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Clinical Outcomes of Treatment of Lateral Epicondylitis with Platelet-Rich Plasma versus Corticosteroid Injection - A Prospective Randomized Comparative Study.

[1]Dr. G. Yamini Vishnu Priya, [2]Dr. Avvaru Jyothsna, [3*]Dr. Soyal Rao Batchu, [4]Dr. M. Niranjan Naik.

[1]Associate Professor, Department of Orthopaedics Government Medical College, Kadapa, Andhra Pradesh, India.

[2]Assistant Professor, Department of Orthopaedics, Government Medical College, Kadapa, Andhra Pradesh, India.

[3] Associate Professor, Department of Orthopaedics, Government Medical College, Kadapa, Andhra Pradesh, India.

[4]Postgraduate, Department of Orthopaedics, Government Medical College, Kadapa, Andhra Pradesh, India.

Correspondence:
Dr. Soyal Rao Batchu.
Associate Professor, Department of Orthopaedics, Government Medical College, Kadapa, Andhra Pradesh, India.

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Abstract

Background: A frequent degenerative tendinopathy of the elbow that results in pain, diminished grip strength, and functional impairment is lateral epicondylitis. Corticosteroid injections can quickly relieve symptoms, but their long-term efficacy remains limited. A biological treatment rich in growth factors, PRP (Platelet-Rich Plasma) has become popular as a regenerative therapy to aid with tendon regeneration. This study compared the clinical results of PRP and corticosteroid injections in patients with chronic lateral epicondylitis***Methods:***A prospective randomized comparative study was conducted in the Department of Orthopaedics, Government Medical College and Hospital, Kadapa, from March 2024 to March 2026. Eighty patients with chronic lateral epicondylitis were randomly allocated into two groups: Group A (n=40) received 3–4 ml of autologous PRP, while Group B (n=40) received 40 mg triamcinolone acetonide with 1% lignocaine. The VAS (Visual Analogue Scale) and DASH (Disabilities of the Arm, Shoulder, and Hand) scores were used to measure pain and functional results at baseline, 4, 8, and 12 weeks. Paired and independent student's t-tests were used for statistical analysis, with $p<0.05$ being regarded as statistically significant. ***Results:*** The mean age of participants was 44.8±8.6 years, with female predominance (65%) and right-sided involvement (88.75%). Baseline VAS and DASH scores were comparable between groups ($p>0.05$). At 4 weeks, the corticosteroid group demonstrated significantly greater pain relief (VAS, $p<0.001$). By 8 weeks, both groups showed similar pain and functional outcomes. At 12 weeks, PRP produced significantly better functional improvement, with lower DASH scores than the corticosteroid group ($p=0.002$), while VAS scores remained comparable. Both interventions significantly improved pain and function from baseline ($p<0.001$), and no major complications were observed. ***Conclusion:*** Both PRP and corticosteroid injections are effective in managing chronic lateral epicondylitis. Corticosteroids provide faster short-term pain relief, whereas PRP offers superior functional recovery and sustained clinical benefits at 12 weeks, making it a preferable option for long-term management.

Keywords: Lateral Epicondylitis, Platelet-Rich Plasma, Corticosteroid Injection, Visual Analogue Scale, DASH Score, Functional Outcome.

INTRODUCTION

Tennis elbow, or lateral epicondylitis, is a common musculoskeletal condition caused by repetitive overuse of the forearm extensor tendons, especially the extensor carpi radialis brevis. It is characterised by discomfort and soreness across the lateral epicondyle.[1] Histopathological research has shown that, despite being traditionally thought of as an inflammatory condition, it is actually primarily a degenerative tendinopathy with minimal inflammatory cell infiltration, angiofibroblastic hyperplasia, collagen disarray, fibroblast proliferation, and neovascularisation.[2].

The condition affects approximately 1–3% of the adult population and is most frequently observed in individuals engaged in repetitive wrist extension, gripping, and forearm rotational activities.[3] Despite its association with racquet sports, most affected individuals are non-athletes, with the disorder commonly occurring among manual labourers, agricultural workers, and homemakers in India. Lateral epicondylitis is most prevalent during the fourth and fifth decades of life and often results in significant pain, reduced grip strength, and impaired performance of daily activities.

Conservative treatment, including rest, activity modification, analgesics, physiotherapy, and counterforce bracing, remains the initial management strategy for most patients. However, when symptoms persist despite adequate conservative therapy, local injection treatments are frequently employed. Corticosteroid injections have long been considered the standard injectable treatment because they provide rapid pain relief and early functional improvement.[4] Nevertheless, their long-term efficacy is limited, with many patients experiencing recurrence of symptoms and declining clinical benefits over time.[5]

Recently, regenerative therapies have attracted considerable attention as alternatives to conventional treatment. Instead of only reducing symptoms, autologous PRP (Platelet-Rich Plasma), which has a high concentration of platelets and growth factors, is meant to encourage tendon healing by boosting tissue regeneration.[6] When compared to corticosteroid injections, PRP has been shown in numerous comparative studies to provide better long-term pain relief and functional improvement, especially in cases of chronic lateral epicondylitis.[7] However, variations in PRP preparation methods, platelet concentration, injection techniques, and follow-up duration have resulted in inconsistent findings across studies.[6,7]

AIMS AND OBJECTIVES

The purpose of this study was to examine the efficacy of corticosteroid injections and autologous PRP in the treatment of lateral epicondylitis in terms of pain alleviation and functional improvement during short-term follow-up. In particular, the study examined the clinical results of both treatment methods at 4, 8, and 12 weeks after injection, evaluated pain reduction using the VAS, and evaluated functional outcomes using the DASH score.

MATERIALS AND METHODS

Study Design

This study was conducted in the Department of Orthopaedics at Government Medical College and Hospital, Kadapa, over a period of two years from March 2024 to March 2026. It was designed as a prospective randomized comparative trial involving 80 clinically diagnosed patients with lateral epicondylitis. The study aimed to compare the effectiveness of autologous PRP injections and corticosteroid injections in terms of pain reduction and improvement in functional outcomes during short-term follow-up.

Inclusion and Exclusion Criteria

The study included patients between the ages of 18 and 60 who had been clinically diagnosed with lateral epicondylitis and who presented with pain over the lateral epicondyle for more than three months, tenderness over the lateral epicondyle, pain exacerbated by resisted wrist dorsiflexion, and a positive Mill's or Cozen's test. The study excluded patients with rheumatoid arthritis, cervical radiculopathy, prior elbow surgery, corticosteroid injections administered to the affected elbow within the previous three months, uncontrolled hypertension or diabetes mellitus, local injection site infection, or anticoagulant therapy.

Sample Size Calculation

Sample size was determined based on the primary outcome measure-pain relief assessed by the VAS. As the study compared mean values between two independent groups, the standard formula for comparison of means using the independent Student's t-test was applied.[8]

The formula applied was:

$n = 2 \times (Z_{1-\alpha/2} + Z_{1-\beta})^2 / d^2$

Where $Z_{1-\alpha/2} = 1.96$ (for 5% significance level) and $Z_{1-\beta} = 0.84$ (for 80% power).

With 40 patients per group, this study was powered to detect standardized effect size of approximately 0.63, corresponding to a moderate treatment effect. Effect sizes of similar magnitude have been reported in earlier comparative studies of PRP and corticosteroid injections in case of lateral epicondylitis.[9]

Therefore, a total of 80 patients (40 per group) were included in this prospective randomized comparative study.

Data Collection Tools

A standardised clinical evaluation proforma comprising patient demographics, clinical examination results, treatment information, and follow-up records was used to gather data. The VAS, a 100-mm scale with a range of 0 (no pain) to 100 (severe pain), was used to measure the degree of pain. The DASH questionnaire, a validated 30-item test with scores ranging from 0 to 100, was used to assess functional outcome. Higher scores indicate greater upper limb disability.

Data Collection Procedure

Eligible patients diagnosed with lateral epicondylitis were enrolled after obtaining informed consent and allocated to receive either autologous PRP or corticosteroid injection. PRP was prepared under aseptic conditions from the patient's

venous blood using a standardized centrifugation technique and injected at the common extensor tendon origin using the peppering technique. The corticosteroid group received 40 mg triamcinolone acetonide mixed with 1% lignocaine using the same technique. All patients received standardized post-injection care and rehabilitation advice. A standardised clinical evaluation proforma comprising patient demographics, clinical examination results, treatment information, and follow-up records was used to gather data.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using appropriate statistical methods. Descriptive statistics were expressed as mean and standard deviation. Intragroup comparisons of outcome measures at different follow-up intervals were performed using the paired t-test, while intergroup comparisons between the PRP and corticosteroid groups were carried out using the independent sample t-test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The age distribution of the study's patients is shown in Table 1. The bulk of patients were between the ages of 41 and 50, suggesting that middle-aged adults were most frequently affected with lateral epicondylitis**.**

Table 1: Age-Wise Distribution of Patients with Lateral Epicondylitis (N = 80)

Age Group (in years)	Number of Patients	Percentage (%)
18–30	2	2.5
31–40	22	27.5
41–50	38	47.5
51–60	18	22.5
Total	**80**	**100**

Table 2 presents the baseline comparison of pain (VAS) and functional disability (DASH) scores between the PRP and corticosteroid groups before treatment. There was **no statistically significant difference** between the two groups at baseline ($p > 0.05$), confirming that both groups were comparable before intervention.

Table 2: Baseline Comparison of VAS and DASH Scores between PRP and Steroid Groups

Parameter	PRP Group (Mean ± SD)	Steroid Group (Mean ± SD)	p-value
VAS	68.4 ± 7.3	67.2 ± 6.8	0.49
DASH	58.6 ± 8.1	57.2 ± 7.6	0.43

Table 3 compares the mean VAS and DASH scores between the PRP and steroid groups during follow-up. Steroid injections produced significantly better pain relief at **4 weeks**, whereas by **12 weeks,** the PRP group demonstrated significantly better functional improvement as reflected by lower DASH scores.

Table 3: Intergroup Comparison of VAS and DASH Scores at 4, 8 and 12 Weeks

Follow-up	PRP VAS (Mean ± SD)	Steroid VAS (Mean ± SD)	p-value	PRP DASH (Mean ± SD)	Steroid DASH (Mean ± SD)	p-value
4 Weeks	54.5 ± 7.4	47.6 ± 7.0	<0.001	43.4 ± 8.0	42.0 ± 7.5	0.43
8 Weeks	44.1 ± 6.8	43.3 ± 6.9	0.57	34.8 ± 7.4	35.8 ± 7.2	0.55
12 Weeks	36.5 ± 6.5	37.8 ± 6.7	0.37	29.1 ± 6.8	34.0 ± 7.0	0.002

Table 4 demonstrates the improvement in pain and functional disability among patients treated with PRP injection. Both VAS and DASH scores showed a **highly significant reduction** from baseline to 12 weeks ($p < 0.001$).

Table 4: Reduction in Mean VAS and DASH Scores from Baseline to 12 Weeks in the PRP Group

Parameter	Baseline	12 Weeks	Mean Reduction	Percentage Reduction	p-value
VAS – PRP	68.4	36.5	31.9	46.6%	<0.001
DASH – PRP	58.6	29.1	29.5	50.3%	<0.001

Table 5 shows the improvement in pain and functional disability following corticosteroid injection. Both outcome measures improved significantly over the 12-week follow-up period ($p < 0.001$).

Table 5: Reduction in Mean VAS and DASH Scores from Baseline to 12 Weeks in the Steroid Group

Parameter	Baseline	12 Weeks	Mean Reduction	Percentage Reduction	p-value
VAS – Steroid	67.2	37.8	29.4	43.8%	<0.001
DASH – Steroid	57.2	34.0	23.2	40.6%	<0.001

Table 6 compares the overall improvement achieved with PRP and corticosteroid injections after 12 weeks. Although both treatments produced comparable pain relief, the PRP group demonstrated **greater reduction in both VAS and DASH scores**, particularly with superior functional improvement.

Table 6: Comparison of Mean Reduction in VAS and DASH Scores between PRP and Steroid Groups

Parameter	PRP Mean Reduction	Steroid Mean Reduction	Difference (PRP − Steroid)
VAS	31.9	29.4	+2.5
DASH	29.5	23.2	+6.3

DISCUSSION

In patients with chronic lateral epicondylitis, the current prospective randomised comparative trial assessed the therapeutic results of corticosteroid injections and autologous PRP. Using the VAS and DASH score, the main goal was to compare the two therapy modalities in terms of pain reduction and functional improvement over a 12-week follow-up period. The findings demonstrated that although corticosteroid injections provided faster pain relief during the early follow-up period, PRP resulted in superior functional recovery by the end of 12 weeks, supporting its role as a regenerative treatment for chronic tendinopathy.

Demographic Characteristics

The majority of patients in the present study were females (65%), while males constituted 35% of the study population. This female predominance is comparable with the findings reported by Chen et al.[10] who also observed a higher incidence of lateral epicondylitis among women in Indian populations. Similar observations have been reported in several other Indian studies, suggesting that repetitive domestic activities involving prolonged gripping, lifting, and wrist extension may contribute to the higher prevalence among females. However, international studies have shown variable gender distribution, with some reporting equal gender involvement and others demonstrating slight male predominance depending on occupational exposure and lifestyle characteristics.[3]

Right-sided involvement was observed in 88.75% of patients, indicating a clear predominance of the dominant upper limb. This finding is consistent with previous reports that identified repetitive mechanical loading of the dominant extremity as an important etiological factor in lateral epicondylitis.[3] Comparable right-sided predominance has been reported by Kumar et al.[9] further supporting the association between repetitive occupational or household activities and tendon degeneration.

Nearly half of the patients were between the ages of 41 and 50. The participants' mean age was 44.8 ± 8.6 years. This age distribution closely resembles the epidemiological findings of Shiri et al.[3] and supports the concept that lateral epicondylitis is primarily a degenerative disorder affecting middle-aged adults. Age-related reduction in tendon vascularity, collagen quality, and healing potential probably contributes to the increased susceptibility observed during the fourth and fifth decades of life.[11] Although Cho et al.[12] and Walker-Bone et al.[13] reported a slightly older peak age group, these differences may reflect variations in occupational patterns and demographic characteristics.

Baseline Comparability

The two treatment groups were comparable at baseline with respect to both pain intensity and functional disability. The mean baseline VAS scores were 68.4 ± 7.3 in the PRP group and 67.2 ± 6.8 in the corticosteroid group, while the corresponding DASH scores were 58.6 ± 8.1 and 57.2 ± 7.6, respectively. None of these differences reached statistical significance, indicating successful randomization and comparable disease severity before treatment. Similar baseline equivalence has been reported in the randomized controlled trials conducted by Peerbooms et al.,[14] and Gosens et al.[15] thereby strengthening the internal validity of the present study.

Pain Outcomes

Pain reduction was observed in both treatment groups throughout the follow-up period. However, the pattern of improvement differed between the two interventions.

At four weeks, the corticosteroid group demonstrated significantly lower VAS scores than the PRP group, indicating superior short-term pain relief. This observation agrees with the findings of Smidt et al.[4] and Coombes et al.[5] who reported that corticosteroid injections provide rapid symptomatic improvement due to their potent anti-inflammatory

effects. Suppression of secondary inflammatory mediators can offer instant pain relief, even though lateral epicondylitis is now understood to be a degenerative tendinopathy rather than a strictly inflammatory illness. In contrast, PRP showed a slower onset of action, which is expected because its therapeutic effect depends on gradual biological healing through platelet-derived growth factors rather than immediate analgesia.[6]

By the eighth week, pain scores in both groups became comparable without any statistically significant difference. This finding indicates that the early advantage associated with corticosteroid injection gradually diminished over time. Similar observations have been reported by Coombes et al.[5], Smidt et al.[4] and Peerbooms et al.[14] The progressive improvement observed in the PRP group during this period is likely attributable to enhanced fibroblast proliferation, collagen synthesis, angiogenesis, and tissue remodeling mediated by platelet-derived growth factors.[16,17]

Although there was no statistically significant difference, the PRP group's VAS scores at twelve weeks were marginally lower than those of the corticosteroid group. This trend is consistent with previous randomized trials by Peerbooms et al.[14] and Gosens et al.[15] as well as meta-analyses conducted by Fitzpatrick et al.[18] and Arirachakaran et al.[9] which reported better long-term pain control with PRP. However, due to variations in PRP preparation methods, platelet concentration, injection procedures, and patient selection, some systematic reviews have documented variable results.[7] Overall, the present findings support the growing evidence that corticosteroids provide rapid but temporary pain relief, whereas PRP offers gradual and sustained clinical improvement.

Functional Outcomes

Functional recovery, assessed using the DASH score, demonstrated an interesting pattern during follow-up. Both groups showed improvement from baseline, indicating that both treatment modalities were effective in reducing disability.
Even though corticosteroids provide better pain alleviation after four weeks, there was no statistically significant difference between the two groups' DASH scores. Similar early functional improvement following corticosteroid injection has been reported by Smidt et al.[4] The comparable functional outcomes during the initial follow-up probably reflect the combined influence of pain reduction in the corticosteroid group and the early regenerative activity initiated by PRP.

At eight weeks, continued improvement was observed in both groups, but the corticosteroid group appeared to reach a plateau, whereas functional recovery continued progressively in the PRP group. Similar findings have been reported by Peerbooms et al.[14] suggesting that PRP-mediated tendon healing becomes increasingly evident during intermediate follow-up.

The PRP group showed greater functional recovery by twelve weeks, as evidenced by considerably lower DASH scores compared to the corticosteroid group. This finding suggests that PRP not only relieves symptoms but also improves tendon quality and mechanical strength through biological repair. Similar long-term functional superiority of PRP has been demonstrated by Peerbooms et al.[14] Gosens et al.[15] Fitzpatrick et al.[18] and Arirachakaran et al.[19] Comparable results have also been reported from Indian studies by Kumar et al.[9]

Relationship Between Pain Relief and Functional Recovery

An important observation in the present study was that pain relief and functional improvement did not always occur simultaneously. Although pain scores were comparable between the two groups at 12 weeks, functional outcomes remained significantly better in the PRP group. This suggests that restoration of tendon function depends not only on pain reduction but also on structural healing of the diseased tendon. Corticosteroids primarily provide symptomatic relief without reversing tendon degeneration, whereas PRP stimulates biological repair through growth factor-mediated regeneration.[16,17] Consequently, PRP offers more sustained restoration of upper limb function and may reduce the likelihood of symptom recurrence.

Overall Clinical Implications

The findings of the present study demonstrate that both PRP and corticosteroid injections are effective treatment options for chronic lateral epicondylitis, although their mechanisms and clinical benefits differ. Corticosteroid injections are particularly useful when rapid pain relief is required, allowing early return to daily activities. However, their beneficial effects diminish over time because they do not address the underlying degenerative pathology. In contrast, PRP promotes tendon healing through biological regeneration, resulting in progressive improvement and superior functional recovery. These observations are consistent with previous randomized trials and recent meta-analyses by Mishra et al.[6] Krogh et al.[7] Chen et al.[10]

The present study supports the use of corticosteroid injections for immediate symptomatic relief and PRP therapy for patients requiring durable functional recovery and long-term clinical improvement. These findings are in agreement with

both Indian and international literature and reinforce the growing preference for regenerative therapies in the management of chronic lateral epicondylitis.

LIMITATIONS

The present study has certain limitations. The follow-up period was limited to 12 weeks, which restricted the assessment of long-term clinical outcomes, including symptom recurrence and the sustained effectiveness of the interventions beyond three months. In addition, as this was a single-center study conducted in a teaching hospital, the findings may not be fully generalizable to patients in other healthcare settings, including rural hospitals and private practice environments.

CONCLUSION

The findings of the present study indicate that in patients with chronic lateral epicondylitis, autologous PRP injections provide superior functional improvement at 12 weeks compared to corticosteroid injections, as demonstrated by significantly better DASH scores. Although corticosteroid injections offer faster pain relief during the early follow-up period, particularly at 4 weeks, this advantage gradually diminishes, resulting in comparable pain outcomes between the two groups by 12 weeks. These findings suggest that PRP more effectively addresses the underlying degenerative tendon pathology through biological stimulation and tissue regeneration, leading to progressive, sustained, and longer-lasting clinical benefits.

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