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Original Research Article

# A Study to Evaluate the Efficacy of Platelet Rich Plasma Injection in Patients of Chronic Lateral Epicondylitis (Study of 25 cases)

**B. L. Khajotia[1], Ajay Kumar Bokolia[2], Pradeep Singh Shekhawat[3], Kapil Meena[4], Mukesh Kumar Saini[5]**

[1]Senior Professor and HOD, Department of Orthopaedics, S. P. Medical College and Associated Group of Hospitals, Bikaner (Raj.)

[2]Resident Doctor, Department of Orthopaedics, S. P. Medical College and Associated Group of Hospitals, Bikaner (Raj.)

[3]Assist. Professor, Department of Orthopaedics, S. P. Medical College and Associated Group of Hospitals, Bikaner (Raj.)

[4,5]Resident Doctor Department of Orthopaedics, S. P. Medical College and Associated Group of Hospitals, Bikaner (Raj.)

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**Corresponding Author: Ajay Kumar Bokolia**

**Conflict of interest: Nil**

**Abstract:**

**Background:** Tennis elbow is a condition where the outer part of the elbow become sore and tender. It is a painful and debilitating condition, caused by angiofibroblastic hyperplasia of the tendinous origin of extensor carpi radialis brevis (ECRB) muscle. The disorder develops insidiously and is usually related to repetitive and strenuous physical activity and stress, mostly applied to the origin of the extensor carpi radialis brevis.

**Methods:** This study was carried out prospectively on patients attending Out Patient Department of orthopedics, Sardar Patel Medical College, Bikaner with Chronic lateral epicondylitis between the age of 18-70 years of both male and female gender.

**Results:** In male patients grip strength has been improved from 50% to 79.2% following injection at the end of 6th months. In female patients grip strength has been improved from 20% to 80% following injection at the end of 6th months.

**Conclusion**: We conclude that PRP injection significantly decrease pain and increased elbow performance at 6 months follow-up. It is an effective treatment modality for the management of Tennis elbow.

**Keywords:** Lateral Epicondylitis, Platelet-Rich Plasma, Tennis Elbow.

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## Introduction

Tennis elbow is a prevalent cause of elbow pain, particularly in individuals aged 30 to 50 years. While historically associated with tennis players, the condition is more broadly caused by repetitive wrist extension and forearm supination, making it common in a variety of occupations and activities, including manual labor, typing, and lifting. Epidemiological studies estimate that lateral epicondylitis affects 1% to 3% of the general population annually. [1] Contrary to its name, lateral epicondylitis is not primarily an inflammatory condition. Histopathological studies have revealed that it is, in fact, a degenerative tendinopathy characterized by Angio-fibroblastic hyperplasia, collagen disorganization, and absence of inflammatory cells a process termed "tendinosis". [2] Treatment recommendation for tennis elbow ranges from conservative treatment including rehabilitation resistance exercise with progression of the 1 exercise program, corticosteroid injection, [3] NSAIDS, activity modification, RICE (rest, ice, compression, elevation), stretching exercises, forearm counter force bracing, autologous blood injection, [4] extracorporeal shock wave therapy, [5] botulinum toxin injection [6] and hyaluronic acid with chondroitin sulfate injection. [7]

### Aim and Objectives Aim:

- To Study the clinical outcome of platelet rich plasma (PRP) Injection in Chronic Lateral Epicondylitis (Tennis elbow).
- To study complication of PRP injection in Chronic Lateral Epicondylitis. Objectives:
- Clinical Examination
- Evaluation of functional outcome by using: -

1. VAS (Visual analogue pain scale)
2. Mayo elbow performance score
3. Nirschl staging of lateral epicandylitis

## Materials and Methods

This study was carried out prospectively in the Department of Orthopaedics, Sardar Patel Medical College and Associate Group of Hospitals Bikaner.

**Target Population:** Patients attending Out Patient Department, Sardar Patel Medical College, Bikaner with Chronic lateral epicondylitis between the age of 18-70 years of both male and female gender.

**Sample Size:** A Total number of 44 patients were selected on O.P.D. basis and followed up to 6 months after their intervention after approval by ethical committee.

**Study population & sample size:** The study population comprised patients with blunt abdominal trauma admitted to the Emergency Department of Surgery, S. P. Medical College Hospital during the study period. Based on previous studies showing a prevalence of blunt abdominal trauma of 20%, the minimum required sample size was calculated to be 64 at a 95% confidence interval and 10% allowable error. After accounting for 10% attrition and rounding off, a total of 100 patients with blunt abdominal trauma were included in the study.

### Inclusion Criteria

1. Patients with the age 18 years or older and consenting to study.
2. Duration of symptoms for at least 3 months.
3. Pain over the common extensor origin increases with pressure over the lateral epicondyle and with resisted dorsiflexion of the wrist and or middle finger, for which no other cause could be identified.

### Exclusion Criteria

1. Patients with tendon rupture or post-surgical tendon repairs.
2. Patients with Active inflammatory disease.
3. Patients with any recent febrile or infectious disease.
4. Patients with history of any malignancy (including hematologic and non-hematologic malignancies).
5. Patients with history of autoimmune and platelet disorders, treatment with anticoagulant and anti-platelet medications 10 days before 45 injections.
6. Patients with consistent use of NSAIDs within 48 hours before procedure, use of systemic steroids during past 3 months.
7. Patients with haemoglobin measures of less than 10g/dl.
8. Patients with platelet counts of less than 1,50,000 per micro litter.
9. Diabetic Patients.
10. Pregnant woman.
11. Carpal tunnel syndrome, other peripheral nerve injury such as radial nerve injury.
12. Any bony malformation, bony or articular lesion at elbow (diagnosed by radiographic imaging)
13. Other causes of elbow pain such as osteochondritis dissecans of capitellum, lateral compartment arthrosis, varus instability, radial head arthritis, posterior interosseous nerve syndrome, cervical disc syndrome, cervical radiculopathy, carpal tunnel syndrome, synovitis of radio humeral joint, fibromyalgia and osteoarthritis of elbow.
14. Patients older than 70 years of age.

### Observations

This study was carried out prospectively to evaluation of efficacy of PRP injection in patients with chronic lateral epicondylitis in department of orthopaedics at Sardar Patel Medical College and Associated Group of Hospitals, in Bikaner. A total number of 44 patients were selected on O.P.D. basis after PRP injection patient was followed up at the interval of 4th week, 8th week, 4th month and 6th month. Assessment have done using by three outcome measures: Visual Analogue Score, Nirschl Staging, Mayo elbow performance score.

**Table 1: Distribution of cases according to age and sex**

| Age group (in years) | Male | Percentage (%) | Female | Percentage (%) | Total | Percentage (%) |
|---|---|---|---|---|---|---|
| 21-30 | 4 | 9.1 | 3 | 6.8 | 7 | 15.9 |
| 31-40 | 7 | 15.9 | 9 | 20.5 | 16 | 36.4 |
| 41-50 | 8 | 18.2 | 4 | 9.1 | 12 | 27.3 |
| 51-60 | 4 | 9.1 | 2 | 4.5 | 6 | 13.6 |
| 61-70 | 2 | 4.5 | 1 | 2.3 | 3 | 6.8 |
| Total | 25 | 56.8 | 19 | 43.2 | 44 | 100.0 |

In our study we found that out of 44 patients of chronic lateral epicondylitis, 25 were males and 19 were females. Maximum number of the patients found with the age group of 31-40 years.

**Table 2: Distribution of visual analogue scale (VAS) at various interval**

| VAS Scale | Pre injection | 4th week | 8th week | 4th month | 6th month |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 19 |
| 1-3 | 0 | 0 | 0 | 20 | 22 |
| 4-7 | 0 | 23 | 43 | 24 | 3 |
| 8-10 | 44 | 21 | 1 | 0 | 0 |
| Total | 44 | 44 | 44 | 44 | 44 |

In this study we found that before injection almost patients had their VAS score were 8-10. None of the patients has been improved their VAS score to 0 at the 4th week 43% patients have been improved their VAS score 0 at the 6th month follow-up.

**Table 3: Distribution of mayo score at various interval**

| Mayo score | Pre injection | 4th week | 8th week | 4th month | 6th month |
|---|---|---|---|---|---|
| <60 | 44 | 35 | 0 | 0 | 0 |
| 60-74 | 0 | 9 | 22 | 8 | 0 |
| 75-89 | 0 | 0 | 22 | 34 | 12 |
| ≥90 | 0 | 0 | 0 | 2 | 32 |
| Total | 44 | 44 | 44 | 44 | 44 |

In our current study 72% patients have been improved their Mayo score to ≥90 at the 6th month follow-up. After PRP injection, 0% patients had their Mayo score <60 and 60-74 at the 6th month follow-up.

**Table 4: Distribution of Nirschl staging at various interval**

| Nirschl staging | Pre injection | 4th week | 8th week | 4th month | 6th month |
|---|---|---|---|---|---|
| 1-2 | 0 | 7 | 18 | 39 | 43 |
| 3-4 | 11 | 26 | 26 | 5 | 1 |
| 5-6 | 26 | 11 | 0 | 0 | 0 |
| 7 | 7 | 0 | 0 | 0 | 0 |
| Total | 44 | 44 | 44 | 44 | 44 |

In our study patient before PRP injection with Nirschl stage 7 was 7, None of the patients found with Nirschl stage 7 at the end of 4th week, 8th week, 4th month, 6th month. Before PRP injection 59% patients with Nirschl stage 5-6. At the 6th month mostly, patients were found with Nirschl stage 1 to 2.

**Table 5: Post intervention exacerbation of pain**

| Post intervention exacerbation of pain | M | Male | Female | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Yes | 11 | 45.8 % | 11 | 55.0 % |
| No | 13 | 54.2 % | 9 | 45.0 % |
| Total | 24 | 100 % | 20 | 100 % |

In this study we found that 11 male (45.8 %) patients and 11 (55%) female patients complained of post intervention exacerbation of the pain.

All these patients with this increase of pain after the procedure had to be given tablet paracetamol 500mg. for pain relief as a co-intervention.

No patients reported elbow stiffness, infection, reflex sympathetic dystrophy, post injection flare, erythema, facial flushing, infection, neurovascular damage or tendon rupture or other untoward complications.

**Table 6: Mean VAS score for male and female**

| Follow up Period | Male | Female |
|---|---|---|
| | Mean ± SD | Mean ± SD |
| Before Injection | 8.96 ± 1.02 | 8.59 ± 0.94 |
| 4th Week | 7.26 ± 1.13 | 6.59 ± 0.94 |
| 8th Week | 5.11 ± 1.15 | 4.82 ± 1.01 |
| 4th month | 3.41 ± 1.22 | 3.65 ± 0.79 |
| 6th month | 1.26 ± 1.13 | 1.18 ± 1.24 |

In this study we observed that mean VAS score in both male and female have been decreased at every successive follow up period.

**Table 7: Mean Nirschl staging for male and female**

| Follow up Period | Male | Female |
|---|---|---|
| | **Mean ± SD** | **Mean ± SD** |
| Before Injection | 5.34 ± 0.94 | 4.44 ± 0.93 |
| 4th Week | 2.81 ± 1.04 | 3.62 ± 1.04 |
| 8th Week | 2.87 ± 1.01 | 2.71 ± 0.97 |
| 4th month | 2.68 ± 1.14 | 1.47 ± 0.51 |
| 6th month | 1.49 ± 0.62 | 1.00 ± 0.00 |

In this our current study we found that mean Nirschl stage has been reduced the successive follow up period.

**Table 8: Mean mayo score for male and female**

| Follow up Period | Male | Female |
|---|---|---|
| | Mean ± SD | Mean ± SD |
| Before Injection | 42.61 ± 4.56 | 71.76 ± 12.18 |
| 4th Week | 50.56 ± 4.79 | 71.03 ± 8.60 |
| 8th Week | 71.00 ± 3.78 | 79.26 ± 6.05 |
| 4th month | 79.11 ± 3.89 | 84.12 ± 5.96 |
| 6th month | 93.33 ± 3.20 | 95.44 ± 3.96 |

In this study after PRP injection we found that mean Mayo score has been improved at each successive follow up period.

**Table 9: Grip strength improves in male and female**

| Grip strength | Male | | | | Female | | | |
|---|---|---|---|---|---|---|---|---|
| | Before Injection | | After Injection | | Before Injection | | After Injection | |
| | No. | % | No. | % | No. | % | No. | % |
| Strong | 12 | 50 | 19 | 79.2 | 4 | 20 | 16 | 80 |
| weak | 12 | 50 | 5 | 20.8 | 16 | 80 | 4 | 20 |
| Total | 25 | 100 | 24 | 100 | 20 | 100 | 20 | 100 |

In male patients grip strength has been improved from 50% to 79.2% Following injection at the end of 6th months. In female patients grip strength has been improved from 20% to 80% following injection at the end of 6th months.

**Discussion**

An injection of platelet rich plasma (PRP) has been reported to be effective or the treatment of lateral epicondylitis. There was a significant decrease in pain. [8,9] It is hypothesized that mitogen such-as platelet derived growth factor induce fibroblastic mitosis and chemotactic polypeptides such as transforming growth factor cause fibroblasts to migrate and specialize and have been found to cause angiogenesis. A specific humoral mediator may promote the healing cascade in the treatment of tendinosis as well. These growth factors trigger stem cell recruitment, increase local vascularity and directly stimulate the production of collagen by tendon sheath fibroblasts. The mechanism of action of both autologous blood and platelet rich plasma is attributed to degranulation of a granules of platelets releasing growth factors which play a role in tissue healing and regeneration. Platelet derived growth factor, transforming growth factor, vascular derived endothelial growth factor, epithelial growth factor, hepatocyte growth factor and insulin like growth factor are some of the factors involved. Autologous biological blood that can be exogenously applied to various tissues where, after being injected, the platelet present in the blood releases high concentrations of platelet-derived growth factors that enhance tissue healing. No activation agent was used during our procedure. The activation of the platelets will occur through the exposure of platelets to the thrombin, which is released from the tendon tissue during injection. During the first 2 days of tendon healing, inflammatory process is initiated by migration of neutrophils and, subsequently, macrophages to the degenerative tissue site. In turn, activated macrophages release multiple growth factors, including platelet-derived growth factor, transforming growth factors alpha and beta, interleukin-1 and fibroblast growth factor. Angiogenesis and fibroplasia start shortly after day 3, followed by collagen synthesis on days 3 to 5. This process leads to an early increase in tendon breaking strength, which is the most important tendon healing parameter, followed by epithelization and, ultimately, the remodeling process.

In this current study, the mean age encountered in male was 42.8 years and in female was 38.4 years. (Range of participant: 24 to 64 years); the peak incidence was seen from 31 to 50 years. This was

seen similar in two separate studies Verhaar et al [14] (1993) observed mean age to be 45 years and Verhaar et al [16] (1996) observed mean age to be 43 years. Edwards and Calandrucciol [10] (2003) in his study observed the mean age to be 46.5 years. Seyed Ahmad Raeissadat et al (2014) in his study observed the mean age to be 47.2. [15]

The severity of pain was measured pre injection and after 4 weeks, 8 weeks, 4 month and 6 months by the VAS for pain and Mayo score and Nirschl staging for functional outcome. Pre injection the mean VAS score for pain in male were 8.96 (SD 1.02) and mean VAS score for female before injection was 8.59 (SD 0.94). As were the mean Nirschl stage for males were 5.34 (SD 0.94) and for females were 4.44 (SD 0.93) as were the mean Mayo score for males before injection was 42.61 (SD 4.56) and mean mayo Score for female were 71.76 (SD 12.18).

Mean VAS score for male at end of 4th week, 8th week, 4th month 6th month were (7.26, 5.11, 3.41, 1.26) respectively.

Mean VAS score for female at end of 4th week, 8th week, 4th month 6th month were (6.59, 4.82, 3.65, 1.18) respectively. Mean Nirschl stage for male at end of 4th week, 8th week, 4th month 6th month were (2.81, 2.87, 2.68, 1.49) respectively. Mean Nirschl stage for female before injection was 4.44 and at end of 4th week, 8th week, 4th month 6th month were (3.62, 2.71, 1.47, 1.00) respectively. Mean Mayo score for male at end of 4th week, 8th week, 4th month 6th month were 50.56, 71.00, 79.11, 93.33 respectively. Mean Mayo score for female at end of 4th week, 8th week,

4th month 6th month were 71.03, 79.26, 84.12, 95.44 respectively. At 6 months after injection mean VAS score for males were 1.26 (SD 1.13) and for females mean VAS score were 1.18 (SD 1.24) as were mean Nirschl stage for males were 1.49 (SD 0.62) and for females were 1.00 (SD 0.00). as were after 6 months of injection mean Mayo score for males were 93.33 (SD 3.20) and for females mean mayo score 95.44 (SD 3.96).

In male patients grip strength has been improved from 50% to 79.2% following injection at the end of 6th months. In female patients grip strength has been improved from 20% to 80% following injection at the end of 6th months.

In out of 24 male participants 11 male (45.8%) complained of post intervention exacerbation of pain while in out of 20 female participants in 11(55.0%) complained of increase of pain after injection.

Our study co relates with study of Wolf et al [13] (2011) and Kazemi et al [11] (2010) who reported no complication of erythema, swelling, nausea. Ozturan et [12] (2010) in their study found that. 21% of patients have elbow erythema, 16% had swelling and 21% had nausea.

This study was designed to evaluate the efficacy of PRP injection in patient with lateral epicondylitis. The both male and female had similar effect in decreasing pain and functional outcome. There was significant improvement in decreasing of pain and disability of function following the PRP application after 6th months of injection.

On the basis of Mayo elbow performance score out of 44 patients, 32 (72.73%) patients had excellent result (Mayo score ≥90), 12 (27.27%) patients had good result Mayo score (75-89).

Out of 44 patients no any patients had fair or poor result after at the time 6 month of injection (Mayo score60-74, <60).

Our results are coherent with the results of the study conducted by Mishra and Paveloko", they reported a significant improvement of symptoms after 8 weeks in 60% of the patients treated with buffered PRP versus 16% of the patients treated with a local anesthetic. Similar results were observed by Heachuman et al. in their nonrandomized trial where they treated 31 patients with failed previous conservative treatment. they injected PRP in all the elbows and 90% of patients and elbows met the criteria of successful treatment.

We conclude that PRP injection significantly decrease pain and increased elbow performance at 6 months follow-up. It is a effective treatment modality for the management of Tennis elbow but since it was done in 44 patients with 6 Months follow-up. The results cannot be generalised. We need a large number of patients with long term follow up to prove the efficacy of PRP injection in chronic lateral epicondylitis.

## Conclusion

We conclude that PRP injection significantly decrease pain and increased elbow performance at 6 months follow-up. It is a effective treatment modality for the management of Tennis elbow but since it was done in 44 patients with 6 Months follow-up. The results cannot be generalised. We need a large number of patients with long term follow up to prove the efficacy of PRP injection in chronic lateral epicondylitis.

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