

# Comparative Analysis of Platelet Rich Plasma and Corticosteroid Injection in Lateral Epicondylitis

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**Abstract:** ***Background:** Lateral epicondylitis, also known as 'tennis elbow', is a very common condition affecting mainly middle - aged patients that is associated with local tendon pathology, alteration in pain perception and motor impairment. Several approaches to conservative treatment have been proposed, the most frequently used is PRP. Platelet - rich plasma (PRP) is a growing modality for tissue healing, regeneration and has more pain relief lasting effect. **Aim of the work:** was to evaluate the outcome of platelet - rich plasma injections and to compare the results of platelet - rich plasma injections in the treatment of lateral epicondylitis in terms of pain relief and functional improvement with corticosteroid injection quoted in literature. **Patients and Methods:** This was a prospective study conducted on 45 patients with symptomatic lateral epicondylitis (site of pain and tenderness) diagnosed with clinical examination like COZEN'S TEST (pain elicited with the active extension of the wrist with the forearm in pronation and elbow in extension) and WRINGING TEST were included in the study. Patients aged 18 years or above with closed physis of either sex with the clinical diagnosis of lateral epicondylitis not responding to conservative treatment like NSAIDs, rest, or hot fomentation in the last 3 - 6 months were included in the study. Patients with a history of acute elbow trauma, elbow arthritis, patients requiring anti - platelet medication for the treatment of ischemic heart disease, cerebrovascular accidents or other medical conditions, any previous elbow surgeries, other causes of elbow pain such as Osteochondritis of the capitulum, Posterior interosseous nerve syndrome, synovitis of radio humeral joint, cervical radiculopathy were excluded. Freshly prepared PRP of 1 ml was injected at the most tender site over the lateral epicondyle. Pre - injection VAS, Nirschl grading, qDASH9 score, radiograph of elbow AP/LATERAL, and hematological investigation (CBC, Coagulation profile) were recorded. **Results:** A total of 45 patients were enrolled in this study out of which 16 patients (35.56 %) were in between 31 to 40 years age group which was more prevalent and the minimum and maximum age was 18 and 63 years respectively. 20 (44.44%) were males and 25 (55.56%) were females. Mean VAS before PRP injection, after 3 weeks, 3 months and 6 months were  $6.57 \pm 1.30$ ,  $4.68 \pm 1.09$ ,  $2.82 \pm 1.06$ ,  $1.72 \pm 1.04$  respectively, Mean nirschl before PRP injection, after 3 weeks, 3 months and 6 months were  $5.37 \pm 0.94$ ,  $3.66 \pm 0.84$ ,  $2.13 \pm 0.74$ ,  $1.55 \pm 0.71$  respectively, and Mean qdash9 scores before PRP injection, after 3 weeks, 3 months and 6 months were  $67.65 \pm 13.04$ ,  $48.76 \pm 9.49$ ,  $32.39 \pm 9.43$ ,  $17.58 \pm 9.22$  respectively, which were significantly improved in the follow up. **Conclusion:** It could be concluded that Intra - tendinous PRP injections at the most tender site in patients of lateral epicondylitis is a valid treatment option. Single injection of PRP is as effective as multiple injections and more efficacious than steroid in treatment of lateral epicondylitis. The limitation of this study are small study group, absence of a control, short term follow up, no sonographic evaluation was done.*

**Keywords:** Platelet Rich Plasma, Corticosteroid Injection, Lateral Epicondylitis

## 1. Introduction

The upper limb plays an important role in the daily life of every individual. Among the conditions of the arm, tennis elbow is one of the commonly occurring conditions<sup>1</sup>.

The diagnosis of lateral epicondylitis was first made by Runge F in 1873, the author described lateral humeral condylar tenderness and difficulty in writing<sup>2</sup>. In 1882, Morris coined the term "lawn tennis elbow" as he found the condition was associated with the tennis backhand stroke<sup>3</sup>. Over time, this entity became known as "tennis elbow" or lateral epicondylitis. It is important to realize that the term "tennis elbow" is a misnomer as golfers, baseball players, clothing pressers, salesmen carrying grips, violinists, blacksmiths, telephone operators, and homemakers are all susceptible to this condition.

It is generally a work - related or sport - related pain disorder usually caused by excessive quick, monotonous, repetitive eccentric contractions and gripping activities of the wrist. Tennis elbow affects 1% to 3% of the adult population<sup>4</sup>.

The histological findings include granulation tissue, micro - rupture, an abundance of fibroblasts, vascular hyperplasia, unstructured collagen, and a notable lack of traditional inflammatory cells (macrophages, lymphocytes, neutrophils) within the tissue<sup>5</sup>.

The effectiveness of oral non - steroidal anti - inflammatory agents, topical and injectable medications including corticosteroids (CS), splinting and physical therapy has been evaluated in many studies. However, these therapies do not alter the tendon's inherent poor healing properties secondary to poor vascularization<sup>6</sup>. Given the inherent nature of the tendon, the treatment options including platelet - rich plasma (PRP), and autologous blood are aimed at inducing inflammation rather than suppressing it<sup>7</sup>.

Due to the higher concentration of platelets in PRP than whole blood, it was shown to have a greater effect on the repair process in the treatment of chronic nonhealing tendinopathies including tennis elbow<sup>7</sup>. Local corticosteroid injection works by suppressing inflammatory processes and recurrence is higher, probably due to permanent adverse

changes within the tendon and partially due to overuse of the arm after injection, as a result of direct pain relief<sup>8</sup>.

PRP is derived from the centrifugation of autologous blood, resulting in higher platelet concentrations than that of the original sample. The rationale behind its use lies in its potential ability to provide growth factors to the relatively avascular diseased tendon, thus promoting tissue healing and tendon regeneration<sup>9</sup>.

PRP has gained significant attention in orthopedic and sports medicine communities in the past decade, largely due to the promising results of pre-clinical laboratory studies. In practice, PRP is applied by single or multiple injections to the area of maximal tenderness.<sup>10</sup> PRP can potentially enhance tendon healing and tissue regeneration by delivering various growth factors and cytokines, thereby affecting cell proliferation, chemotaxis, cell differentiation, and angiogenesis.

This study is proposed to compare the effectiveness of PRP injection in reducing pain and improving function in patients with lateral epicondylitis.

## 2. Material and Method

The present study was conducted in the department of orthopaedics at Chhatrapati Shivaji Subharti Hospital affiliated to N. S. C. B Subharti Medical College of Swami Vivekanand University, Meerut, over 2 years from November 2020 to November 2022.

### Study Design:

Prospective study

### Sample size:

The study was conducted on 45 patients, attending the outpatient department (OPD). Patients with symptomatic lateral epicondylitis (site of pain and tenderness) diagnosed with clinical examination like COZEN'S TEST (pain elicited with the active extension of the wrist with the forearm in pronation and elbow in extension) and WRINGING TEST were included in the study.

### Selection of Subject

#### Inclusion criteria:

Patients aged 18 years or above with closed physis of either sex with the clinical diagnosis of lateral epicondylitis not responding to conservative treatment like NSAIDs, rest, or hot fomentation in the last 3 - 6 months.

#### Exclusion criteria:

Patients with a history of acute elbow trauma, elbow arthritis, patients requiring anti-platelet medication for the treatment of ischemic heart disease, cerebrovascular accidents or other medical conditions, any previous elbow surgeries, other causes of elbow pain such as Osteochondritis of the capitulum, Posterior interosseous nerve syndrome, synovitis of radio humeral joint, cervical radiculopathy.

#### Procedure

Patients were prospectively studied for platelet-rich plasma injection. Pre-injection VAS, Nirschl grading, qDASH9 score, radiograph of elbow AP/LATERAL, and hematological investigation (CBC, Coagulation profile) were recorded. The procedure was explained to the patient and consent was taken. Freshly prepared PRP of 1 ml was injected at the most tender site over the lateral epicondyle.

#### Outcome Evaluation:

The patient was evaluated for pain and functional deficit. The pain was evaluated by visual analog scale (VAS) (1 to 10) and Nirschl grading (phases 1 to 7) and qDASH Scoring. All patients were given only a single injection to see the primary effect of mentioned use. In follow up the score of the visual analog scale, Nirschl grade, and qDASH score were recorded at 3 weeks, 3 months, and 6 months.

## 3. Result and Observation

The present study was conducted on 45 patients who were randomly selected according to age and sex, to compare the results of platelet-rich plasma injection in the treatment of lateral epicondylitis in terms of pain relief and functional improvement with corticosteroid injection quoted in the literature. The study sample comprised the prospective group.

The findings and the results are documented and further interpreted as follows.

A total of 45 patients were enrolled in this study out of which 1 patient (2.22 %) was between 18 to 20 years, 12 patients (26.67 %) were between the age of 21 to 30 years and 16 patients (35.56 %) were in between 31 to 40 years age group, 9 patients (20 %) were between the age of 41 to 50 years and 5 patients (11.11 %) were in between 51 to 60 years age group, 2 patients (4.44 %) were between the age of 61 to 70 years. The minimum age was 18 years and the maximum was 63 years. The mean age was 38.51 years. 20 (44.44%) were males and 25 (55.56%) were females.

**Table 1:** Mean value of VAS score at pre-treatment, 3 weeks, 3 months, and 6 months

S. No.	Parameter	Mean $\pm$ S. D			
		At the initial clinical assessment	At 3 week follow up	At 3 month follow up	At 6 months
1	PRP	6.57 $\pm$ 1.30	4.68 $\pm$ 1.09	2.82 $\pm$ 1.06	1.72 $\pm$ 1.04

Mean VAS scores were calculated before PRP injection, after 3 weeks, 3 months and 6 months. The mean Total VAS score before PRP injection was 6.57  $\pm$  1.30. There was significant improvement at 3 weeks follow up which was 4.68  $\pm$  1.09, at 3 month follow up the total score was 2.82

$\pm$  1.06 and till 6 month follow up the improvement continued and the mean total score was 1.72  $\pm$  1.04. The scores at follow up were also found to be statistically significantly different from pre-injection scores ( $p$  value = 0.000).

**Table 2:** Mean value of NIRSCHL score at initial clinical assessment, 3 weeks, 3months and 6 months

S. No.	Parameter	Mean $\pm$ S. D			
		At the initial clinical assessment	At 3 week follow up	At 3 month follow up	At 6 months
1	PRP	5.37 $\pm$ 0.94	3.66 $\pm$ 0.84	2.13 $\pm$ 0.74	1.55 $\pm$ 0.71

Mean NIRSCHL scores were calculated before PRP injection, after 3 weeks, 3 months, and 6 months. The mean Total NIRSCHL score before PRP injection was 5.37  $\pm$  0.94. There was significant improvement at 3 weeks follow up which was 3.66  $\pm$  0.84, at 3 months follow up the total score

was 2.13  $\pm$  0.74 and till 6 month follow up the improvement continued and the mean total score was 1.55  $\pm$  0.71. The scores at follow up were also found to be statistically significantly different from pre - injection scores ( $p$  value = 0.000).

**Table 3:** Mean value of QUICK DASH - 9 score at initial clinical assessment, - week, 3 - month, and 6 month

S. No.	Parameter	Mean $\pm$ S. D			
		At the initial clinical assessment	At 3 week follow up	At 3 month follow up	At 6 months
1	PRP	67.65 $\pm$ 13.04	48.76 $\pm$ 9.49	32.39 $\pm$ 9.43	17.58 $\pm$ 9.22

Mean QDASH - 9 scores were calculated before PRP injection, after 3 weeks, 3 months, and 6 months. The mean Total QDASH - 9 score before PRP injection was 67.65  $\pm$  13.04. There was significant improvement at 3 weeks follow up which was 48.76  $\pm$  9.49, at 3 months follow up the total

score was 32.39  $\pm$  9.43 and till 6 month follow up the improvement continued and the mean total score was 17.58  $\pm$  9.22. The scores at follow up were also found to be statistically significantly different from pre - injection scores ( $p$  value = 0.000).

**Table 4:** Shows Total VAS, NIRSCHL and QDASH9 at baseline, 3 week, 3 month and 6 month respectively

S. No.	Parameter	Mean $\pm$ S. D			
		At Initial Clinical Assessment	At 3 week follow up	At 3 month follow up	At 6 months
1	VAS	6.57 $\pm$ 1.30	4.68 $\pm$ 1.09	2.82 $\pm$ 1.06	1.72 $\pm$ 1.04
2	NIRSCHL	5.37 $\pm$ 0.94	3.66 $\pm$ 0.84	2.13 $\pm$ 0.74	1.55 $\pm$ 0.71
3	QDASH9	67.65 $\pm$ 13.04	48.76 $\pm$ 9.49	32.39 $\pm$ 9.43	17.58 $\pm$ 9.22

For comparing mean values at initial assessment with effect of PRP after 3 week, 3 month and 6 month respectively paired  $t$  - test was applied and  $p$  value for Total VAS, NIRSCHL, and QDASH9 was  $<0.05$  at 3 week, 3 month, 6 month respectively. Therefore the findings were highly significant at 3 week, 3 month and 6 month.

#### 4. Discussion

The elbow joint is the articulation between the humerus, ulna and radius<sup>11</sup>. Musculotendinous unit that crosses the elbow joint helps in positioning the arm and hand. The lateral epicondyle of the humerus is a pyramid - shaped bony prominence which gives origin to the anconeus, extensor carpi radialis brevis (ECRB), extensor digitorum communis (EDC), and extensor carpi radialis longus (ECRL)<sup>12</sup>. Among these, the ECRB is the most affected tendon.

The term "epicondylitis" falsely implies an inflammatory reaction. Excised ECRB tendon in patients with lateral epicondylitis has shown the normal tissue of ECRB invaded by immature fibroblasts and non - functional vascular buds, with disorganized surrounding and hypercellular tissue. This finding led Nirschl et al. to coin the term "angiofibroblastic tendinosis"<sup>13, 14</sup>. Despite the absence of inflammation, patients with lateral epicondylitis complain of pain, particularly during activities requiring wrist extension. Elevated levels of substance - P, calcitonin gene - related peptide, and glutamate have been found within the ECRB tendon in patients with chronic tennis elbow, thus offering another etiology for pain<sup>15, 16</sup>. The cause of pain and disability in lateral epicondylitis is unknown. It is likely to be multifactorial with an emphasis on repetitive

microtrauma and overuse. Tennis elbow affects 1% to 3% of the adult population<sup>4</sup> in the fourth and fifth decade of life.

The treatment of LE varies widely from "watchful waiting" to nonsteroidal anti - inflammatory drugs, physical therapies including exercise, bracing, injection therapies, and, lastly surgery. Glucocorticoid injections have been used since the 1950s, and for many years have been the treatment of choice<sup>17</sup>. The reduction in tendon thickness observed after glucocorticoid injection showed a reduction in tendon thickness under ultrasound in both patellar and Achilles tendons<sup>18</sup>.

During last few years, several new therapies have become available that focus on the use of growth factors (GFs), as a stimulant of tendon repair. Platelet - rich plasma (PRP) is blood plasma with an increased concentration of autologous platelets. Platelet - derived GFs are not only known to enhance the recruitment, proliferation, and differentiation of cells but are also thought to play a role in angiogenesis and inflammation<sup>19</sup>. PRP also includes three proteins in the blood known to act as cell adhesion molecules: fibrin, fibronectin, and vitronectin<sup>20</sup>.

In our study 45 patients were enrolled with complete follow - ups. This was a prospective study the purpose was to compare the results of platelet - rich plasma injection in the treatment of lateral epicondylitis in terms of pain relief and functional improvement with corticosteroid injection quoted in the literature.

Most of the patients (35.56%) were in the age group of 31 - 40 years. The minimum age was 18 years and the maximum was 63 years. The mean age was 38.51 years. With females (55.56%) more commonly involved than males.

It was seen that most patients had gradual but highly significant improvement in symptoms at the time of follow ups.

## 5. Conclusion

- Intra - tendinous PRP injections at the most tender site in patients of lateral epicondylitis is a valid treatment option.
- Single injection of PRP is as effective as multiple injections and more efficacious than steroid in treatment of lateral epicondylitis.
- The limitation of this study is small study group, absence of a control, short term follow up, no sonographic evaluation was done.

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