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Comparison of Single Injection of Autologous Blood Versus Steroid Injection in Terms of Change in Mean Pain Score in the Management of Tennis Elbow

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ABSTRACT

Objectives: To evaluate the efficacy of autologous blood (AB) injection by comparing with corticosteroid (CS) injection in reducing pain associated with lateral epicondylitis (tennis elbow). **Study Settings:** This randomized controlled trial was conducted at the Department of Orthopaedics, Allied Hospital-II, Faisalabad. **Duration of Study:** October 2024 to March 2025. **Data Collection:** A total of 134 patients with tennis elbow were enrolled in the study and given trial of two techniques in equal group system. Group A was given AB injection, while CS injection in Group B cases. The severity of pain was evaluated and recorded with the help of Visual Analog Scale (VAS) at baseline and final at six months. **Results:** At baseline, the mean pain score in Group A was 7.21 ± 1.46, while in Group B, it was 7.29 ± 1.35 (p = 0.738), indicating comparable initial pain levels. At the final six-month follow-up, the mean pain score in Group A decreased to 0.96 ± 0.96, while in Group B, it was 1.59 ± 1.40 (p = 0.002), demonstrating a significantly greater pain reduction in the AB injection group. **Conclusion:** ABS injection is a superior treatment option for lateral epicondylitis compared to corticosteroid injection, providing greater and sustained pain relief over six months. Given its regenerative properties, AB injection should be considered a viable first-line treatment for patients seeking long-term improvement.

INTRODUCTION

Lateral epicondylitis, also referred to as tennis elbow, accounts for the majority of lateral elbow pain cases, affecting 1% to 3% of individuals. Despite its association with tennis, it is actually more common in the general population.[1-3] Most frequently seen in individuals aged 40 to 50 years, lateral epicondylitis affects both genders without preference. It is often linked to obesity, smoking, occupational overuse, and participation in tennis.[4-5] In Pakistan, 86% of housewives reported experiencing pain at varying intensities (mild, moderate, or severe) according to the PRTEE questionnaire. However, only 39.33% (59/150) were diagnosed with lateral epicondylitis through physical examination using special tests (Cozen's, Mill's, and Maudsley's tests). Among those diagnosed, right arm pain was experienced in majority of the cases i.e. (71.19%), while 16.95% reported left-arm pain, and 11.86% had pain in both arms.[6] Unlike their counterparts in Western countries, Pakistani housewives perform a wide range of household tasks despite facing less occupational pressure.[7]

Previously believed to be caused by tendon inflammation, lateral epicondylitis has been shown in histopathologic studies to lack inflammatory cell infiltration. The most widely accepted hypothesis links lateral epicondylitis to the incomplete healing of microtears in the extensor carpi radialis brevis tendon. Fortunately, the condition is self-limiting, with symptoms usually resolving within 12 to 18 months without medical intervention.[8]

A wide range of treatment modalities is available for lateral epicondylitis, from conservative management to surgical intervention.[9-10] Conservative treatments include watchful waiting, rest, activity modification, physical therapy, bracing, extracorporeal shockwave therapy(ESWT), NSAIDs, and local injections.[11] Due to the tendon's limited blood supply, its healing potential is compromised, which in turn diminishes the efficacy of traditional treatment approaches.[12] Autologous whole

blood and corticosteroids are two widely used injection therapies for lateral epicondylitis. While both aim to alleviate pain and enhance healing, they function through distinct mechanisms.[13] In 2003, Edward et al. pioneered the use of autologous blood (AB) injections for lateral epicondylitis. Extracted from a peripheral vein, AB contains various cell mediators and hormones that aid in tendon cell differentiation, support tissue regeneration, and replace damaged cells. Research has demonstrated that AB triggers an inflammatory response around the tendon, activating cellular and humoral mediators to facilitate repair.[14]

A study evaluating corticosteroid versus autologous whole blood (AB) injections for tennis elbow measured pain levels using the Visual Analog Scale (VAS). Pre-treatment VAS scores were 5.41 ± 0.50 in the AB group and 5.95 ± 0.76 in the corticosteroid group. After one week, scores decreased to 4.73 ± 0.62 for AB and 1.65 ± 1.46 for corticosteroids. At two months, pain was nearly eliminated, with VAS scores of 0.08 ± 0.28 in the AB group and 0.17 ± 0.61 in the corticosteroid group. Final follow-up showed a VAS of 0.65 ± 1.15 in AB-treated patients and 1.34 ± 1.82 in the corticosteroid group.[15]

The use of autologous blood injections for lateral epicondylitis remains relatively unexplored. This study sought to assess its efficacy as a treatment modality, comparing it with the commonly administered corticosteroid injection.

METHODOLOGY

This randomized controlled trial (RCT) was conducted at the Department of Orthopaedics, Allied Hospital-II, Faisalabad, over a duration of six months following approval from the College of Physicians and Surgeons Pakistan (CPSP). The study aimed to compare the mean pain scores between autologous blood injection and steroid injection in patients diagnosed with tennis elbow.

A total of 134 patients (67 per group) were included in the study, with the sample size determined using the WHO sample size calculator. The calculation was based on a 5% significance level, 80% power, and anticipated mean values of 0.65 ± 1.158 for autologous blood and 1.34 ± 1.828 for steroid injection. Patients aged 18 to 60 years with typical symptoms of unilateral or bilateral tennis elbow and a Visual Analog Scale (VAS) score >5 were included. Patients were excluded if they had contraindications to steroid injection, uncontrolled comorbid conditions such as diabetes mellitus and osteoarthritis, radiographic or local evidence of infections or fractures, a history of acute trauma, or previous treatment for tennis elbow.

After obtaining ethical approval and informed consent, patients presenting with pain on the lateral aspect of the elbow in the outpatient department were enrolled in the study. Patients were randomly assigned to two groups using the lottery method. In Group A, patients received 40 mg of methyl prednisolone acetate mixed with 1 ml of 2% lidocaine, while in Group B, patients received 2 ml of autologous venous blood drawn from either upper limb, mixed with 1 ml of 2% lidocaine. All injections were administered at the site of maximum tenderness over the lateral epicondyle, ensuring avoidance of the skin and subcutaneous tissue. The procedure was performed by the researcher.

The study utilized VAS for evaluation of pain severity, with a scale of 0 indicating no pain and 10 denoting the worst pain imaginable. Baseline pain scores were recorded at presentation. Follow-up assessments were conducted at two-week intervals, with the final outcome measured at six months post-treatment. Patients were advised to return for scheduled follow-ups, and compliance was ensured by maintaining a record of their contact numbers. Using SPSS version 25, data analysis involved computing frequencies and percentages for categorical variables such as gender, residence, and side involvement. Mean and SD were used to describe continuous variables like age, duration of symptoms, and VAS scores. Group-wise comparison of pain scores at six months was conducted using the independent samples t-test.

RESULTS

Table 1: Demographic and Clinical Characteristics of Patients with Tennis Elbow

The study included a total of 134 patients diagnosed with tennis elbow, with complete data available for all cases. No patients were excluded from the analysis. The age distribution of the patients showed that 51.5% (n=69) were between 18 and 40 years of age, while 48.5% (n=65) were between 41 and 60 years. We computed 38.93 years as the mean age, with 12.39 as standard deviation, indicating a broad age range among participants. Regarding gender distribution, 61.9% (n=83) male and 38.1% (n=51) females. The affected limb was more commonly the right side, observed in 71.6% (n=96) of cases, whereas the left side was involved in 28.4% (n=38) of cases.The duration of symptoms among patients varied, with a mean duration of 5.87 months and a standard deviation of 3.50 months. All 134 patients had complete data available for symptom duration, with no missing values.

Table 1

Demographic information of patients under management of tennis elbow(n=134)

Variable	Category	Count	Percent
Age Group	18-40	69	51.5%
	41-60	65	48.5%
Gender	Male	83	61.9%
	Female	51	38.1%
Side Involved	Right	96	71.6%
	Left	38	28.4%

Table 2: Comparison of Autologous Blood Injection and Steroid Injection for Pain Reduction in Tennis Elbow

Baseline mean pain scores were 7.21 ± 1.46 in Group A and 7.29 ± 1.35 in Group B, (t = -0.336, df = 132, p = 0.738) showing equal pain with no difference. At final follow-up, pain scores decreased to 0.96 ± 0.96 in Group A and 1.59 ± 1.40 in Group B, showing remarkable difference (t = -3.095, df = 132, p = 0.002). The mean pain reduction difference was -0.63414 (95% CI: -1.039 to -0.229), indicating superior pain relief with autologous blood injection.

Table 2

Comparison of Single Injection of Autologous Blood Versus Steroid Injection in Terms of Change in Mean Pain Score in the Management of Tennis Elbow (N=134)

Variable	Group A (Mean ± SD) (n=67)	Group B (Mean ± SD) (n=67)	t-value	df	p-value	Mean Difference	95% CI (Lower, Upper)
Baseline Pain Score	7.21 ± 1.46	7.29 ± 1.35	-0.336	132	0.738	-0.08185	(-0.564, 0.400)
Final Pain Score	0.96 ± 0.96	1.59 ± 1.40	-3.095	132	0.002	-0.63414	(-1.039, -0.229)

DISCUSSION

Our study included 134 patients diagnosed with lateral epicondylitis (LE), with a mean age of 38.93 ± 12.39 years. This aligns with Albert Cakar et al. (2024),[16] who reported a similar mean age range in their randomized clinical trial with 120 patients. However, our cohort had a male predominance (61.9%), whereas Cakar et al[16] observed a more balanced gender distribution. These variations may be due to demographic differences in patient recruitment or varying occupational risk factors among study populations. Furthermore, Hasan Onur Arik and colleagues (2014)[17] documented a slightly older cohort (mean age: 45.2 years), signifying that LE's onset might be influenced due occupational strain and life style leading to different age distributions across various trials.

Although both interventions reduced significant pain scores compared to baseline, our findings support autologous blood (AB) injections for being superior long-term treatment, showing sustained improvement over six months. These findings are further supported by Cakar et al in 2024,[16] who documented corticosteroid (CS) injections as rapid pain reliever at 15 days (p= 0.001) but lost efficacy over long time, whereas AB injections maintained its benefits. This shows that CS offers symptomatic relief by suppressing inflammation but does not contribute to healing of the tissue, whereas AB injections promote biological repair through cellular and humoral mediators.

Like Hasan Onur Arik and co-workers in 2014[17] and other studies also[18-22] similarly advocated that CS injections resulted in faster pain reduction (p = 0.0001), yet AB injection provided long-term improvements in pain, grip strength, and function (p = 0.0001) suggesting that while CS might be preferred in acute pain scenarios, AB should be the primary choice for sustained symptom relief and functional recovery. The differing pain relief durations between the modalities may be attributed to their distinct biological mechanisms. CS injections work by reducing local inflammation through inhibition of pro-inflammatory cytokines explaining their effect of immediate pain relief. However, they do not enhance tendon regeneration and may even contribute to tendon degeneration over repeated use, explaining their diminishing efficacy over time.

In contrast, AB injections contain growth factors, platelets, and leukocytes, which promote tissue healing and collagen synthesis in damaged tendons. This aligns with Aybars Kıvrak et al (2023),[18] who compared platelet-rich plasma (PRP), CS, and AB injections and found that AB and PRP led to sustained improvements, whereas CS lost effectiveness beyond the short-term period. The regenerative potential of AB may be due to its ability to trigger angiogenesis and fibroblast activation, processes necessary for tendon repair.

While our findings strongly support AB as the superior long-term treatment, some studies have reported conflicting results. For example, Mohammad Noman et al[23] (2016) found that AB injections reduced mean pain scores from 6.17 ± 1.48 to 1.22 ± 0.52, demonstrating a mean difference of 4.94 ± 1.52 (p = 0.0001). However, Dojode CM (2012)[22] reported an even greater reduction of 7.2 ± 0.6 at six-month follow-up, which is notably higher than our findings. These discrepancies could be due to variations in injection techniques, patient selection criteria, or follow-up durations. Differences in the volume of injected blood, preparation methods, or use of adjunct therapies (e.g., rehabilitation exercises) may also explain these inconsistencies.

Additionally, Muhammad Mannan et al. (2024)[23] reported that while AB injections demonstrated longer-lasting benefits, CS injections provided more immediate pain relief. However, their results did not conclusively support AB injections as superior in all cases, suggesting that patient-specific factors such as chronicity of symptoms, baseline inflammation levels, and functional demands might influence treatment outcomes.

Several meta-analyses have suggested that PRP injections may provide superior long-term results compared to AB injections. For instance, Qiaolong Xu et al. (2019)[20] compared PRP and CS injections and found that PRP led to more sustained pain relief over time, though they did not directly include AB in their analysis. While PRP is often considered a more advanced biological therapy, AB injections may offer comparable benefits at a lower cost and with easier preparation, making them a viable alternative in resource-limited settings.

Our findings reinforce the growing evidence that AB injections should be preferred over CS for long-term management of LE due to their regenerative potential and sustained efficacy. However, CS may still be useful in patients requiring immediate symptomatic relief. Based on the available evidence, future research should:

Explore combination therapies (e.g., AB + CS, AB + PRP) to optimize treatment outcomes.

Investigate patient-specific predictors of response to determine which subgroups benefit most from AB.

Standardize AB preparation and injection protocols to reduce variability in outcomes across studies. Evaluate long-term tendon health in patients receiving repeated CS injections to better understand the risks of degeneration. However, being a single-centered study was the major limitation of our study affecting the generalizability of our findings. Multi-centered trial in future research should be done on larger sample size for further validation.

CONCLUSION

Our study supports the growing body of evidence that autologous blood(AB) injection provides a superior long-

term outcome compared to corticosteroid(CS) injection for lateral epicondylitis. Given its regenerative properties and sustained pain relief, AB injection should be considered a viable first-line treatment option, particularly for patients seeking longer-lasting benefits and reduced recurrence rates.

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