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An evaluation of treatment options for lateral epicondylitis

Lateral epikondilitte tedavi seçeneklerinin değerlendirilmesi

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Abstract

Aim: Lateral pain in the elbow is a widespread problem in orthopedics and physiotherapy. There are different conservative treatment options available, but there is no consensus on their superiority to each other. The aim of this study was to evaluate the efficacy of three different treatment methods applied to patients followed up with a diagnosis of lateral epicondylitis.

Methods: The study included a total of 105 patients who were diagnosed with lateral epicondylitis between 2010 and 2016 and treated conservatively. The patients were separated into three groups according to the treatment administered. In Group 1 (n:28), 1 ml betamethasone dipropionate (Diprospan®, Schering-Plough Corp., Kenilworth, NJ, ABD) was applied with the peppering method. In Group 2 (n:28), the same peppering method was used to apply 1 ml local anesthetic (prilocaine hydrochloride, Citanest®, AstraZeneca plc., London, UK). In Group 3 (n:49), extracorporeal shockwave therapy (ESWT) treatment was performed. Data were evaluated before and at one, three, and six months after treatment. Clinical scores were evaluated according to the Quick Dash (Q-DASH, Quick disabilities of arm, shoulder, and hand) scoring system and VAS (visual analog scale) scores during the daily activities of the patients. Quality of life and patient satisfaction levels were evaluated based on Quick Dash scores.

Results: A significant improvement was observed in all three methods in the VAS and quality of life of the patients at one, three, and six months after treatment compared to pre-treatment values (P<0.001). A higher level of patient satisfaction was determined in Groups one and two compared to the ESWT group (P<0.001).

Conclusion: Significant rates of satisfaction were determined in all three methods, and the corticosteroid treatment administered with the peppering method was not superior over local anesthetic applied with the same method. Although ESWT was beneficial, it was less effective than the other methods and cost higher.

Keywords: Lateral elbow pain, peppering, ESWT

Öz

Amaç: Dirsek yan ağrısı, ortopedi ve fizik tedavi pratiğinde sık karşılaşılan bir problemdir. Farklı konservatif tedavi seçenekleri mevcut olup, birbirlerine üstünlükleri konusunda fikir birliği yoktur. Bu çalışmada lateral epikondilit tanısıyla takip edilen hastalarda üç farklı tedavi yönteminin etkinliğini değerlendirilmek amaçlanmıştır.

Yöntemler: 2010-2016 yılları arasında lateral epikondilit tanısıyla takip edilen ve konservatif olarak tedavi edilen 105 hasta çalışmaya dahil edildi. Hastalar yapılan tedavi metoduna göre 3 gruba ayrıldı. Birinci gruptaki 28 hastaya 1 ml betametazon dipropiyonat (Diprospan®, Schering-Plough Corp., Kenilworth, NJ, ABD), ikinci gruptaki 28 hastaya sadece 1 ml lokal anestezik prilokain hidroklorür (Citanest®, AstraZeneca plc., Londra, Birleşik Krallık), aynı yöntemle 30-40 kez iğne ucu ciltten çıkarılmadan aynı bölgeye batırılıp çıkarılarak (peppering yöntemiyle) uygulandı. Üçüncü gruptaki 49 hastaya Ekstrakorporeal şok dalga terapisi (ESWT) tedavisi uygulandı. Tedavi öncesi ve 1. 3. ve 6. aydaki veriler değerlendirildi. Klinik skorlar Quick Dash (Q-DASH, Quick disabilities of arm, shoulder and hand) skorlama sistemine göre değerlendirilerek, hastaların günlük yaşam aktiviteleri sırasındaki VAS (Visual Analog Scale) skorlarına bakıldı. Yaşam kalitesi ve hasta memnuniyeti düzeyleri Quick Dash skorlarına göre değerlendirildi.

Bulgular: Her üç yöntemde tedavi sonrası birinci ay, üçüncü ay ve altıncı aydaki VAS skorunda ve hastanın yaşam kalitesinde tedavi öncesine göre anlamlı olarak iyileşme gözlendi (P<0,001). İlk iki grupta ESWT grubuna göre daha yüksek hasta memnuniyet oranı tespit edildi (P<0,001).

Sonuç: Her üç yöntem içinde anlamlı memnuniyet oranları ile karşılaşılmış olup, peppering yöntemiyle uygulanan kortikosteroid (KS) tedavisinin aynı yöntemle uygulanan lokal anesteziklere üstünlüğü olmadığı görülmüştür. Üçüncü yöntemin (ESWT) faydalı olduğu görülse de diğerlerine göre daha az etkili olduğu ve daha maliyetli olduğu sonucuna varıldı.

Anahtar kelimeler: Lateral dirsek ağrısı, Peppering, ESWT

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Introduction

Lateral epicondylitis (LE) is the most diagnosed cause of elbow pain, which progresses with degeneration following repeated trauma or overuse of the forearm extensors attached over the lateral epicondyle in the elbow [1]. Although the incidence of LE is equal in males and females, it is observed more in the working age group and most often between the 3rd and 5th decades [2,3]. Despite the common name "tennis elbow," tennis players only constitute 10% of patients in clinical practice [4]. Degeneration develops at the tendon adhesion site associated with repeated microtrauma, and this is defined as tendinosis [5]. Treatment of this frequently encountered problem is firstly conservative [6,7]. In current LE treatment, several treatment forms are recommended starting with simple local injections and extending as far as complex surgical techniques. However, as LE can be self-limiting, the majority of studies has been conducted with short follow-up periods and because of the presence of several factors that can affect the results and insufficient physiological data, enough evidence does not exist to demonstrate which treatment method is better than the others [8].

The aim of this study was to retrospectively evaluate the efficacy of the 3 different techniques, namely, local corticosteroid injection and local anesthetic injection with the peppering technique, along with extracorporeal shockwave therapy in patients with LE.

Materials and methods

The study included a total of 105 patients diagnosed with lateral epicondylitis (LE) between 2010 and 2016. The patients were randomly separated into treatment groups and the data were examined retrospectively, after approval was obtained from the Ethics committee of Adana City Research and Educational Hospital (decision no.: 413 date: 27/03/2019). Consent forms were obtained from all patients, which consisted of 52 males and 53 females with a mean age of 44.6 years (range: 20-72 years). Inclusion criteria were defined as sensitivity with palpation over the lateral epicondyle of the elbow, positive wrist extension test with the elbow in extension, and that the patient had received anti-inflammatory treatment various times for at least 3 months. Patients were excluded from the study if they had a history of elbow trauma or cervical discopathy, medial epicondylitis, radial tunnel syndrome, rheumatoid arthritis, systemic diseases such as diabetes mellitus, had undergone surgery for LE, or received an injection within the previous 6 months. One patient in the corticosteroid group received physical therapy for 3 weeks and 1 patient received epicondylitis bandage treatment. Two and five patients had received physical therapy in the local anesthetic and ESWT groups, respectively.

Data were evaluated before treatment and at one, three, and six months after treatment. Clinical scores were evaluated according to the Quick Dash (Q-DASH, Quick disabilities of arm, shoulder and hand) scoring system and VAS (visual analog scale) scores during the daily activities of the patients.

Group 1 included 28 patients (15 male, 13 female) who were administered 1 ml betamethasone dipropionate (Diprospan®, Schering-Plough Corp., Kenilworth, NJ, USA), and Group 2 included 28 patients (18 male, 10 female) who received 1 ml prilocaine hydrochloride (Citanest®, AstraZeneca plc., London, UK). The mean follow-up period was 8.4 months (range, 6-12 months).

Technique

In Groups 1 and 2, the most sensitive point over the LE was identified, and the injection was made over and around the epicondyle by injecting, withdrawing, redirecting, and reinserting the needle 30-40 times without completely removing it from the skin.

In Group 3 (n:49, 19 males, 30 females), ESWT treatment was performed 3 times at weekly intervals (2000 impulse, 1.8 bar, 15 Hz frequency).

The demographic data of the 3 groups are shown in Table 1.

LE was determined in the right elbow in 25 cases and the left elbow in 3 in Group 1, in the right elbow in 21 and the left elbow in 7 in Group 2, and in the right elbow in 35 and the left elbow in 14 in Group 3.

Statistical analysis

Data obtained in the study were analyzed statistically using SPSS v21 software. Conformity of the data to normal distribution was assessed with the Shapiro Wilk test. In the comparison of age, VAS and DASH scores between the ESWT, corticosteroid and local anesthetic groups, One-Way Analysis of Variance (ANOVA) and post-hoc Tukey tests were used. Chi-square test was applied when examining the distribution of gender and affected side. $P<0.05$ was considered statistically significant.

The study consisted of three groups with four measurements for each group. Taking the time-group interaction into account, we planned to include at least 101 patients in the study with a partial eta-square of 0.02, 5% type 1 error, 80% power and a correlation of at least 0.40 between the measurements. The computations were carried out with G*power.

Results

According to the Quick-DASH (Q-DASH) scoring system, the mean scores in Group 1 were 56.3 pre-treatment and 15.7 at 6 months post-treatment, in Group 2, 56.5 pre-treatment and 14.6 at 6 months post-treatment, and in Group 3, 60.8 pre-treatment and 29.1 at 6 months post-treatment. The treatments were effective in all 3 groups. The changes in Q-DASH and VAS scores at 1, 3, and 6 months after treatment are shown in Table 2. Statistically significant results were obtained in all 3 methods. The change showing treatment efficacy was lower in Group 3 (EWST) than in Groups 1 and 2. Statistically significant differences were determined between the groups with regards to 6-month VAS values ($P<0.001$), more specifically, between EWST and corticosteroid group ($P=0.001$) and between the EWST and local anesthetic group ($P=0.002$). A statistically significant difference was determined between the groups with respect to the Q-DASH scores at 6 months after treatment ($P<0.001$) between the EWST and corticosteroid group ($P<0.001$) and between the EWST and local anesthetic group ($P<0.001$). No statistically significant difference was determined between the corticosteroid and local anesthetic groups with

respect to the VAS and Q-DASH scores (P=0.997). The Q-DASH scores of the patients are shown in Figure 1.

Table 1: Demographic data of the patients according to gender and affected side

		Groups			
Gender	Steroid	Local anesthetic	ESWT	Total	*P*-value
Female	13 (48.1%)	10 (35.7%)	30 (61.2%)	53 (50.5%)	0.087
Male	15 (53.6%)	18 (64.3%)	19 (38.8%)	52 (49.5%)	
Total	28 (100.0%)	28 (100.0%)	49 (100.0%)	105 (100.0%)	
		Groups			
Side	Steroid	Local anesthetic	ESWT	Total	*P*-value
Right	25 (89.3%)	21 (75.0%)	35 (71.4%)	81 (77.1%)	0.190
Left	3 (10.7%)	7 (25.0%)	14 (28.6%)	24 (22.9%)	
Total	28 (100.0%)	28 (100.0%)	49 (100.0%)	105 (100.0%)	

Table 2: The change in clinical scores according to the treatment results

Q-DASH scores	Steroid	Local anesthetic	ESWT	*P*-value
	Mean (SD)	Mean (SD)	Mean (SD)	
Pre-treatment	56.34 (8.56)	56.52 (10.28)	60.84 (11.42)	0.102
1st month	26.69 (16.02)	26.46 (17.95)	37.16 (16.54)	0.007
3rd month	16.10 (10.55)	16.37 (11.39)	33.18 (16.39)	<0.001
6th month	15.78 (10.30)	14.62 (11.36)	29.19 (17.23)	<0.001
P-value	<0.001	<0.001	<0.001	
General *P*-value	0.008			
VAS values	Steroid	Local anesthetic	ESWT	*P*-value
	Mean (SD)	Mean (SD)	Mean (SD)	
Pre-treatment	6.50 (1.11)	6.54 (1.20)	7.18 (1.70)	0.065
1st month	2.93 (2.02)	2.79 (2.35)	4.27 (2.15)	0.005
3rd month	1.79 (1.34)	1.82 (1.56)	3.88 (2.06)	<0.001
6th month	1.72 (1.46)	1.76 (1.32)	3.35 (2.12)	<0.001
P-value	<0.001	<0.001	<0.001	
General *P*-value	0.048			

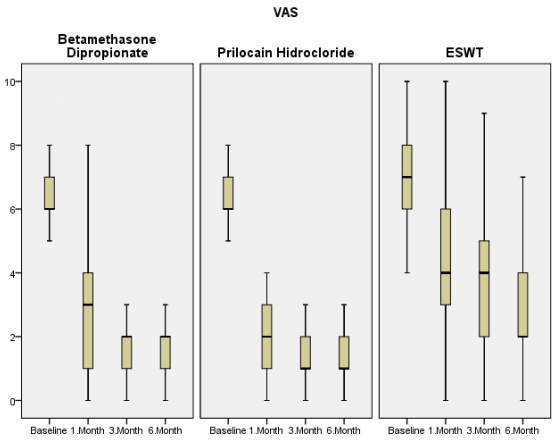

Figure 1: Schematic form of the Q-DASH scores of the 3 patient groups according to time

Discussion

Lateral epicondylitis (tennis elbow) which presents with pain and function loss, is associated with degenerative changes that develop secondary to mechanical pain and loading at the adhesion site of the extensor muscles, particularly of the carpi radialis brevis to the bone [3-10]. In biopsies taken from this region, acute inflammatory cells, no inflammation, vascular hyperplasia, disorganized collagen bundles and intense fibroblast clusters are observed, all of which is known as angiofibroblastic degeneration (tendinosis) [5,11,12].

Many different methods have been described in LE treatment [3,8,12]. Starting with corticosteroid injection, several methods such as platelet-rich plasma (PRP) and autologous blood transfusion, physical therapy, and shockwaves (ESWT) have been recommended in literature [3,8,9,12,13].

To the best of our knowledge, there has been no previous study which has compared the ESWT method with local anesthetic only, and steroid therapy without local anesthetic, applied with the peppering method.

Several studies have reported that the application of corticosteroid (triamcinolone) is the most preferred method in the treatment of tennis elbow and the best option in the short term [3,8,12-14].

In a randomized, controlled study of 146 patients by Hay et al. [15], steroid was more effective than placebo or naproxen in the first 4 weeks, but in the 12th month, no difference was found between the 3 groups. Smidt et al. [16] compared the 3 separate methods of corticosteroid, physical therapy, and a watch-and-wait policy, and while the best result was obtained in the steroid group in a 6-week period, this was the group with the most recurrences in the long term. In the current study, the best results were obtained in Groups 1 and 2 (corticosteroid and local anesthetic) in the early period (first month). In a study by Bisset et al. [12] and a review of 17 studies by Combes et al [17], corticosteroid treatment was more effective than other methods in the reduction of pain in the short term, but this effect was reversed in the long term.

Yi et al. [18] also reported that corticosteroid was as effective as deep friction massage in the short term (4 weeks), but in the long term (6 months), deep friction massage was the best method. In a meta-analysis of 6 high-quality, randomized, controlled studies, Orchard et al. stated that after 3 months, corticosteroid was harmful compared to a placebo injection or conservative treatment. The authors stated that there was no high-quality review showing the opposite, and therefore recommended that it not be used considering the mid-term harm rather than the short-term benefit [19].

In the current study, corticosteroid and local anesthetic treatment were administered with different methods of the peppering technique, in which the needle is injected, withdrawn and re-inserted 30-40 times with the aim of increasing blood flow. The effective results seen in the early period (4 weeks) was observed to persist at 6 months with this technique. The peppering technique increases the surrounding bleeding, which potentially increases the healing process. In the studies of Kraushaar et al. [5] and Regan et al. [20], the peppering technique was used, and the bleeding in the degenerative myxoid tissue of patients with epicondylitis triggered the healing process by creating new channels.

Injection treatment can be applied in the form of a single injection to the epicondyle region or by inserting and withdrawing the needle 30-40 times to the origin of the extensor muscles in the lateral epicondyle region [21-24]. In the current study, peppering technique was applied to Groups 1 and 2, and effective results were obtained within a 6-month period.

In a study by Okcu et al. [22], corticosteroid and local anesthetic combined were applied with the peppering technique and as a single injection, and it was shown that in the long-term, the same combination of drugs administered with a peppering technique was relatively more effective. In another study by Dogramaci et al [23], local corticosteroid injection administered with the peppering technique was reported to provide more successful results than corticosteroids administered with the classic technique or a single local anesthetic administered with the peppering technique. Altay et al. [24] applied local anesthetic only and a combination of local anesthetic and corticosteroid (lidocaine+triamcinolone) with the peppering technique and reported a high success rate with both methods at the end of the first year.

In contrast to the results of those studies, no difference was determined in the results of the present study between the application of local anesthetic only and steroid treatment only, both applied with the peppering technique. Compared to ESWT, the results were better. The improvements in VAS and Q-DASH scores at 1 and 3 months (early term) were more advanced than those of ESWT at 6 months, which can be considered mid-term.

There are many studies that have reported that ESWT is effective in the treatment of lateral epicondylitis [25-31]. In a study that compared ESWT with corticosteroid treatment, it was emphasized that although ESWT was beneficial, it was less effective than steroid treatment and more costly [32]. Some studies have reported that it has the same effect as a placebo [33-36]. Aydin et al. [37] compared ESWT and wrist extensor splints and reported that successful results were obtained with both methods.

Although effective results were obtained with ESWT treatment in the current study, the success rate was more limited than that of the other two methods. When the ESWT treatment group was evaluated over the study period, a statistically significant improvement was seen in the clinical scores, and improvement became more pronounced as time progressed. The efficacy at 3 months was greater than at the first month, and a greater improvement was seen in the clinical scores at 6 months.

Limitations

There were numerous limitations to our study. First, the patients were randomly divided into groups. The number of patients participating in the study was sparse. Radiological criteria were not included in the study and follow-up period was not long enough.

Conclusion

For the optimal treatment of lateral epicondylitis, it is important to interpret the scientific evidence. By combining this with experience and the facilities available, an evidence-based, appropriate choice should be made for the patients. The results of this study demonstrated that in the application of an injection, the outcome was attributed more to the technique of peppering rather than the drug. Patient preference should also be taken into consideration when selecting the treatment method. Nevertheless, there is a need for further, well-planned, high-quality, randomized, controlled studies which follow the natural course of the disease to be able to determine the most effective treatment.

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