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Original Research Article

A Comparative Study to Evaluate the Efficacy of Platelet-Rich Plasma versus Triamcinolone to Treat Tennis Elbow: A Randomized Controlled Trial

Santosh Kumar Gupta[1*], Amitosh Mishra[2], Digvijay Mishra[3]

[1]Assistant Professor, Department of Orthopedic, T. S. M. Medical College, Lucknow, Uttar Pradesh, India
[2] Associate Professor, Department of Orthopaedics, Integral Institute of Medical Sciences & Research, Lucknow, Uttar Pradesh, India
[3]Medical Officer, Urban CHC Shivpur, Varanasi, Uttar Pradesh, India

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Corresponding Author: Dr Santosh Kumar Gupta
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Abstract:

Background: Tennis elbow, or lateral epicondylitis, is a common musculoskeletal condition characterized by pain and tenderness over the lateral aspect of the elbow. Platelet-rich plasma (PRP) and corticosteroid injections, such as triamcinolone, are commonly used interventions for tennis elbow, but their comparative efficacy remains uncertain.

Aim and objectives: To compare the efficacy of PRP and triamcinolone in treating tennis elbow.

Materials and Methods: Thirty participants with clinically diagnosed tennis elbow were randomly assigned to receive either a single ultrasound-guided injection of PRP or triamcinolone. Pain intensity, functional improvement, patient satisfaction, recurrence rates, and adverse events were assessed at baseline, three months, and six months post-treatment.

Results: PRP and triamcinolone injections significantly reduced pain intensity and improved function at three and six months post-treatment. Both groups had high patient satisfaction rates, with no significant differences observed between PRP and triamcinolone. Recurrence rates and adverse events were similar between the two treatments.

Conclusion: Both PRP and triamcinolone injections offer effective options for managing tennis elbow. Over a six-month follow-up period, they had comparable outcomes in pain relief, functional improvement, patient satisfaction, recurrence rates, and adverse events. These findings suggest that PRP may be a promising alternative to corticosteroid injections for tennis elbow treatment.

Keywords: tennis Elbow, Platelet-Rich Plasma, Triamcinolone, Comparative Efficacy, Pain Relief.

Introduction

Tennis elbow, or lateral epicondylitis, is a prevalent musculoskeletal condition characterized by pain and tenderness over the lateral aspect of the elbow. [1] It commonly affects individuals engaged in repetitive wrist extension activities, such as tennis players, manual laborers, and office workers. Despite its name, tennis elbow can occur in anyone who engages in activities that strain the extensor tendons of the forearm. The condition can significantly impair functional capacity and quality of life, necessitating effective treatment strategies to alleviate symptoms and promote recovery. [1]

The management of tennis elbow encompasses a spectrum of conservative and interventional modalities, including rest, physical therapy, nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroid injections, platelet-rich plasma (PRP) therapy, and surgical intervention for refractory cases. [2] Among these options, corticosteroid injections, particularly triamcinolone, have been a cornerstone of treatment due to their potent anti-inflammatory properties and rapid symptomatic relief. However, concerns regarding their potential adverse effects on tendon structure and long-term outcomes have prompted the exploration of alternative therapies, such as PRP. [3]

Platelet-rich plasma is an autologous blood-derived product containing a concentrated platelet component rich in growth factors, cytokines, and other bioactive molecules known to promote tissue healing and regeneration. [4] Its use in musculoskeletal conditions, including tennis elbow, has gained considerable interest in recent years due to its perceived ability to stimulate tissue repair mechanisms without the adverse effects of corticosteroids. Despite promising anecdotal

evidence and theoretical advantages, the comparative efficacy of PRP versus corticosteroids in treating tennis elbow remains an area of ongoing investigation. [5]

This study aims to contribute to the existing body of literature by conducting a comparative analysis of the efficacy of PRP and triamcinolone in the management of tennis elbow. Through a randomized controlled trial design, we seek to evaluate the respective effects of these interventions on pain relief, functional improvement, patient satisfaction, and recurrence rates over a specified follow-up period. By elucidating the comparative benefits and limitations of these treatment modalities, our findings aim to inform clinical decision-making and optimize the management of tennis elbow for better patient outcomes.

Materials and Methods:

Study Design: This study was designed as a prospective, randomized controlled trial to compare the efficacy of PRP and triamcinolone in treating tennis elbow. It was conducted in accordance with the principles outlined in the Declaration of Helsinki and approved by the institutional review board.

Participants: Thirty participants diagnosed with tennis elbow were recruited from the orthopedic outpatient clinic of TSM Medical College, Lucknow, and Uttar Pradesh, India. Inclusion criteria included age between 18 and 65 years, clinical diagnosis of lateral epicondylitis based on history, physical examination findings, imaging studies, and failure of conservative management for at least three months. Exclusion criteria comprised previous corticosteroid or PRP injections within the past six months, concomitant inflammatory arthropathies, systemic diseases affecting tendon health, pregnancy, and contraindications to injection therapies.

Randomization and Blinding: Participants were randomly allocated into two treatment groups using a computer-generated randomization sequence in a 1:1 ratio. Allocation concealment was ensured through the use of opaque, sealed envelopes. To minimize bias, both participants and outcome assessors were blinded to the treatment allocation throughout the study duration.

Interventions: Participants in Group A received a single ultrasound-guided injection of PRP prepared from autologous blood, following standardized protocols. Group B participants received a single ultrasound-guided triamcinolone acetonide injection (40 mg/ml) into the affected elbow under aseptic conditions. All injections were administered by experienced orthopedic physicians.

Outcome Measures: The primary outcome measure was the reduction in pain intensity, assessed using a Visual Analog Scale (VAS), ranging from 0 to 10, with higher scores indicating greater pain severity. Secondary outcome measures included functional improvement measured by the Patient-Rated Tennis Elbow Evaluation (PRTEE) questionnaire, patient satisfaction using a Likert scale, and recurrence rates at three and six months post-treatment.

Data Collection and Statistical Analysis: Baseline demographic and clinical characteristics were recorded for all participants. Outcome measures were assessed at baseline, three months, and six months following treatment. As applicable, data were analyzed using appropriate statistical methods, including independent t-tests, Mann-Whitney U tests, and chi-square tests. Statistical significance was set at $p < 0.05$. Data analysis was conducted using SPSS version 25 (IBM Corp., Armonk, NY, USA).

Ethical Considerations: Informed consent was obtained from all participants before enrollment in the study. Confidentiality of participant data was maintained throughout the study process, and participants were assured of their right to withdraw from the study at any time without repercussion.

Results

Participant Characteristics: Thirty participants (15 in each group) with clinically diagnosed tennis elbow completed the study. The mean age of participants was 45.2 years (SD = 6.3), with a majority being male (n = 20, 66.7%). Baseline demographic and clinical characteristics were comparable between the two treatment groups (Table 1).

Primary Outcome: Pain Intensity: At baseline, the mean pain intensity score on the VAS was 7.8 (SD = 0.6) in both groups. Following treatment, there was a significant reduction in pain intensity in both groups at three months (PRP: mean VAS = 2.4, SD = 0.8; Triamcinolone: mean VAS = 2.6, SD = 0.7) and six months (PRP: mean VAS = 1.8, SD = 0.6; Triamcinolone: mean VAS = 2.0, SD = 0.5). However, there was no statistically significant difference in pain reduction between the PRP and triamcinolone groups at both time points.

Secondary Outcome: Functional Improvement: Baseline Patient-Rated Tennis Elbow Evaluation (PRTEE) scores were comparable between the PRP and triamcinolone groups (PRP: mean PRTEE = 65.3, SD = 8.7; Triamcinolone: mean PRTEE = 64.9, SD = 7.9). Following treatment, both groups demonstrated significant improvement in functional outcomes at three months (PRP: mean PRTEE = 31.5, SD = 6.4; Triamcinolone: mean PRTEE = 32.7, SD = 5.9) and six months (PRP: mean

PRTEE = 24.6, SD = 4.8; Triamcinolone: mean PRTEE = 26.1, SD = 4.5). However, there was no statistically significant difference in functional improvement between the two treatment groups at either follow-up ($p > 0.05$).

Table 1: Pain Intensity (VAS) and Functional Improvement (PRTEE) at Follow-Up

Time Point	PRP Group (n=15)	Triamcinolone Group (n=15)	P value
VAS (0-10)			
- Baseline	7.6 (0.628)	7.8 (0.582)	0.462
- 3 months	2.4 (0.843)	2.6 (0.712)	0.241
- 6 months	1.8 (0.612)	2.0 (0.548)	0.112
PRTEE			
- Baseline	65.3 (8.757)	64.9 (7.932)	0.564
- 3 months	31.5 (6.441)	32.7 (5.934)	0.231
- 6 months	24.6 (4.882)	26.1 (4.554)	0.286

Data is expressed as mean (SD)

Patient Satisfaction: Overall, both treatment groups reported high levels of satisfaction with the outcomes of their respective interventions. At the three-month follow-up, 13 participants (86.7%) in the PRP group and 12 (80.0%) in the triamcinolone group reported being either satisfied or very satisfied with their treatment outcomes. Similarly, at the six-month follow-up, satisfaction rates were 93.3% in the PRP group and 86.7% in the triamcinolone group. There was no statistically significant difference in patient satisfaction between the two groups at both follow-up time points ($p > 0.05$).

Recurrence Rates: During the six-month follow-up period, recurrence of symptoms was observed in 4 participants (26.7%) in the PRP group and 5 participants (33.3%) in the triamcinolone group. However, there was no statistically significant difference in recurrence rates between the two treatment groups ($p > 0.05$).

Adverse Events: No serious adverse events were reported in either treatment group during the study period. Transient local discomfort at the injection site was the most commonly reported adverse event, observed in 3 participants (10.0%) in the PRP group and 4 participants (13.3%) in the triamcinolone group.

Discussion

The present study aimed to compare the efficacy of PRP and triamcinolone in treating tennis elbow, focusing on pain reduction, functional improvement, patient satisfaction, recurrence rates, and adverse events. The findings revealed that PRP and triamcinolone demonstrated significant benefits in alleviating pain, enhancing function, and satisfying patients' expectations, with no substantial differences between the two treatments over the six-month follow-up period.

The observed reduction in pain intensity following PRP injection aligns with previous research, supporting its efficacy in managing tennis elbow. A meta-analysis by Mishra et al. (2013) reported that PRP injections resulted in significant pain relief compared to placebo three months post-treatment, supporting the current findings. [6] Similarly, the pain reduction observed in the triamcinolone group is consistent with the known anti-inflammatory properties of corticosteroids, as demonstrated in previous studies. [7, 8]

Furthermore, PRP and triamcinolone injections led to substantial functional improvement, as evidenced by the significant reduction in Patient-Rated Tennis Elbow Evaluation (PRTEE) scores three and six months post-treatment. These findings are consistent with the results of randomized controlled trials (RCTs) by Krogh et al. [8] and Peerbooms et al., [9] which demonstrated improved functional outcomes following PRP and corticosteroid injections, respectively.

Patient satisfaction rates were high in both treatment groups, with most participants expressing satisfaction or high satisfaction with their treatment outcomes. This aligns with a systematic review by Arirachakaran et al. (2018), [10] which reported favorable patient satisfaction rates following PRP and corticosteroid injections for lateral epicondylitis.

Recurrence rates of symptoms were similar between the PRP and triamcinolone groups, with no significant difference observed. While the recurrence rates in this study were consistent with those reported in previous studies [8, 11], the lack of a statistically significant difference between the two treatments suggests that PRP and corticosteroid injections may have comparable long-term efficacy in preventing symptom recurrence.

Regarding adverse events, transient local discomfort at the injection site was the most commonly reported adverse event in both groups, consistent with the known side effects of PRP and corticosteroid injections. [12,13] However, no serious adverse events were reported in either

treatment group, indicating the safety of both interventions in the management of tennis elbow.

While this study provides valuable insights into the comparative efficacy of PRP and triamcinolone in treating tennis elbow, several limitations should be acknowledged. The sample size needed to be bigger, potentially limiting the generalizability of the findings. Additionally, the six-month follow-up period may only capture long-term outcomes or recurrence rates within this timeframe. Future research with larger sample sizes, more extended follow-up periods, and cost-effectiveness analyses is warranted further to elucidate the optimal treatment approach for tennis elbow.

Concussion

PRP and triamcinolone injections offer effective options for managing tennis elbow, resulting in significant pain reduction, functional improvement, and high patient satisfaction rates. While no significant differences were observed between the two treatments in this study, PRP may offer a promising alternative to corticosteroid injections, potentially promoting tissue healing and regeneration. Further research is needed to confirm these findings and optimize treatment strategies for tennis elbow.

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