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Comparison of the effects of neural therapy injection and extracorporeal shock wave therapy on pain and hand functions in the treatment of lateral epicondylitis

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Ethics Committee Approval
The study was approved by the Buca Seyfi Demirsoy Training and Research Hospital non-interventional research ethics committee (date/protocol no: 28.09.2022/09-112). All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

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Abstract

Background/Aim: Lateral epicondylitis (LE), commonly known as “tennis elbow”, is a painful inflammatory condition affecting wrist extensor tendons. Various treatments, such as extracorporeal shockwave therapy (ESWT) and neural therapy injections, have been used to alleviate symptoms of LE. However, there is a limited number of comparative studies available. This study aims to compare the effectiveness of sequential neural therapy injections and ESWT in reducing pain and improving functionality in patients with LE.

Methods: A retrospective cohort study analyzed data from 128 LE patients. Among them, 30 patients underwent neural therapy, while 30 underwent ESWT, following the exclusion criteria. Pain levels were measured using the visual analog scale (VAS), and functionality was assessed using the Duruöz hand index (DHI) before and after treatment.

Results: Both neural therapy injections and ESWT led to substantial reductions in pain and improvements in functionality, with no notable differences observed between the two treatment methods. Additionally, no significant variations were found based on age, body mass index, gender, or the side of the elbow treated.

Conclusion: The findings suggest that both neural therapy injections and ESWT are equally effective in managing symptoms of LE. Treatment choice may depend on patient preference, cost, availability, or other factors. Further research is necessary to examine long-term outcomes, potential side effects, and factors predicting a better response to one treatment.

Keywords: lateral epicondylitis, pain, neural therapy, extracorporeal shock wave therapy

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Introduction

Lateral epicondylitis (LE) is an inflammatory condition that affects the attachment site of the wrist extensor tendons. It is commonly referred to as tennis elbow due to the repetitive wrist-elbow-straining movements often seen in tennis players [1]. The primary symptom experienced by patients is pain in the lateral epicondyle, which can radiate to the humerus and forearm [2]. The main goals of treatment include pain reduction, inflammation resolution, and restoration of functionality [2,3].

Extracorporeal shockwave therapy (ESWT) is a commonly utilized physical therapy for treating LE, although the existing literature presents conflicting results [4-6]. ESWT induces inflammation and enhances blood flow in the targeted area, stimulating the body's self-repair mechanisms and promoting healing in chronic muscle-tendon disorders [5]. Furthermore, alternative injection methods such as local corticosteroids, platelet-rich plasma, and autologous blood injection have been employed as substitutes for conventional approaches in treating LE for a considerable period.

In contrast to these injections, neural therapy is also utilized to treat various musculoskeletal conditions. However, insufficient literature on studies involving neural therapy injections is lacking. Building upon this premise, our study aimed to compare the effects of sequential neural therapy injections and ESWT treatment on pain and functionality in patients diagnosed with LE.

Materials and methods

Our study is designed as a retrospective cohort study. We retrospectively evaluated the data of 128 patients with LE who sought treatment at the physical therapy outpatient clinic for elbow pain between January 2021 and January 2022. The data from those volunteers who met the inclusion criteria were analyzed.

Inclusion and Exclusion Criteria

The inclusion criteria were: patients who have experienced elbow pain within the last 3 months; patients who have received a diagnosis of lateral epicondylitis through physical examination and/or radiological imaging; and patients who have completed all tests assessing treatment efficacy. The exclusion criteria were: pregnancy or lactation; the presence of severe inflammatory diseases, muscle diseases such as myasthenia gravis, sepsis, or a diagnosis of cancer; all rheumatological diseases that may cause arthritis/arthralgia in the elbow; history of any recent injection into the painful elbow, elbow fracture, or the presence of metal implants (e.g., screws or nails) in the elbow; the presence of psychiatric diseases such as schizophrenia or mental retardation; patients who have undergone ESWT for symptomatic elbow treatment within the last 6 months; and patients with a history of decompensated heart failure, 2nd and 3rd degree AV block, bradycardia, or the use of anticoagulant agents.

In our study, we screened the data of patients who did not experience any changes in their medical treatments (such as oral analgesics or myorelaxants) and did not receive additional injections in their elbows throughout the study period. The study received approval from the Ethics Committee of Buca Seyfi Demirsoy Training and Research Hospital for non-interventional research (date/protocol no: 28.09.2022/09-112).

Intervention

We analyzed the data of 128 patients diagnosed with LE. Among these patients, it was observed that 86 received additional treatments in addition to medical treatment. Of the 86 selected patients, 34 underwent neural therapy injections, while the remaining 52 underwent ESWT treatments.

Patients who actively participated in each treatment protocol and attended the evaluation follow-ups were included in our study. Four of the 34 patients who received neural therapy injections were excluded from the study as they did not maintain their weekly follow-up appointments. To ensure comparability, we selected 30 patients from the 52 individuals who received ESWT treatment, matching them in terms of age and gender with the neural therapy group. In summary, we compared the data of 30 patients from both treatment groups.

The ESWT and neural therapy injection groups followed treatment protocols consisting of once-weekly sessions for three consecutive weeks.

The first group (n=30) comprised patients who received neural therapy injections in their painful elbows. The neural therapy injections were locally administered using the quaddle method, targeting the muscle tendon and ligament directly in the affected area. Five ampules of jetcaine were prepared by diluting them with 100 cc saline. Each injection contained 2 mL of lidocaine and was administered at a 10–20 mm depth using an insulin injector. For segmental effect, intracutaneous injections were applied around the tendon from a total of 6–8 points. Each injection session lasted approximately 5–8 minutes.

In the second group (n=30), ESWT was administered once a week for three consecutive weeks. The ESWT protocol involved using a frequency of 6 Hz, an intensity of 1.6 Barr, and delivering 2000 beats per session. Gel was applied around the painful area while the patient's elbow was flexed at 80–90°. Each ESWT session lasted approximately 15 min.

Evaluation criteria were established by a different doctor prior to the initiation of treatment and at its completion. The clinical and demographic data of the patients, including age, sex, physical examination findings, duration of symptoms, medication usage, presence of secondary diseases, and body mass index (BMI), were recorded and assessed before the treatment phase.

The Visual Analog Scale (VAS) was utilized to assess patients' pain levels before and after the administration of ESWT or neural therapy injections. Patients were asked to rate their pain on a scale of 0 to 10, with 0 indicating no pain and 10 representing unbearable pain before and after the treatment.

Our study also employed the Duruöz Hand Index (DHI) [7] as another assessment tool. The DHI evaluates hand-related activity limitations and is used to measure functional performance [7]. This test comprises 18 questions and is relatively easy to administer. Prior to treatment initiation, as well as after treatment, DHI data were recorded in both groups. The DHI assesses the utilization and functionality of the affected hand and elbow during daily activities such as kitchen tasks, clothing management, cleaning, workplace activities, and other activities of daily living. Each item is scored on a scale of 0 (no

difficulty) to 5 (impossible to do), reflecting the individual's ability. The maximum total score is 90, with higher scores indicating more severe activity limitations.

Statistical analysis

All statistical analyses were performed using SPSS 27.0. Additionally, all data are presented as the arithmetic mean with standard deviation (SD). Mann Whitney U and Wilcoxon tests were utilized to compare within and between groups. Furthermore, linear regression analysis was conducted to examine the independent variables influencing VAS and DHI values after treatment. A significance level of $P<0.05$ was considered statistically significant for all analyses.

Results

According to the inclusion criteria, we compared the data of 30 patients who received neural therapy injections with those of 30 patients who received ESWT in our study. The neural therapy group had a mean age of 49.4 years, while the ESWT group had a mean age of 49.9 years. Upon examination of the patients' age and BMI values, no significant difference was found between the two groups (Table 1).

Of the participants, 25% were males, and 75% were females. The right elbow accounted for 86.7% of the treatments, while the left accounted for 13.3%. No significant difference was observed between the two groups regarding the patients' gender and the treated elbow's direction (Table 1).

Table 1: Demographic data

	Neural therapy (n=30)	ESWT (n=30)	*P*-value
Age, year, Mean (SD)	49.4 (11.96)	49.9 (10.16)	0.862
BMI, kg/m^2, Mean (SD)	26.74 (2.37)	26.53 (1.66)	0.347
Gender, n (%)			
Female	21 (70)	24 (80)	0.551
Male	9 (30)	6 (20)	
Side, n (%)			
Right	26 (86.7)	26 (86.7)	1.000
Left	4 (13.3)	4 (13.3)	

SD: standard deviation

The two groups had no statistically significant differences in the pretreatment VAS scores (Table 2). However, both groups significantly improved pain scores after treatment ($P<0.001$). In the ESWT group, the median VAS score decreased from 7 before treatment to 4 after treatment. Similarly, in the neural therapy group, the VAS score decreased from 7 before treatment to 4 after treatment, which was also considered statistically significant (Table 2).

There was no statistically significant difference in the pretreatment median DHI values between the two groups ($P=0.399$). However, both groups exhibited a statistically significant improvement in DHI scores after treatment ($P<0.001$) (Table 2). In the ESWT group, the median DHI value decreased from 59 before treatment to 43.5 after treatment, with this reduction being statistically significant. Similarly, in the neural therapy group, the median DHI value decreased from 58.5 before treatment to 39 after treatment (Table 2), which is also statistically significant. When comparing the improvements in these scores between the groups, no superiority was observed between the two treatment methods.

Table 2: Comparison of VAS and DHI values within and between groups

	Group				Statistic test	*P*-value
	ESWT		Neural therapy			
	Mean (SD)	Median (Min–Max)	Mean (SD)	Median (Min–Max)		
VAS 0	6.8 (0.92)	7 (5–8)	6.83 (0.99)	7 (5–9)	U=446	0.951
VAS 3	3.93 (1.55)	4 (1–6)	4.67 (1.27)	4 (2–7)	U=353	0.140
Statistic test	Z=−4.48		Z=−4.401			
***P*-value**	<0.001		<0.001			
DHI 0	58.33 (9.08)	59 (37–75)	55.83 (10.02)	58.5 (37–73)	U=393	0.399
DHI 3	40.37 (12.33)	43.5(13–59)	40.83 (12.62)	39 (13–70)	U=396.5	0.429
Statistic test	Z=−4.705		Z=−4.374			
***P*-value**	<0.001		<0.001			

U: Mann Whitney U Test, Z: Wilcoxon Test, SD: standard deviation, Min: minimum, Max: maximum, VAS: Visual analog scale, DHI: Duruöz hand index

Discussion

LE is a disease that can be mostly treated using conservative methods [2-4]. Despite the various methods employed for LE treatment, there is no clear consensus on their efficacy. To the best of our knowledge, no study has demonstrated the impact of neural therapy injection, known to provide analgesia in several musculoskeletal diseases, on treating LE. Additionally, no literature study has been found comparing the effectiveness of ESWT and neural therapy injection in treating this disease. With this in mind, our study aimed to determine the efficacy of neural therapy injections and compare them with ESWT. We also believed that this study would contribute to the literature as the first to compare the effectiveness of these two treatment methods. Upon retrospectively reviewing the data of patients with LE who underwent these two treatment methods, we concluded that neural therapy is equally effective as ESWT, particularly in terms of alleviating elbow pain and improving functionality.

Neural therapy is a treatment approach that effectively alleviates chronic pain by injecting local anesthetics into various tissues, including scars, peripheral nerves, autonomic ganglia, trigger points, and glands. This therapeutic method aims to restore balance to the autonomic nervous system, which is responsible for triggering or perpetuating several chronic diseases [8, 9]. Different administration forms, such as segmental, intramuscular, and intravenous, are available [9]. The most commonly employed technique involves an intracutaneous injection directly into the affected area (known as the quaddle method). Procaine and lidocaine are the most frequently used medications for these injections. It is widely recognized that the local anesthetics utilized in neural therapy possess anti-inflammatory and neuroprotective properties that benefit the nervous system [9].

In our study, we assessed the data of patients who received intracutaneous injections of a solution containing lidocaine hydrochloride at 6–8 points surrounding the symptomatic elbow. As a result, we observed an improvement in pain and functionality scores in these patients after three injection sessions conducted over three consecutive weeks. Nevertheless, no definitive consensus exists regarding the optimal number and frequency of neural therapy sessions for treating musculoskeletal pain. We speculate that the sustained improvement in pain scores over the long term may be attributed to increased treatment sessions. Further investigations are necessary to evaluate the long-term effectiveness of neural therapy.

A single study in the literature investigated the injection of lidocaine diluted with saline into the elbows of patients with

LE [10]. This study involved 28 participants who were divided into three groups. The first group received a mixture of saline and lidocaine, the second group received corticosteroid and lidocaine, and the third group received autologous blood and lidocaine. The study reported minimal pain score reduction in each group following treatment, with no significant differences observed in shoulder-hand disability scores. It is important to note that this study involved a single-session injection.

In contrast, our study demonstrated positive outcomes regarding elbow pain and functionality following neural therapy injections administered once a week for three consecutive weeks. Based on these findings, we believe that the effectiveness of neural therapy increases with consecutive and repetitive treatment sessions, as the therapy enhances muscle blood supply through vasodilation resulting from segmental stimulation. Furthermore, our study utilized intracutaneous administration, while other injections were delivered into the tissue or joint. Consequently, we aimed to investigate the regulatory effect of bioelectrical activity on the cell wall rather than focusing solely on the anesthetic properties of the substances used.

While there is a lack of studies focusing on neural therapy for LE treatment, several studies have evaluated other types of injections [11-15]. These injection treatments are also recommended for patients who do not respond to alternative methods. A meta-analysis of 70 studies involving 1,381 patients compared eight injection methods used in LE treatment with a placebo [12]. The pooled results indicated autologous blood and platelet-rich plasma demonstrated statistically significant superiority over placebo. Botulinum toxin showed limited benefits for alleviating elbow pain but was associated with finger extension paresis [13]. Both hyaluronic acid and prolotherapy were more effective than placebo; however, no significant difference was found in the response to polidocanol and glycosaminoglycan. Some studies have reported significant improvements in pain scores in LE patients who received saline injections alone [16,17]. They suggested that these improvements could be attributed to a placebo effect or the modulation of osmolarity and sodium ions.

ESWT application is another therapeutic option widely utilized for musculoskeletal problems over the past 25–30 years [18]. This noninvasive therapy employs focused acoustic waves to target specific body parts for pain relief and to facilitate healing processes [19]. ESWT promotes neovascularization, reduces calcification, and directly stimulates tissue healing through hyperstimulation of the treated tissues [5,6]. However, the effectiveness of ESWT in treating LE remains controversial in the literature. For instance, a systematic review comparing the treatment of LE reported no significant advantage of ESWT over placebo, with only two pooled results favoring ESWT [6]. In another study involving 50 patients with LE, ESWT was as effective as therapeutic ultrasound in reducing elbow pain and improving functionality [20]. Furthermore, in a review encompassing 13 articles on LE treatment methods, 501 out of 1,035 patients underwent ESWT, while the remaining 534 underwent other treatment modalities [21]. The findings of this review suggested that ESWT is more effective and safer than other treatment methods, particularly in addressing pain, hand functions, and grip strength loss.

The conflicting results in previous studies have been attributed to variations in the dosage and devices used for ESWT, as standardized procedures for ESWT in musculoskeletal conditions are still lacking, and extensive research is needed to determine the optimal dosages and frequency of administration. In our study, we administered ESWT once a week for three consecutive weeks using the most commonly employed method in the literature, with a frequency of 6 Hz, intensity of 1.6 bar, and 2000 beats per session. Notably, our study demonstrated a statistically significant improvement in elbow pain and daily living activity scores among patients who received ESWT, which is consistent with findings reported in the literature.

These studies have reported minimal side effects associated with ESWT [6,18-20]. The most frequently reported side effects include temporary pain, skin redness, nausea, and swelling.

Furthermore, it was noted that these side effects typically had a short duration and resolved after the completion of treatment. In our study, no side effects were observed that impeded the course of treatment or necessitated dosage adjustments. Our patients successfully completed the three sessions without any issues within the dose and frequency parameters we utilized.

Limitations

While our study yielded important insights into the comparative effectiveness of neural therapy injections and ESWT in treating LE, it is essential to consider several limitations.

First, the study's retrospective nature inherently carries potential biases, including selection bias and information bias. Reliance on medical records introduces the possibility of inaccuracies or incomplete information.

Second, the sample size was relatively small, which may have limited our ability to detect smaller yet potentially significant differences between the two treatment methods. Further studies with larger sample sizes would be valuable in confirming our findings.

Third, our study lacked a control group. Without a control group receiving no or a placebo treatment, we cannot exclude the possibility that some observed improvements were due to natural recovery or placebo effects.

Fourth, our study solely assessed the short-term effects of the treatments. Longer-term follow-up is necessary to assess the durability of treatment effects and determine if one treatment yields superior long-term outcomes.

Lastly, our study did not consider potential side effects or complications associated with the treatments. Future research should encompass an evaluation of the safety profiles of the treatments in addition to their efficacy.

Despite these limitations, our study offers preliminary evidence suggesting that both neural therapy injections and ESWT can be effective treatments for LE. Further research is warranted to confirm and expand upon our findings.

Conclusion

Both neural therapy injections and ESWT effectively reduced pain and improved functionality among patients with LE. No significant differences were observed between the two treatment methods regarding effectiveness. Additionally,

treatment outcomes did not show significant variations based on age, BMI, gender, or the side of the elbow treated.

These findings indicate that both treatments offer viable options for managing LE symptoms, and patient preferences, cost, availability, and other individual factors can influence treatment selection. Further research is necessary to investigate these treatments' long-term outcomes and potential side effects. Additionally, identifying factors that may predict treatment response and help determine which patients would benefit more from one treatment over the other would be valuable.

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