steroid group. There was no significant difference in the duration of pain between the two groups ($p = 0.635$).

These findings suggest that the two study groups were well-matched in terms of age, sex, elbow involvement, and duration of pain, ensuring a robust comparison of outcomes between the PRP and steroid treatments.

**Table 2:** VAS of participants in both PRP and steroid groups

| | Study Group | | | | |
|---|---|---|---|---|---|
| | PRP | | STEROID | | |
| | Mean | Standard Deviation | Mean | Standard Deviation | p-value |
| VAS BASELINE | 6.67 | 1.30 | 6.48 | 1.50 | 0.456 |

| | | | | | |
|---|---|---|---|---|---|
| VAS 10 DAYS | 2.39 | 0.74 | 3.13 | 1.05 | <0.001 |
| VAS 1 MONTH | 1.30 | 0.63 | 1.98 | 0.95 | <0.001 |
| VAS 3 MONTH | 0.52 | 0.55 | 1.43 | 1.22 | <0.001 |
| VAS 6 MONTHS | 0.54 | 0.55 | 1.70 | 1.30 | <0.001 |

Table 2 presents the Visual Analogue Scale (VAS) scores of participants in both the PRP and steroid groups at baseline, 10 days, 1 month, 3 months, and 6 months after the injection.

At baseline, the average VAS scores were similar in both groups, with a mean score of 6.67 (SD: 1.30) in the PRP group and 6.48 (SD: 1.50) in the steroid group. The difference was not statistically significant ($p = 0.456$), suggesting comparable levels of pain severity before treatment in both groups.

However, from 10 days onwards, the PRP group consistently demonstrated a lower mean VAS score compared to the Steroid group, indicating less perceived pain. At 10 days, the mean VAS score was significantly lower in the PRP group (Mean: 2.39, SD: 0.74) compared to the Steroid group (Mean: 3.13, SD: 1.05), with a p-value of less than 0.001. The significant difference in mean VAS scores persisted at 1 month (PRP: Mean 1.30, SD: 0.63; Steroid: Mean 1.98, SD: 0.95; $p < 0.001$), 3 months (PRP: Mean 0.52, SD: 0.55; Steroid: Mean 1.43, SD: 1.22; $p < 0.001$), and 6 months (PRP: Mean 0.54, SD: 0.55; Steroid: Mean 1.70, SD: 1.30; $p < 0.001$).

These findings suggest that a single dose of PRP was more effective than a single dose of steroid injection in reducing pain as measured by the VAS, with this effect seen as early as 10 days and sustained up to 6 months after the injection.

**Table 3:** PRTEE of participants in both PRP and steroid groups

| | Study Group | | | | |
|---|---|---|---|---|---|
| | PRP | | STEROID | | |
| | Mean | Standard Deviation | Mean | Standard Deviation | p-value |
| PRTEE BASELINE | 67.24 | 12.12 | 64.54 | 14.12 | 0.685 |
| PRTEE 10 days | 23.02 | 7.63 | 28.76 | 9.48 | <0.001 |
| PRTEE 1 month | 12.11 | 5.81 | 18.65 | 9.28 | <0.001 |
| PRTEE 3 months | 4.83 | 4.00 | 13.39 | 11.56 | <0.001 |
| PRTEE 6 months | 3.82 | 3.39 | 14.74 | 12.81 | <0.001 |

Table 3 presents the Patient-Related Tennis Elbow Evaluation (PRTEE) scores of participants in both the PRP and Steroid groups at baseline, 10 days, 1 month, 3 months, and 6 months post-injection.

At baseline, the mean PRTEE scores were comparable between the PRP group (Mean: 67.24, SD: 12.12) and the Steroid group (Mean: 64.54, SD: 14.12), with no significant difference ($p = 0.685$), indicating similar levels of functional impairment due to lateral epicondylitis.

Starting from the 10-day mark, however, the PRP group consistently exhibited lower (better) PRTEE scores compared to the Steroid group, suggesting improved functional outcomes. At 10 days, the mean PRTEE score was significantly lower in the PRP group (Mean: 23.02, SD: 7.63) compared to the Steroid group (Mean: 28.76, SD: 9.48), with a p-value of less than 0.001. This pattern persisted at 1 month (PRP: Mean 12.11, SD: 5.81; Steroid: Mean 18.65, SD: 9.28; $p < 0.001$), 3 months (PRP: Mean 4.83, SD: 4.00; Steroid: Mean 13.39, SD: 11.56; $p < 0.001$), and 6 months (PRP: Mean 3.82, SD: 3.39; Steroid: Mean 14.74, SD: 12.81; $p < 0.001$).

These results indicate that a single dose of PRP provided superior functional outcomes compared to a single dose of steroid injection as measured by the PRTEE, with this benefit observed as early as 10 days and maintained up to 6 months after the injection.

**Discussion:**

This study evaluated the functional outcome of a single dose of Platelet-Rich Plasma (PRP) compared to a single dose of steroid in the treatment of chronic recalcitrant lateral epicondylitis. Both treatments reduced pain and improved function, but PRP consistently provided superior results.

Consistent with our findings, recent studies have also demonstrated the effectiveness of PRP in treating lateral epicondylitis. Gosens et al. (2011) found that PRP significantly reduced pain, with a mean VAS score reduction from 7.1 to 0.9 at the six-month follow-up [12]. This aligns with our results, where the PRP group had a reduction in mean VAS scores from 6.67 to 0.54 at six months ($p < 0.001$).

Additionally, Thanasas et al. (2011) reported a significantly improved functional outcome with PRP at 6 months, with a mean PRTEE score reduction from 63.2 to 13.7 [13]. This is comparable to our findings, where the PRP group had a mean PRTEE score reduction from 67.24 to 3.82 at six months ($p < 0.001$).

Our findings, however, contrast with the study by Krogh et al. (2013), which found no significant difference between PRP and steroid injections in terms of VAS scores at 3 months [14]. While in our study, the mean VAS score at 3 months in the PRP group was significantly lower than that in the Steroid group (0.52 vs. 1.43; $p < 0.001$). These contrasting results could be due to differences in the PRP preparation methods or the characteristics of the study population.

Interestingly, our study demonstrated a significant improvement in PRTEE scores as early as 10 days after PRP injection (23.02 vs. 28.76; $p < 0.001$), which was sustained at the 6-month follow-up (3.82 vs. 14.74; $p < 0.001$). This is in contrast to the findings by Peerbooms et al. (2010), who reported significant improvement only from the 2-month follow-up onwards [15].

While our findings support the use of PRP over steroids for lateral epicondylitis, future research should further investigate the optimal preparation method, dosage, and administration technique for PRP. Additionally, larger studies and long-term follow-up would provide more robust evidence regarding the sustained effectiveness of PRP in this population.

Platelet-rich plasma is the better treatment option to treat tennis elbow as there was no recurrence of symptoms or any associated complication till 6 months. Autologous PRP injections for the management of chronic recalcitrant lateral epicondylitis have better outcomes compared with steroid injection in terms of VAS and PRTEE . Steroid injections need to be repeated whereas a single dose of PRP provided effective pain relief for at least 6 months.

**CONCLUSION:**

This was meticulously conducted to compare the therapeutic efficacy of a single dose of Platelet-Rich Plasma (PRP) versus a single dose of steroid injection in patients diagnosed with chronic recalcitrant lateral epicondylitis who did not respond adequately to conservative management.

Our findings revealed that both PRP and steroid injections effectively reduce pain and improve function in these patients, contributing significantly to their quality of life. However, in a comparative context, PRP injections were found to yield superior results. The PRP group demonstrated significantly better functional outcomes, as evidenced by the substantial improvement in the Patient Related Tennis Elbow Evaluation (PRTEE) score from baseline to six months (67.24 to 3.82; $p < 0.001$). Moreover, PRP treatment led to more effective pain relief, indicated by a marked reduction in Visual Analogue Scale (VAS) scores from baseline to six months (6.67 to 0.54; $p < 0.001$).

The superiority of PRP is crucial because the treatment of chronic recalcitrant lateral epicondylitis has long been a challenging endeavour for clinicians. Not only does this finding increase the array of effective treatment options, but it also provides patients with a potentially preferred alternative that employs their body's healing mechanisms.

It is worth noting, however, that while this study contributes to the accumulating evidence supporting the use of PRP in treating lateral epicondylitis, further research is necessary. Future studies should aim to optimize PRP preparation methods, dosages, and administration techniques to further enhance its clinical efficacy. Larger studies with longer follow-up periods will also be valuable to provide more robust evidence regarding the sustained effectiveness and long-term outcomes of PRP treatment in this population.

Finally, while this study focused on PRP versus steroids, exploring PRP in combination with other treatment modalities, or comparing it to other emerging treatments, could be a valuable direction for future research, ultimately contributing to improved patient care in chronic recalcitrant lateral epicondylitis.

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