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Research Article

Is Platelet Rich Plasma (PRP) Better than Steroids? A Comparative Study on Lateral Epicondylitis Treatment

Dr Tejaswi Dussa[1], Dr Chaitanya Gadi[2], Dr. Jhansi Sesham[3], Dr Deepak K[4]*, Dr Katukota Vishal[5], Dr Naresh Kumar Eamani[6]
[1]Assistant professor, BIRRD(T)hospital, SVIMS-SPMCW
[2]Associate professor, BIRRD(T)hospital, SVIMS-SPMCW
[3]Assistant professor, BIRRD(T)hospital, SVIMS-SPMCW
[4]Professsor BIRRD(T)hospital, SVIMS-SPMCW
[5]Assitant Professor, BIRRD(T)hospital, SVIMS-SPMCW
[6]Assistant Professor, BIRRD(T)hospital, SVIMS-SPMCW
Corresponding author: Dr Deepak K, Professor, BIRRD(T)hospital, SVIMS-SPMC(W)
Email: doc_deep@yahoo.com
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Abstract
Background: Clinical equipoise exists between steroid and platelet rich plasma (PRP) injection in treating lateral epicondylitis. To address this ongoing debate, effectiveness of PRP injections and corticosteroid injections was examined in patients with lateral epicondylitis in a tertiary care hospital in Andhra Pradesh, India.
Methods: A retrospective cohort study was conducted among patients treated for unilateral lateral epicondylitis with either steroid or PRP injection. At total number of 46 patients' charts were evaluated for the outcomes including visual analogue scale (VAS), DASH, and Numeric Pain Intensity Scale (Nirschl) scores were abstracted.
Results: The mean age of the 46 patients was 36.9 years (SD 11.7 years). With follow-up, both the groups have shown a significant improvement in all the three scores. A significant difference was noted in all the scores in favour of PRP group. The difference was significant at the end of three (-0.8; 95% CI: -0.2 to -1.6) and six months (-1.1; 95% CI: -0.3 to -1.7) for VAS score. DASH score improvement was noticed at three months (-8.8; 95% CI: -5.9 to -11.6) and six months (-8.8; 95% CI: -6.4 to -9.7) (Table 2, figure 3). For Nirschl score, a significant improvement (5.8; 95% CI: 3.6 to 7.8) was noticed at six months.
Conclusion: PRP injections offer a promising alternative to steroid injections for the treatment of lateral epicondylitis in Indian setting. Further research with more comprehensive design is needed to fully validate these findings.

Keywords: Lateral Epicondylitis, Platelet-Rich Plasma, Steroids, Treatment Outcome.

INTRODUCTION

Lateral epicondylitis, commonly known as tennis elbow, is a prevalent musculoskeletal disorder, particularly affecting adults between 35 and 55 years old. (1) This condition manifests with characteristic symptoms like lateral elbow pain, pain during wrist extension, and diminished grip strength. (2) Currently, various injection therapies exist for lateral epicondylitis, including botulinum toxin A, autologous blood, glycosaminoglycan polysulfate, sodium hyaluronate, polidocanol, epinephrine, dextrose, sodium morrhuate, PRP, and corticosteroids. (3–5) among these, corticosteroids have been considered as the treatment of choice since 1950s. (6) Their effectiveness in alleviating pain, particularly of neurogenic origin, is well-established. (7)

Platelet-Rich Plasma (PRP), an autologous blood product enriched with platelets, plays a significant role in tissue repair through the release of growth factors. (8) These factors influence the activity of vascular and other blood cells involved in angiogenesis and inflammation. Numerous studies have documented the superior outcomes achieved with PRP injections compared to other treatment modalities for lateral epicondylitis. (2,9–11)

Despite international recognition of PRP's efficacy, debate persists among orthopedic surgeons regarding its superiority over corticosteroids. While several studies have compared these two treatment options (9,11–14), a definitive answer to which is more effective remains elusive. To address this

ongoing debate, we compared the effectiveness of PRP injections and corticosteroid injections in patients with lateral epicondylitis in a tertiary care hospital in Andhra Pradesh, India.

METHODS

Study design: Retrospective cohort study.

Study setting: The study was conducted in a tertiary care centre in Tirupati.

Study population: All adult patients (>18 years) with unilateral lateral epicondylitis were eligible in this study. Patients diagnosed with lateral epicondylitis that did not improve with traditional treatments including non-steroidal anti-inflammatory drugs (NSAIDs), physical therapy, and bracing, etc. for at least three months were included in the study. We excluded those who had bilateral involvement, and prior history of local steroid or autologous plasma injection, history of acute elbow trauma; diagnosis of systemic diseases such as rheumatoid
arthritis, DM (diabetes mellitus), hepatitis, anemia, and bleeding disorders; patients who are on anticoagulant treatment; patients with documented severe weight change in the preceding year; patients with a history of malignancy, pregnancy, previous elbow fractures, epilepsy, or cervical radiculopathy. We excluded patients with history of prior elbow surgery in the preceding six months and patients with any local pathology identified through radiological investigations, were excluded. We also excluded patients who did not have a complete treatment history and follow-up information.

Sample size and sampling technique: To detect a mean difference of 7 (Main 3 reference) in DASH score at the end of 6 months with a standard deviation of 8 and 9 in PRP and steroid group, we expected to recruit at least 23 patients in each group with a power of 80% and keeping the alpha-error at 5%.

Description of the procedure: For PRP injection, a total of 20 mL of whole blood is collected from the antecubital fossa using a 25-mL syringe containing 2 mL of anticoagulant (Sodium citrate 22 mg, citric acid 7.3 mg, glucose monohydrate 24.5 mg). Each patient's blood yield's approximately 0.05 mL of platelet concentrate following centrifugation at 3200 g for 3 minutes. The resulting autologous platelet concentrate includes concentrated white cells and platelets (buffy coat) after the centrifugation process. After extracting the buffy coat from the cylinder, 2 mL of supernatant plasma (platelet-poor plasma) was added to make the final PRP injection, without the use of an activating agent. DP solution consisted of 1.5 mL of 25% dextrose and 0.5 mL of 0.5% lidocaine in a 2.5-mL syringe. All preparation procedures are carried out as standard protocols.

All treatments were applied based on the standard hospital protocol. The patients in the PRP group were given 2 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 (40 mg/mL, injection tricot). Under strict aseptic condition, injections were applied with the patients' elbows flexed at 90 degrees with the help of 21 G injector to the area with the most pain on the lateral epicondyle using the peppering technique.

Afterward, patients in all groups were advised to rest their elbows the first day after injection, to adhere to immobilization with a shoulder arm sling, to avoid anti-inflammatory drugs other than paracetamol the first two weeks after injection, to avoid cold or hot application, and to avoid anticoagulant and anti-aggregate drugs during the follow-up and taking additional injections to the elbow area. According to the hospital policy, the patients were evaluated on the fifteenth day, fourth week, third month, and sixth month. VAS, DASH, NIRCHL (Numeric Pain Intensity Scale) scores, and clinical results were evaluated in the pre- and post-injection follow-ups.

Data collection: The usual hospital policy is to review the patients at three different time points- before the treatment, after 2 weeks before the second injection, after 10 weeks from the first injection and after six months from the first injection. The clinical findings and complaints of the patients were assessed on the follow-up days. The baseline characteristics were noted in data collection form from the clinical records.

Statistical analysis: The data was entered into Microsoft Excel and analyzed in Stata version 18.0. The baseline characteristics were expressed in frequency and percentage for the categorical variables and mean and standard deviations were used for the continuous variables. The difference between the two groups at the baseline were tested by Chi-square test for categorical variables and by t-tests for the continuous variables. For outcome variables, the difference between the

two groups were tested by unpaired t-test, while difference within the same groups at different point of time was tested by paired t-test. The mean difference between the groups or within the groups were calculated with appropriate 95% confidence intervals (CI). For all statistical tests, a p-value <0.05 was considered as statistically significant.

Human subject protection: Ethics committee clearance was taken from the institutional ethics committee. Informed consent was taken from all the participants.

RESULTS

We screened 187 patients with lateral epicondylitis out of which, we recruited 46 patients. 141 patients were excluded, mostly because of associated systemic illnesses (Figure 1). The mean age of the 46 patients was 36.9 years (SD 11.7 years). Majority were male (n=25, 54.4%), and left side (n=29, 63.0%) being affected. There was no major difference (p>0.005) in baseline clinical parameters between the two groups. (Table 1)

Table 1: Baseline characteristics of the two groups

Variables	Estimate		p-value
	PRP group	Steroid group	
Gender, n (%)			
Male	13 (52.0)	12 (48.0)	0.77
Female	12 (48.0)	13 (52.0)	
Mean age, years (SD)	37.4 (12.2)	36.5 (11.4)	0.79
Affected side			
Left	15 (51.7)	14 (48.3)	0.76
Right	8 (47.1)	9 (52.9)	
Dominant side			
Left	1 (33.3)	2 (66.7)	0.55
Right	22 (51.2)	21 (48.8)	

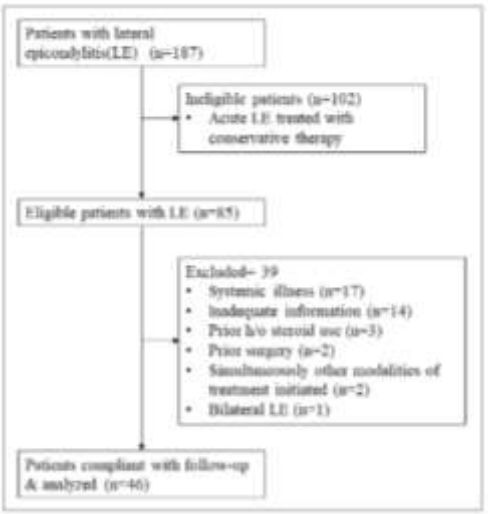

Figure 1: Flowchart showing recruitment of the participants

At baseline, there was no difference in the mean VAS, DASH and NIRSCHL scores between the two groups (Table 2). With follow-up, both the groups have shown a significant improvement in all the three scores. Noteworthy, that the initial improvement was more for the steroid group, however, at the end of six months, the improvement was more for the PRP group. A significant difference was noted in VAS score was noticed in favour of the PRP group at the end of three (Mean difference -0.8; 95% CI: -0.2 to -1.6, p<0.05) and six months (Mean difference -1.1; 95% CI: -0.3 to -1.7, p<0.05) (Table 2, figure 2). On the contrary to the VAS score, DASH score improvement was higher for the steroid group at the end of two weeks (Mean difference 6.4; 95% CI: 2.5 to 10.3, p<0.05) and four weeks (Mean difference 6.8; 95% CI: 4.2 to 9.5, p<0.05) after injection. However, the change shifted in favour of the PRP group at the end of three (Mean difference -8.8; 95% CI: -5.9 to -11.6, p<0.05) and six months (Mean difference -8.8; 95% CI: -6.4 to -9.7, p<0.05)

(Table 2, figure 3). For NIRSCHL score, the improvement was similar till the end of three months post-treatment but a significant improvement was noticed at the end of six months in favour of the PRP group (Mean difference 5.8; 95% CI: 3.6 to 7.8, p<0.05) (Table 2, figure 4). None of the participants from both the groups had any local or systematic complications after treatment.

Table 2: Difference in VAS, DASH and NIRSCHL scores between PRP and steroid group

Outcome	Score (SD)		Mean difference (95% CI)
	PRP group	Steroid group	
VAS score			
Baseline	6.7 (0.9)	6.9 (0.9)	-0.2 (-0.8 to 0.3)
2 weeks	5.7 (1.1)	5.2 (1.4)	0.5 (-0.3 to 1.2)
4 weeks	4.7 (1.2)	4.6 (1.2)	0.1 (-0.6 to 0.8)
3 months	2.3 (1.3)	3.1 (1.1)	-0.8 (-0.2 to -1.6)*
6 months	1.9 (0.8)	3.0 (1.5)	-1.1 (-0.3 to -1.7)*
DASH score			
Baseline	62.9 (10.2)	66.3 (9.1)	-3.4 (-9.1 to 2.3)
2 weeks	51.2 (5.5)	44.8 (7.5)	6.4 (2.5 to 10.3)*
4 weeks	32.6 (4.7)	25.8 (4.3)	6.8 (4.2 to 9.5)*
3 months	14.4 (4.5)	23.2 (5.1)	-8.8 (-5.9 to -11.6)*
6 months	7.9 (2.3)	15.9 (3.1)	-8.0 (-6.4 to -9.7)*
NIRSCHL score			
Baseline	49.0 (3.9)	47.2 (5.0)	1.8 (-0.8 to 4.5)
2 weeks	49.7 (5.0)	52.6 (5.10	-2.9 (-5.9 to 0.1)
4 weeks	57 (3.8)	55 (5.6)	2.0 (-0.8 to 4.9)
3 months	61.6 (3.7)	59.7 (3.7)	1.8 (-0.4 to 4.0)
6 months	70.3 (4.1)	64.5 (2.8)	5.8 (3.6 to 7.8)*

**Statistically significant*

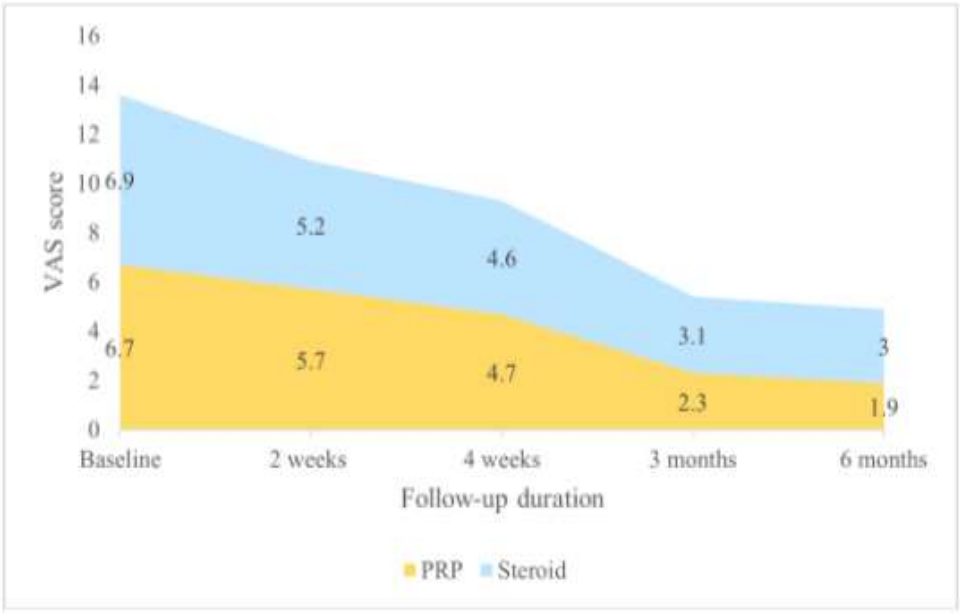

Figure 2: Change in VAS score for PRP and steroid groups

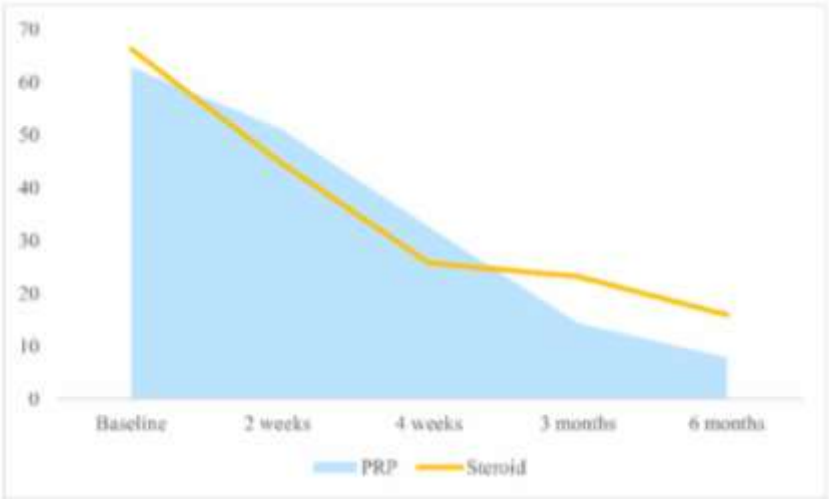

Figure 3: Change in DASH score for PRP and steroid group

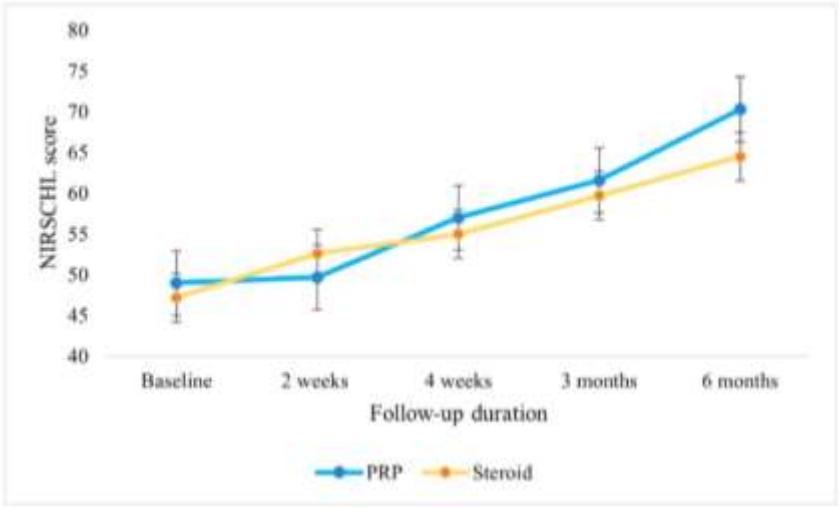

Figure 4: Change in Nirschl score for PRP and steroid group

DISCUSSION:

This retrospective cohort study investigated the effectiveness of intralesional injections of platelet-rich plasma (PRP) and corticosteroids in alleviating pain and functional limitations associated with lateral epicondylitis. Patients underwent assessments using the Visual Analog Scale (VAS), Disability of Arm, Shoulder and Hand (DASH) score, and Nirschl score at baseline and at regular intervals over a six-month period. Both treatment groups demonstrated significant reductions in pain and disability scores over time. Notably, steroid injections provided a rapid initial improvement in symptom severity, evidenced by a significant reduction in VAS scores at early follow-up intervals. However, this effect proved transient, with VAS scores in the PRP group surpassing those of the steroid group by the third month and continuing to improve throughout the remainder of the study period. Similar trends were observed for DASH and Nirschl scores, highlighting the sustained benefit of PRP injections in promoting long-term functional recovery. These findings suggest that while both PRP and corticosteroids offer effective treatment options for lateral epicondylitis, PRP injections may be superior in achieving long-lasting pain relief and improved function.

In the treatment of lateral epicondylitis, conservative management, including activity modification, ice application, and nonsteroidal anti-inflammatory medication (NSAIDs), remains the first line of therapy. For non-responders, intralesional pharmacotherapy has been attempted with varying degrees of success. Until recently, steroid injections were considered the gold standard of treatment. However, their unsatisfactory long-term outcomes have raised questions about their utility. (1,15–17) Randomized trials have shown that even conservative management with NSAIDs can yield better results than

corticosteroid use. (1,10,15,17–20) This is likely due to the suppression of inflammation in the early stages by steroids, mediated by the arachidonic acid pathway. (21) However, animal studies suggest that long-term steroid therapy can lead to progressive thinning of the peroneus longus tendon due to a significant reduction in collagen synthesis. (22) Our findings further corroborate the existing knowledge regarding the pathophysiological limitations of steroid use for lateral epicondylitis.

Recent histological findings have revealed that tendinosis is not an acute inflammatory condition, but rather a pathology characterized by the failure of normal tendon repair mechanisms. This has prompted researchers to explore biological treatment options like PRP injections. (19) The evidence supporting PRP injections is steadily accumulating. A prospective study investigating the role of PRP in refractory lateral epicondylitis concluded that a single-dose injection was highly effective, even preventing the need for surgery. Furthermore, randomized controlled trials have confirmed the long-term benefits of PRP therapy. (20,23) However, conflicting evidence exists, with some studies suggesting that steroids are superior to PRP. (9,24) Despite this, our findings align with those of another Indian study, which reported that while the initial effects of PRP injections are comparable to those of steroids, the long-term benefits (after 3 months) are significantly greater in the PRP group. (25) Notably, unlike corticosteroids which suppress inflammation, PRP injections trigger it. (26–28) The growth factors released by platelets in PRP play a crucial role in healing chronic injuries. (26–28) These growth factors replenish stem cells, enhance local vascularization, stimulate collagen production by tendon sheath fibroblasts, and promote increased endogenous growth factor production, leading to sustained therapeutic effects over time. (29–31)

Our study acknowledges some limitations. Firstly, we were unable to account for the potential influence of several factors, including the specific method and placement of the injections, the method of PRP preparation and its cell density, and individual patient characteristics such as nutritional habits. These factors could potentially influence the outcomes of PRP injections, and further well-designed prospective studies are needed to fully understand their impact. Additionally, the single-center setting of our study limits the generalizability of our findings to broader populations. However, despite these limitations, the present study provides valuable insights into the effectiveness of PRP injections for treating lateral epicondylitis, particularly given the dearth of robust evidence in the Indian context.

CONCLUSION:

This retrospective cohort study demonstrates that platelet-rich plasma (PRP) injections offer a promising alternative to steroid injections for the treatment of lateral epicondylitis. While both treatments provide significant pain relief and functional improvements, PRP injections exhibit superior long-term efficacy, with sustained benefits exceeding those of steroids. Further research with a broader scope and more comprehensive design is needed to fully validate these findings and optimize PRP treatment protocols.

REFERENCES

1. Smidt N, van der Windt DA. Tennis elbow in primary care. BMJ. 2006 Nov 4;333(7575):927–8.
2. Tosti R, Jennings J, Sewards JM. Lateral Epicondylitis of the Elbow. The American Journal of Medicine. 2013 Apr 1;126(4):357.e1-357.e6.
3. Behrens SB, Deren ME, Matson AP, Bruce B, Green A. A Review of Modern Management of Lateral Epicondylitis. The Physician and Sportsmedicine [Internet]. 2012 May 1 [cited 2023 Dec 11]; Available from: https://www.tandfonline.com/doi/abs/10.3810/psm.2012.05.1963
4. Krogh TP, Bartels EM, Ellingsen T, Stengaard-Pedersen K, Buchbinder R, Fredberg U, et al. Comparative effectiveness of injection therapies in lateral epicondylitis: a systematic review and network meta-analysis of randomized controlled trials. Am J Sports Med. 2013 Jun;41(6):1435–46.
5. Scarpone M, Rabago D, Zgierska A, Arbogest J, Snell E. The efficacy of prolotherapy for lateral epicondylosis: A pilot study. Clin J Sport Med. 2008 May;18(3):248–54.
6. Hollander JL. Intra-articular hydrocortisone in arthritis and allied conditions; a summary of two years' clinical experience. J Bone Joint Surg Am. 1953 Oct;35-A(4):983–90.

7. Ljung BO, Alfredson H, Forsgren S. Neurokinin 1-receptors and sensory neuropeptides in tendon insertions at the medial and lateral epicondyles of the humerus. Studies on tennis elbow and medial epicondylalgia. J Orthop Res. 2004 Mar;22(2):321–7.
8. Anitua E, Andia I, Ardanza B, Nurden P, Nurden AT. Autologous platelets as a source of proteins for healing and tissue regeneration. Thromb Haemost. 2004 Jan;91(1):4–15.
9. Krogh TP, Fredberg U, Stengaard-Pedersen K, Christensen R, Jensen P, Ellingsen T. Treatment of lateral epicondylitis with platelet-rich plasma, glucocorticoid, or saline: a randomized, double-blind, placebo-controlled trial. Am J Sports Med. 2013 Mar;41(3):625–35.
10. Rodik T, McDermott B. Platelet-Rich Plasma Compared With Other Common Injection Therapies in the Treatment of Chronic Lateral Epicondylitis. J Sport Rehabil. 2016 Feb;25(1):77–82.
11. Gosens T, Peerbooms JC, van Laar W, den Oudsten BL. Ongoing positive effect of platelet-rich plasma versus corticosteroid injection in lateral epicondylitis: a double-blind randomized controlled trial with 2-year follow-up. Am J Sports Med. 2011 Jun;39(6):1200–8.
12. Varshney A, Maheshwari R, Juyal A, Agrawal A, Hayer P. Autologous Platelet-rich Plasma versus Corticosteroid in the Management of Elbow Epicondylitis: A Randomized Study. Int J Appl Basic Med Res. 2017;7(2):125–8.
13. Khaliq A, Khan I, Inam M, Saeed M, Khan H, Iqbal MJ. Effectiveness of platelets rich plasma versus corticosteroids in lateral epicondylitis. J Pak Med Assoc. 2015 Nov;65(11 Suppl 3):S100-104.
14. Peerbooms JC, Sluimer J, Bruijn DJ, Gosens T. Positive effect of an autologous platelet concentrate in lateral epicondylitis in a double-blind randomized controlled trial: platelet-rich plasma versus corticosteroid injection with a 1-year follow-up. Am J Sports Med. 2010 Feb;38(2):255–62.
15. Yi R, Bratchenko WW, Tan V. Deep Friction Massage Versus Steroid Injection in the Treatment of Lateral Epicondylitis. Hand (N Y). 2018 Jan;13(1):56–9.
16. Arirachakaran A, Sukthuayat A, Sisayanarane T, Laoratanavoraphong S, Kanchanatawan W, Kongtharvonskul J. Platelet-rich plasma versus autologous blood versus steroid injection in lateral epicondylitis: systematic review and network meta-analysis. J Orthop Traumatol. 2016 Jun;17(2):101–12.
17. Hay EM, Paterson SM, Lewis M, Hosie G, Croft P. Pragmatic randomised controlled trial of local corticosteroid injection and naproxen for treatment of lateral epicondylitis of elbow in primary care. BMJ. 1999 Oct 9;319(7215):964–8.
18. Tang S, Wang X, Wu P, Wu P, Yang J, Du Z, et al. Platelet-Rich Plasma Vs Autologous Blood Vs Corticosteroid Injections in the Treatment of Lateral Epicondylitis: A Systematic Review, Pairwise and Network Meta-Analysis of Randomized Controlled Trials. PM R. 2020 Apr;12(4):397–409.
19. Ben-Nafa W, Munro W. The effect of corticosteroid versus platelet-rich plasma injection therapies for the management of lateral epicondylitis: A systematic review. SICOT J. 2018;4:11.
20. Vardhan Reddy V, Chandru V. Comparison between Corticosteroid, Platelet Rich Plasma (PRP) and Xylocaine Infiltration for Lateral Epicondylosis (Tennis Elbow): A Prospective Randomized Study. J Trauma Treat [Internet]. 2016 [cited 2023 Dec 12];5(2). Available from: http://www.omicsgroup.org/journals/comparison-between-corticosteroid-platelet-rich-plasma-prp-andxylocaine-infiltration-for-lateral-epicondylosis-tennis-elbow-aprosp-2167-1222-1000304.php?aid=73073
21. Shakeel H, Ahmad TS. Steroid injection versus NSAID injection for trigger finger: a comparative study of early outcomes. J Hand Surg Am. 2012 Jul;37(7):1319–23.
22. Oxlund H. Long term local cortisol treatment of tendons and the indirect effect on skin. An experimental study in rats. Scand J Plast Reconstr Surg. 1982;16(1):61–6.
23. Mishra AK, Skrepnik NV, Edwards SG, Jones GL, Sampson S, Vermillion DA, et al. Efficacy of platelet-rich plasma for chronic tennis elbow: a double-blind, prospective, multicenter, randomized controlled trial of 230 patients. Am J Sports Med. 2014 Feb;42(2):463–71.
24. Linnanmäki L, Kanto K, Karjalainen T, Leppänen OV, Lehtinen J. Platelet-rich Plasma or Autologous Blood Do Not Reduce Pain or Improve Function in

Patients with Lateral Epicondylitis: A Randomized Controlled Trial. Clin Orthop Relat Res. 2020 Aug;478(8):1892–900.
25. Kıvrak A, Ulusoy I. Comparison of the Clinical Results of Platelet-Rich Plasma, Steroid and Autologous Blood Injections in the Treatment of Chronic Lateral Epicondylitis. Healthcare (Basel). 2023 Mar 6;11(5):767.
26. Crane DM, Everts PAM. PRP Matrix Grafts.
27. Tate KS, Crane DM. Platelet Rich Plasma Grafts In Musculoskeletal Medicine. V O L U M E.
28. Sampson S, Gerhardt M, Mandelbaum B. Platelet rich plasma injection grafts for musculoskeletal injuries: a review. Curr Rev Musculoskelet Med. 2008 Jul 16;1(3–4):165–74.
29. Mishra A, Pavelko T. Treatment of chronic elbow tendinosis with buffered platelet-rich plasma. Am J Sports Med. 2006 Nov;34(11):1774–8.
30. Thanasas C, Papadimitriou G, Charalambidis C, Paraskevopoulos I, Papanikolaou A. Platelet-rich plasma versus autologous whole blood for the treatment of chronic lateral elbow epicondylitis: a randomized controlled clinical trial. Am J Sports Med. 2011 Oct;39(10):2130–4.
31. Dhillon RS, Schwarz EM, Maloney MD. Platelet-rich plasma therapy - future or trend? Arthritis Res Ther. 2012 Aug 8;14(4):219.