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Original Research Article

A Randomized Controlled Trial Comparing Functional Outcomes of Platelet-Rich Plasma and Corticosteroid Injections in Lateral epicondylitis

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Abstract:

Objective: Lateral epicondylitis (tennis elbow) is a common degenerative condition of the elbow causing lateral-sided pain and functional impairment. Corticosteroid injections are frequently used for symptomatic relief; however, their benefits are often short-term with high recurrence rates. Platelet-rich plasma (PRP) has emerged as a biological treatment that promotes tendon healing and may provide sustained clinical improvement. This study aimed to compare the clinical outcomes of autologous PRP injection and corticosteroid injection in the management of chronic tennis elbow.

Methods: This prospective double-blind study included sixty patients diagnosed with chronic lateral epicondylitis who met the inclusion criteria. Patients were randomly allocated into two groups. Group I received a local corticosteroid injection, while Group II received an autologous PRP injection. Clinical outcomes were assessed using the Visual Analog Scale (VAS) and Numerical Pain Score (NPS). Evaluations were performed prior to injection and at 6 weeks, 3 months, and 6 months post-injection.

Results: Both groups showed significant improvement in pain scores following treatment. The corticosteroid group demonstrated greater pain relief at early follow-up; however, pain scores increased over time. In contrast, the PRP group showed gradual and sustained improvement. At the 6-month follow-up, the PRP group demonstrated significantly lower VAS and NPS scores compared to the corticosteroid group, and the difference was statistically significant.

Conclusion: Autologous PRP injection provides superior and longer-lasting pain relief compared to corticosteroid injection in patients with chronic lateral epicondylitis. PRP appears to be an effective and promising treatment modality for tennis elbow, particularly in cases unresponsive to conservative management.

Keywords: Lateral epicondylitis, Tennis elbow, Platelet-rich plasma, Corticosteroid injection, Visual Analog Scale, Numerical Pain Score.

Introduction

Lateral epicondylitis, commonly referred to as tennis elbow, is a frequent cause of lateral elbow pain in adults and is associated with significant functional impairment of the upper limb. It typically affects individuals between the fourth and sixth decades of life and is commonly related to repetitive wrist extension and forearm supination activities, both occupational and recreational [1,2]. The condition results in pain over the lateral epicondyle, reduced grip strength, and difficulty in performing daily activities.

Although historically considered an inflammatory condition, current evidence suggests that lateral epicondylitis is primarily a degenerative tendinopathy involving the origin of the extensor carpi radialis brevis tendon. Histopathological studies demonstrate collagen disorganization, fibroblast proliferation, neovascularization, and micro tearing with minimal inflammatory cell infiltration, a process described as angiofibroblastic degeneration [3,4]. This understanding has shifted treatment strategies from anti-inflammatory approaches toward therapies aimed at tendon healing and regeneration.

Conservative management remains the first line of treatment and includes rest, activity modification, non-steroidal anti-inflammatory drugs, physiotherapy, bracing, and eccentric strengthening exercises. While most patients respond to conservative measures, approximately 10–20% develop chronic symptoms that are refractory to non-operative treatment [5]. In such cases, injection therapies are frequently employed. Corticosteroid injections have been widely used due to their potent anti-inflammatory properties and ability to provide rap-

id pain relief. Several studies have reported significant short-term improvement following steroid injections; however, the benefits tend to diminish over time, with high rates of symptom recurrence and poorer long-term outcomes [6,7]. Moreover, repeated corticosteroid injections have been associated with complications such as tendon weakening, delayed healing, and increased risk of tendon rupture [8].

Platelet-rich plasma (PRP) has emerged as a promising biological treatment option for chronic tendinopathies. PRP is an autologous concentration of platelets that releases various growth factors, including platelet-derived growth factor, transforming growth factor-β, vascular endothelial growth factor, and hepatocyte growth factor, which play a critical role in tissue regeneration, angiogenesis, and collagen synthesis [9]. By promoting tendon healing rather than suppressing inflammation alone, PRP may provide sustained clinical improvement in degenerative tendon disorders.

Recent studies comparing PRP with corticosteroid injections in lateral epicondylitis have demonstrated superior long-term outcomes with PRP, including sustained pain relief and functional improvement [10–12]. However, variations in study design, outcome measures, and follow-up duration necessitate further high-quality randomized controlled trials.

The present study was undertaken to compare the clinical outcomes of autologous platelet-rich plasma injection and corticosteroid injection in patients with chronic lateral epicondylitis, using validated pain assessment tools over a six-month follow-up period.

Materials -and Methods

Study Design and Setting: This prospective, randomized, double-blind controlled study was conducted in the Department of Orthopaedics at a tertiary care teaching hospital over a period of 12 months. Institutional Ethics Committee approval was obtained prior to commencement of the study, and written informed consent was taken from all participants.

Study Population: A total of 60 patients diagnosed with chronic lateral epicondylitis were included in the study. Chronic lateral epicondylitis was defined as lateral elbow pain persisting for more than 6 months despite adequate conservative management.

Inclusion Criteria

- Patients aged between 18 and 65 years
- Clinical diagnosis of lateral epicondylitis based on history and physical examination
- Pain localized over the lateral epicondyle aggravated by resisted wrist extension
- Symptoms persisting for more than 6 months
- Failure of conservative treatment including rest, NSAIDs, physiotherapy, and bracing

Exclusion Criteria

- Previous injection therapy (steroid or PRP) to the affected elbow
- History of elbow surgery or trauma
- Bilateral lateral epicondylitis
- Rheumatoid arthritis or other inflammatory arthropathies
- Diabetes mellitus, bleeding disorders, or active infection
- Pregnancy

Randomization and Blinding: Patients were randomly allocated into two equal groups (30 patients each) using a computer-generated randomization sequence. The study was double-blinded; neither the patients nor the outcome assessors were aware of the type of injection administered.

Intervention

Group I (Corticosteroid Group): Patients in Group I received a single local corticosteroid injection consisting of 80 mg of methylprednisolone acetate mixed with 0.5 ml of 2% plain lignocaine. The injection was administered at the point of maximum tenderness over the lateral epicondyle under strict aseptic precautions.

Group II (PRP Group): Patients in Group II received a single autologous platelet-rich plasma injection. PRP was prepared by drawing venous blood from the cubital vein using sodium citrate as an anticoagulant and centrifuging it using a standardized two-spin technique. Platelet-poor plasma was discarded, and the remaining PRP was used for injection. The PRP was injected at the site of maximum tenderness using a peppering technique under aseptic conditions.

Post-Injection Protocol: All patients were advised relative rest for 48 hours following the injection. Non-steroidal anti-inflammatory drugs were avoided during the study period. A standardized stretching and strengthening exercise program for the forearm extensor muscles was initiated after 48 hours and continued throughout the follow-up period.

Outcome Measures

Clinical outcomes were assessed using:

- **Visual Analog Scale (VAS)** for pain
- **Numerical Pain Score (NPS)**

Assessments were performed prior to injection (baseline) and at 6 weeks, 3 months, and 6 months following the intervention.

Outcome evaluation was carried out by a physiotherapist who was blinded to group allocation.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using appropriate statistical software.

Continuous variables were expressed as mean ± standard deviation. Intergroup comparisons were performed using the independent t-test, while intragroup comparisons were analyzed using the paired t-test. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 60 patients with chronic lateral epicondylitis were included in the study. Thirty patients were allocated to Group I (corticosteroid group) and thirty to Group II (PRP group). Baseline demographic characteristics were comparable between the two groups (Table 1).

Table 1: Demographic Characteristics of the Study Population

Parameter	Steroid Group (Group I) (n = 30)	PRP Group (Group II) (n = 30)
Mean age (years)	43.2 ± 6.1	41.5 ± 5.9
Male	17 (56.7%)	16 (53.3%)
Female	13 (43.3%)	14 (46.7%)
Dominant side involved	18 (60.0%)	19 (63.3%)
Non-dominant side involved	12 (40.0%)	11 (36.7%)

Both treatment groups demonstrated significant improvement in pain scores following injection therapy.

The mean Visual Analog Scale (VAS) scores were comparable between the two groups before treatment. At the 6-week follow-up, the corticosteroid group showed a greater reduction in VAS scores compared to the PRP group; however, this difference reversed over time.

At the 3-month and 6-month follow-ups, patients treated with PRP demonstrated significantly lower VAS scores compared to those treated with corticosteroid injection, and the differences were statistically significant (Table 2).

Table 2: Comparison of Visual Analog Scale (VAS) Scores

Follow-up Period	Steroid Group (Mean ± SD)	PRP Group (Mean ± SD)	p-value
Pre-treatment	7.42 ± 0.94	7.61 ± 1.02	0.38
6 weeks	3.18 ± 0.82	3.96 ± 0.88	0.01
3 months	3.54 ± 0.91	2.38 ± 0.69	0.001
6 months	4.02 ± 0.97	1.58 ± 0.61	<0.001

Similarly, assessment using the Numerical Pain Score (NPS) revealed comparable baseline scores between the two groups. At early follow-up, the corticosteroid group showed better pain relief; however, pain scores in this group gradually increased during subsequent follow-ups. In contrast, the PRP group showed progressive and sustained improvement.

At both the 3-month and 6-month follow-ups, the PRP group had significantly lower NPS values compared to the corticosteroid group (Table 3).

Table 3: Comparison of Numerical Pain Score (NPS)

Follow-up Period	Steroid Group (Mean ± SD)	PRP Group (Mean ± SD)	p-value
Pre-treatment	7.08 ± 0.98	7.36 ± 0.92	0.29
6 weeks	3.05 ± 0.76	3.52 ± 0.81	0.02
3 months	3.41 ± 0.84	2.12 ± 0.64	0.001
6 months	3.79 ± 0.90	1.36 ± 0.52	<0.001

Discussion

Lateral epicondylitis is a common degenerative tendinopathy that causes significant pain and functional limitation. Although corticosteroid injections have been widely used due to their rapid analgesic effect, increasing evidence suggests that their benefits are short-lived and may be associated with poorer long-term outcomes [6,7]. The present study compared autologous platelet-rich plasma (PRP) injection with corticosteroid injection in patients with chronic lateral epicondylitis and demonstrated that PRP provides superior and more sustained pain relief.

In this study, both treatment groups showed significant improvement in pain scores at early follow-up. Patients in the corticosteroid group experienced greater pain relief at the 6-week follow-up, which can be attributed to the potent anti-inflammatory action of corticosteroids. Corticosteroids reduce fibroblast proliferation and inhibit inflammatory mediators, thereby providing rapid symptom relief [6]. However, this effect was not maintained, and

pain scores gradually increased at subsequent follow-ups, suggesting that corticosteroid injections primarily offer short-term symptomatic relief rather than long-term tendon healing.

In contrast, patients treated with PRP demonstrated a gradual and sustained reduction in pain scores over the follow-up period. At the 3-month and 6-month follow-ups, both VAS and NPS scores were significantly lower in the PRP group compared to the corticosteroid group. This sustained improvement supports the concept that PRP addresses the underlying degenerative pathology of lateral epicondylitis rather than merely suppressing inflammation.

The beneficial effects of PRP are attributed to its high concentration of growth factors, including platelet-derived growth factor, transforming growth factor-β, vascular endothelial growth factor, and hepatocyte growth factor (HGF). These growth factors promote collagen synthesis, angiogenesis, and tendon remodeling. HGF also exerts an anti-inflammatory effect by inhibiting nuclear factor kappa-B (NF-κB) activation, thereby reducing cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2) gene expression and protecting tissues from inflammatory damage [9]. This mechanism explains the early reduction in pain and the sustained clinical improvement observed following PRP injection.

The findings of the present study are consistent with previous literature. Mishra and Pavelko reported significant long-term pain relief following PRP injection in patients with chronic lateral epicondylitis unresponsive to conservative treatment [10]. Peerbooms et al., in a randomized controlled trial, demonstrated superior outcomes with PRP compared to corticosteroid injection at one-year follow-up [11].

Similarly, Krogh et al. reported that while corticosteroid injections provided better short-term relief, PRP resulted in improved outcomes at longer follow-up intervals [12]. These studies support the results of the present investigation, reinforcing the role of PRP as a biologic treatment modality with durable benefits.

Conclusion

Both platelet-rich plasma and corticosteroid injections are effective in reducing pain in patients with chronic lateral epicondylitis. Corticosteroid injections provide rapid short-term pain relief; however, their therapeutic effect diminishes over time. In contrast, autologous platelet-rich plasma injection results in sustained and progressive pain reduction with superior outcomes at mid- and long-term follow-up. Based on the findings of this study, PRP appears to be a safe and effective treatment modality for chronic tennis elbow, particularly in patients who do not respond adequately to conservative management. Further large-scale randomized controlled trials with longer follow-up periods are recommended to establish standardized treatment protocols.

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References

1. Nirschl RP, Ashman ES. Elbow tendinopathy: tennis elbow. Clin Sports Med. 2003;22(4):813–836.
2. Walker-Bone K, Palmer KT, Reading I, Cooper C. Prevalence and impact of musculoskeletal disorders of the upper limb in the general population. Arthritis Rheum. 2004;51(4):642–651.
3. Kraushaar BS, Nirschl RP. Tendinosis of the elbow (tennis elbow): clinical features and findings of histological, immunohistochemical, and electron microscopy studies. J Bone Joint Surg Am. 1999;81(2):259–278.
4. Alfredson H, Lorentzon R. Chronic tendon pain: no signs of chemical inflammation but high concentrations of substance P and CGRP. Pain. 2000;87(3):341–347.
5. Sanders TL, Kremers HM, Bryan AJ, Ransom JE, Smith J, Morrey BF. The epidemiology and health care burden of tennis elbow. Am J Sports Med. 2015;43(5):1066–1071.
6. Smidt N, Assendelft WJ, van der Windt DA, Hay EM, Buchbinder R, Bouter LM. Corticosteroid injections for lateral epicondylitis: a systematic review. Pain. 2002;96(1–2):23–40.
7. Coombes BK, Bisset L, Vicenzino B. Effect of corticosteroid injection, physiotherapy, or both on clinical outcomes in patients with unilateral lateral epicondylalgia. JAMA. 2013;309(5):461–469.
8. Shrier I, Matheson GO, Kohl HW. Achilles tendonitis: are corticosteroid injections useful or harmful? Clin J Sport Med. 1996;6(4):245–250.
9. Foster TE, Puskas BL, Mandelbaum BR, Gerhardt MB, Rodeo SA. Platelet-rich plasma: from basic science to clinical applications. Am J Sports Med. 2009;37(11):2259–2272.
10. Mishra A, Pavelko T. Treatment of chronic elbow tendinosis with buffered platelet-rich plasma. Am J Sports Med. 2006;34(11):1774–1778.
11. Peerbooms JC, Sluimer J, Bruijn DJ, Gosens T. Positive effect of an autologous platelet concentrate in lateral epicondylitis. Am J Sports Med. 2010;38(2):255–262.
12. Krogh TP, Fredberg U, Stengaard-Pedersen K, et al. Treatment of lateral epicondylitis with platelet-rich plasma or corticosteroid injection:

a randomized controlled trial. Am J Sports Med. 2013;41(3):625–635.