



Evaluation of injection techniques in the treatment of lateral epicondylitis: a prospective randomized clinical trial

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Objective: We aimed to compare the efficacy of two different injection techniques of local corticosteroid and local anesthetic in the management of lateral epicondylitis.

Methods: This prospective study followed 80 consecutive patients who were diagnosed with lateral epicondylitis at our hospital outpatient clinic between 2005 and 2006. Patients were randomly assigned into two equal groups. Group 1 received a single injection of 1 ml betamethasone and 1 ml prilocaine on the lateral epicondyle at the point of maximum tenderness. Group 2 patients received an injection of the same drug mixture. Following the initial injection, the needle tip was redirected and reinserted down the bone approximately 30 to 40 times without emerging from the skin, creating a hematoma. Patients were evaluated with the Turkish version of the Disabilities of the Arm, Shoulder and Hand questionnaire before injection and at the final follow-up. The unpaired t-test and chi-square tests were used to compare results.

Results: Sixteen patients in Group 1 and 15 patients in Group 2 were lost during follow-up. The average follow-up period of the remaining 49 patients was 21.6 months. There were no significant differences between the two groups with regard to gender, age, follow-up period, symptom duration, involvement side and number of dominant limbs. The Turkish DASH scores of Group 2 were significantly lower than those of Group 1 ($p=0.017$).

Conclusion: Long-term clinical success in the treatment of lateral epicondylitis depends on the injection method. The peppering technique appears to be more effective than the single injection technique in the long-term.

Key words: Extensor muscle; lateral epicondylitis; “peppering” technique; tennis elbow.

Tennis elbow, or lateral epicondylitis (LE), is a condition characterized by pain in the lateral region of the elbow, the origin of the extensor muscles of the wrist and fingers. Tennis elbow develops mostly in the fifth and sixth decade and was first defined by Runge in 1873.^[1] This condition, affecting 1 to 5% of the population, is also known as tendinosis, is the degeneration

in tendon attachment points caused by repetitive microtrauma.^[2] The primary treatment method for this common problem is conservative. Today, several methods, from local injection to complicated surgical techniques, are suggested in the treatment of LE.^[3-5] However, very few methods have been scientifically proven to be effective and there is a lack of evidence

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proving one technique's superiority over another. This lack of evidence is usually the result of LE's self-limiting nature, follow-up periods of 12 months or less, presence of several factors that can affect the outcome and inadequacy of pathophysiological data.^[6-8]

The aim of this prospective and randomized study was to compare the efficacy of 2 injection methods in patients diagnosed with LE.

Patients and methods

Included in this study were eighty consecutive patients who were referred to our clinic and diagnosed with LE between 2005 and 2006. Patients were randomly assigned into two groups and followed prospectively after gaining approval from the ethical committee of our hospital.

The following criteria were used in the diagnosis of LE:

1. Presence of significant pain on the lateral epicondyle during daily activities,
2. Significant sensitivity at the lateral epicondyle and origin of the extensor muscles,
3. Increase in pain during active dorsiflexion of the wrist and middle finger, against resistance with the elbow in extension.

Patients with systemic rheumatic disease, findings of cervical spondylomyelopathy, bone pathologies, elbow instabilities, nerve entrapment at physical examination and those who had been operated or received local injections on the elbow or had major traumas were excluded from the study.

Anteroposterior and lateral radiographs of the involved elbow were taken in all patients. None of the patients underwent electromyography. Patients were evaluated using the Disabilities of the Arm, Shoulder and Hand (DASH-Turkish) questionnaire before injection. Cases were then randomized using a random allocation software.^[9] Chalmer's^[10] criteria for prospective controlled clinical trials were followed throughout the study.

The forty patients in Group 1 received an injection of a single-dose mixture of 1 ml of betamethasone dipropionate (Diprospan®; Schering-Plough Corp., Kenilworth, NJ, USA) and 1 ml of prilocaine HCl (Citanest®; AstraZeneca plc., London, UK) at the most sensitive point of the lateral epicondyle. The forty patients in Group 2 received the same injection. Following the initial injection, the tip of the needle was not removed and was moved back and forth approximately 30 to 40 times to form a local hematoma

around the epicondyle.^[11] The use of a splint, cast and/or any drugs following injection was not recommended. All patients were followed up at the 3rd, 6th, 12th and 18th months.

Results were evaluated using the DASH-Turkish scoring system. Follow-up controls were performed by a third individual (MŞ) who was not informed about the design of the study or injection technique.

Statistical analysis of the two groups was made using the unpaired Student's t-test and chi-square tests on SPSS v16.0 (SPSS Inc.; Chicago, IL, USA) software.

Results

Sixteen patients from Group 1 and 15 patients from Group 2 were excluded from the study due to inadequate follow-up. The patient drop-out rate was 38%. No statistically significant difference was observed between the DASH-Turkish scores of the two groups (including the drop-outs) obtained at the 3rd, 6th, 12th and 18th month follow-ups (Table 1). The mean follow-up time of the final forty-nine patients was 21.6 months. There was no statistically significant difference in terms of age, sex, follow-up time, involvement, involvement of the dominant side, duration of complaints, or DASH-Turkish score before injection between Group 1 and 2 (Table 2). However, a significant difference in favor of Group 2 was noted in DASH-Turkish scores at the final follow-up ($p=0.0017$) (Table 2).

Table 1. Patients' DASH-Turkish scores.

	Mean DASH-Turkish scores		
	Group 1	Group 2	p
Pre-injection	83.4	87.2	0.496
3rd mo. follow-up	62.6	56.4	0.111
6th mo. follow-up	64.4	57.6	0.130
12th mo. follow-up	63.5	51.8	0.006
18th mo. follow-up	59.7	47.2	0.012
Final follow-up	58.2	45.0	0.017

Table 2. Demographic and clinical data of the patients.

	Group 1	Group 2	p
Mean age	45.7	47.4	0.455
Sex (M/F)	10/14	8/17	0.483
Mean follow-up time	22.2 mo.s	20.9 mo.s	0.070
Duration of complaint	11.8 mo.s	6.4 mo.s	0.371
Involved side (R/L)	15/9	15/10	0.850
Dominant/non-dominant side involvement	15/9	18/7	0.478

Discussion

Lateral epicondylitis is a common condition involving pain on the lateral side of the elbow and is associated with degenerative changes at the extensor muscle origin. The condition should be primarily treated conservatively. A variety of methods from corticosteroid (CS) injection to shock waves have been suggested in the literature.^[3,12,13]

Our findings show that the method of injection is more important than the CS for producing better long-term results in the treatment of LE. Several studies have reported that although CS injections reduce pain in the short-term, the effectiveness of this method disappears in the long-term.^[3,14] In their prospective and randomized study, Verhaar et al. compared the results of CS injection and physiotherapy and concluded that CS was much more effective in reducing pain at the end of 6 weeks, but did not differ from physiotherapy after 12 months.^[12] Stahl and Kaufman^[14] compared local CS with saline injections in their prospective, randomized and blinded study. After 6 weeks they found a significant reduction in pain in patients treated with CS injection, but observed no difference between the two groups at the 3rd and 12th month follow-ups.

In another study, local CS, physiotherapy and the wait-and-see policy were prospectively and randomly compared. A significant recovery pattern was observed in the short-term in patients treated with CS injection. However, physiotherapy and the wait-and-see policy proved more effective in the long-term, as the effectiveness of local CS decreased.^[15] Newcomer et al.^[16] assessed local CS and physiotherapy in their prospective, randomized and double-blinded study. The authors did not find a significant difference between the two methods at the end of 6 months and recommended physiotherapy as the first-line treatment.

Although the efficacy of local CSs does not last long and their success in the recovery of tendon degenerations is not clearly defined,^[17,18] these agents are frequently used in the treatment of LE based on anecdotal data rather than scientific evidence.^[19] Considering the long span of follow-up (approximately 2 years) in our study, it is clear that the injection method is more important than the CS itself in the long-term. Altay et al.^[11] reported similar findings. In their prospective and randomized study, they compared local anesthetic with a local anesthetic-CS mixture, using the “peppering” technique. Both groups returned positive results, which was an indicator of the effectiveness of this technique. The flow chart in Table 1 depicts no significant difference between the two groups after 6 months, yet,

significance is observed starting after the first year. This is a proof to the effectiveness of the peppering technique in the long-term. In their prospective and randomized study, Doğramacı et al.^[20] also reported better results using the peppering technique compared to conventional CS injection and to the peppering technique with a single local anesthetic. However, follow-up time was limited to 6 months and the long-term results were unknown.

Our study showed that clinical success depends on the injection method, rather than CSs and that the peppering technique is effective in the long-term. Multiple injections reach the bone through the degenerative tendons and granulation tissue, causing local hematoma. It is believed that this bleeding may initiate a healing process.^[2,21]

The prospective and randomized design is the strength of our study. The long follow-up period and use of an objective scoring system in the clinical evaluation are other positive aspects. When reviewing the literature, we see most studies have limited follow-up periods of one year. These studies also mainly evaluate the results with a visual analog scale and do not clearly report long-term results. The weakness of our study was the dropout rate (38%). We cannot answer whether the patients’ absence at the follow-up was due to recovery or a quest for alternative solutions.

In conclusion, clinical success depends on the injection method rather than medication in the treatment of LE. Injection should be performed using the peppering technique, opening holes on several spots rather than a single spot over the lateral epicondyle as it will provide a longer relief.

Conflicts of Interest: No conflicts declared.

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