Comparing Autologous Blood, Corticosteroid, and Their Combined Injection for Treating Lateral Epicondylitis: A Randomized Clinical Trial

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Compliance with the ethical standards

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Abstract

Objective: This study aimed to compare the efficacy of autologous blood (AB) and corticosteroid (CS) injections, as well as their combination, in treating lateral epicondylitis (LE).

Design: Randomized controlled trial

Methods: A total of 120 patients diagnosed with lateral epicondylitis were divided into three therapeutic injection groups. The AB group received a mixture of 1 ml of autologous venous blood and 2 ml of 2% prilocaine HCl (Priloc %2, Vem, Turkey). The CS group received a mixture of 1 ml of 40 mg methylprednisolone acetate (Prednol-L 40 mg, Mustafa Nevzat, Turkey) and 2 ml of 2% prilocaine HCl. The combined group received a mixture of 1 ml of autologous venous blood, 1 ml of 40 mg methylprednisolone acetate, and 1 ml of 2% prilocaine HCl. Follow-up assessments were conducted on days 15, 30, and 90.

Keywords: Lateral epicondylitis; Tennis elbow; autologous blood; corticosteroid

Level of evidence: Randomized clinical trial, Level 1 evidence

Abbreviations

AB: Autologous blood**, CS:** Corticosteroid, **LE:** Lateral epicondylitis, **PRTEE**: Patient-rated tennis elbow evaluation, **HGS:** Hand Grip Strength

1. Introduction

Lateral epicondylitis (LE) is a common musculoskeletal disorder affecting the extensor tendons of the forearm, manifesting as pain on the lateral side of the elbow and functional limitation during daily activities. Despite its name suggesting inflammation, histopathological examinations of the tendon reveal non-inflammatory angiofibroblastic tendinosis, accompanied by neovascularization, disorganized collagen, and mucoid degeneration [1, 2]. Since tendon degeneration is the underlying pathology, an effective therapeutic approach should reverse the degeneration to regeneration, ensuring symptom relief without recurrence.

Although many treatments exist, a consensus on the optimal single treatment for LE remains elusive. Traditionally, injections have served as a preliminary measure before resorting to surgical interventions, especially in resistant cases. However, an increasing number of alternative injections have been described in recent literature [3]. Newer injection therapies, such as autologous blood (AB) injections and platelet-rich plasma (PRP), have gained prominence and found favor among orthopedic surgeons. Multiple studies have attested to the safety and efficacy of AB and PRP injections as treatment modalities [4-7]. However, corticosteroid (CS) injections continue to be among the most commonly employed treatments for LE. A significant drawback of CS injections is their high recurrence rate. Patients typically experience a swift recovery immediately after injection, which endures for about a month. Unfortunately, this transient relief—often referred to as the 'honeymoon period'—is short-lived, leading to a recurrence of symptoms. Such a response pattern is well-documented in existing studies [8]. Conversely, AB injection therapy tends to proffer a gradual yet consistent reduction in symptoms, boasting a recurrence rate markedly lower than that of CS. It is postulated that AB addresses the intrinsic degeneration of the tendon, with its restorative process inherently spanning a more extended period [9-11].

We hypothesized that a combination of CS and AB injection might offer a superior treatment for LE. This combination may provide a faster resolution of symptoms due to the initial action of CS and provide a lower recurrence rate due to the regenerative action of AB. The purpose of this randomized clinical trial is to test three different types of injection for the treatment of LE: (*1*) AB, (*2*) CS, and (*3*) their combination (AB+CS).

2. Materials and methods

2.1. Patients and study design

A randomized clinical trial was carried out on eligible patients with a diagnosis of LE presented to our outpatient clinic. The diagnosis of LE was made with typical symptoms and physical examination findings, including pain and tenderness localized to the origin of forearm extensors and discomfort on the provoked wrist and middle finger extension. Patients whose complaints persisted for more than 3 months were evaluated for inclusion in the study.

Patients with a history of recent trauma, congenital or neuromuscular disease or abnormality of the upper limb, previous upper limb surgery, and history of rheumatic disease, history of cervical disc

pathology or carpal tunnel syndrome, systemic corticosteroid treatment, any previous local injection treatment, and finally patients with a history of previous allergic reaction towards local anesthetics and corticosteroids were all excluded from the study. All patients were over 18 years of age. The local ethical committee approved the study protocol (Approval number: 2023/137), and all patients gave their informed consent prior to their inclusion in the study. This prospective study was carried out following the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

2.2. Treatment groups and randomization

After taking informed consent, patients were randomly allocated into three treatment groups (AB versus CS versus their combination) with sealed envelopes prepared by a computer-based random number generator. A total of 120 envelopes were divided into three equal groups, 40 patients in each group. Patients in the AB Group received 1 ml of autologous venous blood mixed with 2 ml of 2% prilocaine HCl, patients in the CS Group received 1 ml of 40 mg methylprednisolone acetate mixed with 2 ml of 2% prilocaine HCl, and patients in the Combined Group (AB+CS) received 1 ml of autologous venous blood, 1 ml of 40 mg methylprednisolone acetate mixed with 1 ml of 2% prilocaine HCl. Each group received an equal amount of (3 ml) injected material. Venous blood was collected from the antecubital fossa of the ipsilateral extremity. The senior author performed all injections, and neither the physician nor the patient was blinded to the treatment modality. The injection was administered in aseptic conditions, and the needle was introduced over the maximal tenderness point; the content of the syringe was injected at once to prevent further bleeding. All patients were instructed to abstain from heavy work, and no additional therapy, including NSAIDs or physiotherapy, was prescribed.

2.3. Follow-up and outcome measures

Functional outcomes were assessed with the patient-rated tennis elbow evaluation questionnaire (PRTEE). This outcome score consisted of 15 items related to three subscales, namely pain (5 questions), specific activities (6 questions), and daily activities (4 questions). The total score ranges between 0-100 points, 0 points designates the best functional outcome, whereas 100 points designates the worst functional outcome [12, 13]. To interpret PRTEE results, a minimum clinically important difference (MCID) value previously described by Poltawiski et al. was used [14]. According to his study, a 37% decrease in PRTEE is considered a ‘complete recovery’ or clinically significant change. PRTEE was assessed before the injection (baseline values), on Day 15, Day 30, and Day 90, in the

same manner by the senior author. The same author performed follow-up and data collection. No patients received more than one injection in this clinical trial.

Hand grip strength (HGS) was measured with a digital hand dynamometer before and after injection in all patients. The senior author performed the measurements according to the American Society of Hand Therapists guidelines [15]. Since HGS varies according to factors such as height, weight, age, and gender, each patient's hand grip strength was calculated as a percentage increase from baseline.

2.4. Sample size calculation

In our pursuit to determine the optimal sample size for our study on LE treatments utilizing PRTEE scores, we based our assumptions on several crucial parameters. We anticipated a 37% change in baseline PRTEE scores and considered a standard deviation (SD) of 10, drawing from previous studies. We adopted a conventional significance level (α) of 0.05 and aspired for a power of 0.90, applying the ANOVA testing methodology for three distinct treatment groups. Our computations indicated that to discern this 37% shift in PRTEE scores with the targeted power and significance level, a sample size of roughly 33 participants per group would be essential. Thus, given the three treatment groups in our research design, the aggregate sample size was estimated at 99 participants. However, taking into account a 20% dropout rate, the study included a total of 120 patients, with 40 patients in each group.

2.5. Statistical analysis

Continuous variables were stated as mean and standard deviation, and categorical variables as percentages and frequency distribution. The conformity of the data to normal distribution was tested using the Kolmogorov-Smirnov test. For the comparison of continuous variables between the three groups, ANOVA was used for the data that fit the normal distribution, and the independent sample Kruskal-Wallis test was used for the data that did not fit the normal distribution. Categorical variables were compared using a chi-square test. Freidman test was used to assess the repeated measurements of the same group. A $p<0.05$ was set as a statistically significant alpha error.