



# Comparison of conservative treatment of lateral epicondylitis with wrist splint and epicondylitis band: assessing patient compliance and clinical outcomes

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## ARTICLE INFO

### Keywords:

Lateral epicondylalgia  
Lateral epicondylitis  
Patient adherence  
Elbow pain  
Tendinopathy  
Tennis elbow

Received: Aug 15, 2023

Accepted: Sep 08, 2023

Available Online: 27.09.2023

DOI:

[10.5455/annalsmedres.2023.08.192](https://doi.org/10.5455/annalsmedres.2023.08.192)

## Abstract

**Aim:** Lateral epicondylitis, commonly known as "tennis elbow," is a prevalent condition affecting middle-aged individuals. The lack of a universally accepted treatment protocol has led to a variety of conservative options, including wrist splints and epicondylitis bands. However, limited research exists comparing the clinical outcomes and patient compliance associated with these two treatment modalities.

**Materials and Methods:** A total of 120 patients diagnosed with lateral epicondylitis were enrolled in this comparative study. Cohort A (n=62) received treatment with a wrist splint, while Cohort B (n=58) received an epicondylitis band. Patient adherence to the prescribed orthosis was monitored during follow-up visits. Clinical outcomes were assessed using the Mayo Elbow Performance Score (MEPS) and Visual Analog Scale (VAS) scores.

**Results:** Patients in Cohort A exhibited significantly higher adherence rates (90.3%) to wrist splint usage throughout the treatment process compared to Cohort B (60.3%) with epicondylitis bands (p<0.001). At the end of the sixth week, Cohort A demonstrated superior MEPS scores (p<0.001) compared to Cohort B, but there was no statistically significant difference in VAS scores (p=0.149). Both treatment groups showed significant improvement in VAS and MEPS scores compared to baseline (p<0.001).

**Conclusion:** Our study emphasizes the importance of patient compliance in achieving successful outcomes for lateral epicondylitis treatment with orthoses. Wrist splints demonstrated better patient adherence and superior clinical results compared to epicondylitis bands. Proper patient education and clear instructions on orthosis usage are crucial for treatment success.



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## Introduction

Lateral epicondylitis, commonly known as "tennis elbow," is a common condition predominantly affecting middle-aged individuals [1]. The estimated prevalence of lateral epicondylitis in the general population is between 1% to 3%, with higher occurrence observed in the 40s and 50s age groups [2,3]. This condition is characterized by overuse injuries caused by repetitive microtraumas to the extensor carpi radialis brevis (ECRB) tendon. Repetitive forearm rotation, gripping, and wrist extension activities are common contributors to lateral epicondylitis [4]. A classic clinical test known as the Thomsen test involves eliciting pain over the lateral epicondyle during wrist extension against resistance applied to the third metacarpal while the elbow is in extension and the forearm in pronation [5]. Radiography is used to rule out other possible diagnoses, while

ultrasonography can reveal abnormal tendon thickening and calcifications [6].

Although there is no universally accepted treatment protocol for lateral epicondylitis, certain general principles are accepted [7]. The treatment may manage pain, preserve range of motion, improve grip strength and endurance, and restore normal function [3]. Conservative treatment options include avoiding aggravating activities, using non-steroidal anti-inflammatory drugs (NSAIDs), epicondylitis bands, wrist rest splints, platelet-rich plasma injections, corticosteroid injections, extracorporeal shockwave therapy, dry needling, and laser therapy [2]. Surgical intervention may be considered for cases with persistent symptoms and failed conservative treatment [8]. While some studies have compared the effectiveness of wrist rest splints and epicondylitis bands in reducing pain [9–11], more research is needed to compare these treatment modalities regarding patient outcomes and compliance. This study aims to compare the clinical outcomes of patients diagnosed with

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lateral epicondylitis who received conservative treatment with either a wrist splint or an epicondylitis band. Additionally, the study aims to compare the patients' compliance with wearing these two braces.

## Materials and Methods

This retrospective cohort study included 120 patients diagnosed with lateral epicondylitis who visited our orthopedics and traumatology clinic between January 1, 2021, and December 31, 2021. The study received approval from our hospital's ethics committee (Gaziosmanpaşa Training and Research Hospital Clinical Research Ethics Committee, Approval number: 108), and all patients were informed about the study method and purpose, adhering to the principles of the Helsinki Declaration.

Eligible participants were adult patients who experienced pain and tenderness at the lateral epicondyle for at least one month and had positive Thomsen tests. Patients who received steroid or PRP injections for lateral epicondylitis within six months, patients with rheumatological diseases or elbow and wrist joint pathologies, local dermatological issues hindering the use of the epicondylitis band, and those who can't use NSAIDs were excluded from the study.

Patients were divided into two cohorts based on their application time: Cohort A consisted of the patients who applied to our hospital in the first six months of 2021 and were treated with a wrist splint, while Cohort B consisted of the applicants for the remainder of the year and was provided with an epicondylitis band. All patients received the same non-steroidal anti-inflammatory drugs (oral Naproxen 750mg 1x1) in addition to the orthosis. Follow-up visits were scheduled in the first, third, and sixth weeks. During the first week, any misusing of the orthosis was observed and corrected. Compliance with treatment was assessed during the third week, and patients who consistently used the orthosis in the correct position throughout the day were considered compliant. Functional outcomes were evaluated and compared at the application time and sixth week using the Mayo Elbow Performance Score (MEPS) and Visual Analog Scale (VAS).

## Statistical analysis

After checking the normality with the Shapiro-Wilk test and skewness, kurtosis analyses using SPSS 26 (IBM, Chicago, Illinois), the chi-square test was used to determine patients' compliance to use the braces. Wilcoxon test was used to compare the clinical outcomes before and after the treatments, and the Mann Whitney-U test was used to compare these results between Cohort A and B. A "p" value  $\leq 0,05$  was considered statistically significant.

## Results

Out of 168 patients diagnosed with lateral epicondylitis during the study period, 48 were excluded due to failure to attend follow-up visits or loss of communication. Therefore, the study was conducted with 120 patients. Cohort A consisted of 62 patients (20 female, 42 male) who were given a wrist splint, while Cohort B included 58 patients (19 female, 39 male) who received an epicondylitis band. Demographic information of the patients is presented in Table 1.

**Table 1.** Demographic data of the groups.

	Wrist Splint	Epicondylitis Band
Sex		
Male	42	39
Female	20	19
Number of total patients	62 (51.67%)	58 (48.33%)
Age - years	42.02±7.85	41.43±8.3

**Table 2.** The compliance of patients with using different braces.

	Wrist Splint	Epicondylitis Band	p*
Can't use the brace	6 (9.7%)	12 (20.7%)	
Used the brace in the wrong place	0	11 (19%)	
Used the brace right	56 (90.3%)	35 (60.3%)	<0.001

\*Chi-square test.

**Table 3.** Comparison of MEPS & VAS scores.

	Wrist Splint	Epicondylitis Band	p*
	n/ Mean±SD (range)	n/ Mean±SD (range)	
First MEPS	55.56±7.13 (45-70)	56.55±7.21 (45-70)	0.445
Last MEPS	91.53±6.99 (75-100)	84.14±8.17 (70-100)	<0.001
p**	<0.001**	<0.001**	
First VAS	7.45±1.15 (5-9)	7.53±1.08 (6-9)	<0.001
Last VAS	1.03±0.89 (0-3)	1.55±0.96 (0-3)	0.712
p**	<0.001**	<0.001**	
MEPS Difference	35.97±9.14 (10-50)	27.59±11.74 (0-50)	0.012
VAS Difference	6.42±1.43 (3-9)	5.98±1.57 (3-9)	0.149

\*Mann Whitney-U Test. \*\*Wilcoxon Test. SD: Standard Deviation MEPS: Mayo Elbow Performance Score VAS:Visual analog scale.



**Figure 1.** A patient wearing the epicondylitis band at an incorrect place, directly on the lateral epicondyle.

We have compared the adherence to the treatment methods at the first and last control visits. At the first-week control visit, we found that 11 of 58 patients (19%) from

**Table 4.** Comparison of MEPS & VAS scores according to compliance to use braces.

	Wrist Splint		p*	Epicondylitis Band		p*
	Can use the brace	Can't use the brace		Can use the brace	Can't use the brace	
	n/ Mean±SD (range)	n/ Mean±SD (range)		n/ Mean±SD (range)	n/ Mean±SD (range)	
First MEPS	56.07±6.92 (45-70)	50.83±8.01 (45-65)	0.94	56.85±7.33 (45-70)	55.42±6.89 (45-65)	0.589
Last MEPS	92.86±5.94 (80-100)	79.17±2.04 (75-80)	<0.001	86.3±7.49 (70-100)	75.83±4.69 (70-85)	<0.001
p**	<0.001	<0.001		<0.001	<0.001	
First VAS	7.45±1.14 (5-9)	7.5±1.38 (6-9)	0.037	7.54±1.07 (6-9)	7.5±1.17 (6-9)	0.010
Last VAS	0.82±0.64 (0-2)	3±0 (3-3)	0.935	1.22±0.76 (0-3)	2.83±0.39 (2-3)	0.905
p**	0.026	0.027		0.002	0.002	
MEPS Difference	36.79±8.86 (10-50)	28.33±8.76 (15-35)	<0.001	29.46±11.8 (0-50)	20.42±8.65 (10-40)	<0.001
VAS Difference	6.63±1.29 (4-9)	4.5±1.38 (3-6)	0.002	6.33±1.49 (3-9)	4.67±1.15 (3-6)	0.001

\*Mann Whitney-U Test. \*\*Wilcoxon Test. SD: Standard Deviation MEPS: Mayo Elbow Performance Score VAS: Visual analog scale.

**Figure 2.** A patient wearing the removable wrist splint.

Cohort B were wearing the epicondylitis band at an incorrect place (Figure 1), and the correct placement was taught. However, there was no incorrect usage of the wrist splint (Figure 2). At the sixth-week control visit, 6 of 62 patients (9.7%) from Cohort A and 12 of 58 patients (20.7%) from Cohort B told that they couldn't wear the orthoses continuously during the treatment period. When we look into the reasons for not using the braces, 4 of 6 patients (66.7%) from Cohort A stated that they couldn't perform the activities of daily life, and 10 out of 12 patients (83.3%) from Cohort B have reported that the bands were aggravating the pain over the lateral epicondyle itself. In the end, 56(90.3%) patients were found to wear the wrist splint in the correct place throughout the entire treatment process, while 35(60.3%) patients from Cohort B were able to achieve this success ( $p<0.001$ ) (Table 2).

The Mayo elbow performance scores revealed that Cohort A had better results than Cohort B at the end of the sixth week ( $p<0.001$ ). However, there were no statistically significant differences between the VAS scores ( $p=0.149$ ) of the groups, as each group had better VAS and MEPS scores when compared to the beginning of the treatment ( $p<0.001$ ) (Table 3). Although we achieved good MEPS and VAS scores at the end of the treatment in both of the Cohort A & B patients, worse results were found in patients who couldn't use the given orthoses ( $p<0.001$ ) (Table 4).

## Discussion

This study aimed to compare the clinical outcomes and patient compliance with two conservative treatment methods, removable wrist rest splint, and epicondylitis band, in patients with lateral epicondylitis. We have found that patients with lateral epicondylitis have encountered problems with using orthosis, like removable wrist splints and epicondylitis bands. However, we observed that patient compliance was better with wrist splints than with epicondylitis bands ( $p<0.001$ ).

There are several studies about the efficacy of conservative treatment methods for lateral epicondylitis, but the patient's compliance with the brace usage was not well described [1,12–14]. At the first-week control visit, we found that 19% of patients in Cohort B were wearing the epicondylitis band at an incorrect place, while no incorrect usage was reported for the wrist splint. Furthermore, at the sixth-week control visit, a higher percentage of patients in Cohort B (20.7%) reported difficulty wearing the orthoses continuously throughout the treatment period compared to Cohort A (9.7%). These findings suggest wrist splints may be easier for patients to use correctly and consistently.

Several authors compared different conservative treatment methods. Karlibel et al. compared the efficacy of kinesio taping and forearm bandages [15]. They found that both methods can improve pain and quality of life scores, but neither method was superior. Bisset et al. searched the acute effects of 2 types of counterforce braces and concluded that both have positive effects [16]. Streek et al. stated that the forearm splint is not superior to the elbow band in treating lateral epicondylitis [14]. Nishizuka et al. compared the forearm band with exercise and exercise alone and concluded that the forearm epicondylitis band has no positive effects on the treatment [17]. Garg et al. used a forearm strap brace or a wrist splint to treat lateral epicondylitis and concluded that resting the wrist extensors may result in better pain relief [9].

Altan et al. have compared the effectiveness of the mainly used braces, lateral epicondyle bandage vs. wrist resting splint in the lateral epicondylitis treatment [11]. They found better immediate results favoring the wrist splint in the short term (two weeks), but the long-term results were similar. They have suggested the usage of bands as

the bandages may be more practical to use in daily living and cosmetically more acceptable. In contrast, our study showed that patients in Cohort A, who received wrist splints, had better Mayo elbow performance scores at the end of week six when compared with the patients in Cohort B, who received epicondylitis bands which indicates that wrist splints may lead to better functional outcomes in terms of elbow performance. However, there was no statistically significant difference between the two groups' visual analog scale (VAS) scores, suggesting that both treatment methods effectively reduced pain.

It is important to note that despite the overall positive outcomes in both cohorts, patients who could not use the prescribed orthoses had worse MEPS results ( $p < 0.001$ ), highlighting the importance of patient compliance and adherence to the treatment plan. Future studies could explore strategies to improve patient compliance and identify factors that may influence the successful use of orthoses. Several factors could contribute to the observed difference in compliance between wrist splints and epicondylitis bands. Comfort, ease of use, and the ability to integrate orthosis into daily activities may play pivotal roles in influencing patient adherence. Additionally, we think that the pain over the tract of the ECRB tendon is playing a role in the patients not using the epicondylitis band as the reason was pain at 10 out of 12 patients (83.3%) who couldn't use the brace.

Limitations of our study include the relatively small sample size and lack of a placebo control group which could have helped to control for the placebo effect and provide a more accurate assessment of the treatment methods. Additionally, long-term follow-up beyond six weeks could provide valuable insights into the durability of treatment effects and patient compliance over time.

## Conclusion

Our study highlights the significance of patient compliance when utilizing orthotic treatments for lateral epicondylitis. Removable wrist splints demonstrated better adherence rates and superior clinical outcomes than epicondylitis bands. When used correctly and continuously, orthotic interventions can improve elbow function and reduce pain. Research with larger sample sizes would be valuable in validating our findings and gaining a deeper understanding of the factors influencing patient compliance with orthotic interventions.

## Ethical approval

Ethical approval was obtained for this study from the Gaziosmanpaşa Training and Research Hospital Clinical

Research Ethics Committee (Approval number: 108).

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