

## RESEARCH ARTICLE

# Perceived Pain Severity and Disability After the Recurrence of Tennis Elbow Following a Local Corticosteroid Injection

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## Abstract

**Background:** We hypothesized that there is no difference in the perceived pain and disability when the tennis elbow symptoms recur after a corticosteroid injection (CSI). Consequently, we secondarily aimed to assess the approximate time from CSI until symptom recurrence. Moreover, we aimed to evaluate factors associated with the time to recurrence.

**Methods:** This cross-sectional study was performed during 2018-2019. We enrolled 50 consecutive patients who presented with the recurrence of tennis elbow symptoms and had a history of a single CSI for this condition. We asked the patients to rate the perceived pain and disability by filling the QuickDASH twice, including one by recalling pain and function before the CSI and one for the recent recurrent symptoms to assess the patient's perceived pain and disability at the two-time points.

**Results:** There was a significant difference in perceived pain VAS and disability QuickDASH between pre-injection and recurrence, showing that the patient's perceived pain and disability were greater when recurred ( $P < 0.001$ ). The mean time between CSI and recurrence of symptoms was 6 (4-7) months, which is shorter than the expected spontaneous resolution of tennis elbow ( $> 1$  year) to offer other invasive treatments. Time to recurrence had no significant association with sex, age, side, education, occupation, pre-injection VAS score, pre-injection QuickDASH, or symptom duration using a linear regression model.

**Conclusion:** Although CSI seems to relieve or mask the pain in the short term, there is a considerable chance of recurrence, and patients may perceive more significant pain and disability that may lead to subsequent injection or precocious surgery. Time is an effective treatment for this illness. Shared decision-making is paramount, and patients have to be counseled regarding the natural history and expected prognosis of different treatments.

**Level of evidence:** IV

**Keywords:** Corticosteroid, Injection, Recurrence, Tennis elbow

## Introduction

Enthesopathy of the extensor carpi radialis brevis (eECRB) – also known as tennis elbow – is a common benign self-limiting condition involving 1-3% of the general population, which often is responsive to conservative modalities including activity modification

and physiotherapy.<sup>1,2</sup> Patients who seek treatment are commonly offered a corticosteroid injection (CSI), often irrespective of symptom severity or the existence of other pathologies in the vicinity.<sup>3,4</sup> Hollander was the first to use hydrocortisone in tennis elbow in 1953,

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followed by Cyriax and Troisier (1953), Murley (1954), and Crisp and Kendall (1955) who reported immediate favorable outcomes after CSI in tennis elbow.<sup>5-8</sup> However, subsequent high-quality studies designed as randomized clinical trials with longer follow-up showed no significant difference between CSI and placebo after one month, also illustrated in a meta-analysis.<sup>9-12</sup>

On the other hand, CSI has been associated with a higher recurrence rate with deteriorating effects than other modalities, which is demonstrated in many high-quality clinical trials.<sup>10, 13-15</sup> However, if the symptoms recur, we were curious that the recurrent pain and disability are perceived the same, less or worse than the initial presentation before the CSI. Therefore, we hypothesized that there is no difference in the perceived pain and disability when the tennis elbow symptoms recur after a CSI. Consequently, we secondarily aimed to assess the approximate time from CSI until symptom recurrence. Moreover, we aimed to evaluate factors associated with the time to recurrence.

## Materials and Methods

### Settings and patients

The Ethics Committee approved this cross-sectional study of the university with the approval code FM.REC.1396.75. We enrolled 50 consecutive patients with tennis elbow referred to our orthopedic clinic during 2018-2019 using simple non-random sampling [Table 1].

**Table 1. Demographic data of 50 patients referred after the recurrence of symptoms following one-time corticosteroid injection**

<b>Age (year), mean (SD)</b>	44.42±7.18
<b>Symptom duration (months), mean (SD)</b>	7.5 (8.4)
<b>Time to recurrence, (months), mean (SD)</b>	6.9 (4.1)
<b>Sex, no. (%)</b>	
Male	14 (28)
Female	36 (72)
<b>Education, no. (%)</b>	
Illiterate	3 (6)
Undergraduate	41 (82)
Graduate<	6 (12)
<b>Occupation, no. (%)</b>	
Self-employed	11 (22)
Housekeeper	33 (66)
Employee	5 (10)
Student	1 (2)
<b>Side, no. (%)</b>	
Right	31 (62)
Left	19 (38)

SD: standard deviation

### Inclusion criteria

Our study only includes a subset of tennis elbow patients with recurrent symptoms after a corticosteroid injection.

1. Patients with the age range of 18-70 years old,
2. With the diagnosis of recurrent tennis elbow symptoms,
3. Who had previously received one single local CSI for the diagnosis of tennis elbow by any provider,
4. And now presented for the recurrence of the symptoms after a period of pain relief with no limit for the duration of pain relief. The injection was considered a failure if there was no period of pain relief after CSI. We only included patients with recurrent symptoms and excluded failures.

The diagnosis was based on the clinical examination, including local tenderness on the lateral epicondyle and pain elicited with the wrist's resisted dorsiflexion while the elbow was in extension (positive Cozen test) and Mill's maneuver. Patients were enrolled regardless of physical therapy, the type of corticosteroid, and the injection technique.

Exclusion criteria: Patients with multiple corticosteroid injections, injections of non-steroid medications including hyaluronic acid, ozone, platelet-rich plasma, and botulinum toxin, cervical radiculopathy, previous surgery on the elbow, previous fracture and dislocation, and systemic condition such as inflammatory arthritis.

### Data Collection

We recorded the demographic data and the approximate symptom duration before receiving a CSI and symptom relief after the CSI. We asked the patients to complete the questionnaires twice, including one by recalling pain and function before the CSI and one for the current presentation to assess the patient's perceived pain and disability at the two-time points. Patients completed the Quick disabilities of the arm, shoulder, and hand (QuickDASH). They rated the severity of perceived pain using a visual analog scale (VAS) on a metric of 0-10, with 10 representing the worst pain and 0 indicating no pain.

### Statistical analysis

Data were analyzed using SPSS (IBM Statistics, Chicago, IL). Time durations were presented by the median and interquartile range (IQR). A paired t-test or Wilcoxon test was used to compare time zero scores before receiving a CSI with the latest visit due to recurrence. A linear regression model was used to assess factors associated with the time to recurrence of symptoms. The statistical significance level was considered less than 0.05.

### Results

There was a significant difference in pain VAS between pre-injection and recurrence, showing that the patient's perceived pain was greater when recurred ( $P<0.001$ ). Likewise, the QuickDASH score after recurrence was significantly higher than that of pre-injection time, showing a greater perception of disability when symptoms recurred ( $P<0.001$ ), showing that the perceived pain and disability is greater in patients with recurrence of symptoms. [Table 2].

**Table 2. Comparing patient-reported outcome measure scores between pre-injection and post-recurrence using Paired t-test**

	Before CSI	After recurrence	<i>P</i>
	Mean (SD)	Mean (SD)	
VAS score	4.1 (1.4)	5.9 (1.7)	<0.001
QuickDASH	27 (16)	39 (18)	<0.001

CSI: Corticosteroid injection; SD: Standard deviation; VAS: Visual analog scale; QuickDASH: Quick disabilities of arm shoulder hand

**Table 3. There was no association between the time to recurrence and the variables entered in the linear regression model**

	R square	<i>P</i> value
<b>Model</b>	0.069	0.92
<b>Sex</b>		0.73
<b>Age</b>		0.32
<b>Side</b>		0.20
<b>Occupation</b>		0.90
<b>Education</b>		0.70
<b>Symptom duration</b>		0.61
<b>Pre-CSI VAS</b>		0.88
<b>Pre-CSI QuickDASH</b>		0.89

CSI: corticosteroid injection; VAS: visual analog scale

The median (IQR) approximate duration of symptoms before receiving a CSI was 6 months.<sup>3-12</sup> The median time from injection until recurrence of symptoms was 6 months [Table 1].<sup>4-7</sup> Using a linear regression model, we did not find any significant association between time to recurrence and other variables, including sex, age, side, education, occupation, pre-injection VAS score, pre-injection QuickDASH, and symptom duration [Table 3].

## Discussion

CSI has been reportedly accompanied by a short-term relief, followed by a high recurrence rate of symptoms and adverse effects.<sup>10, 13-18</sup> Giving patients an injection reinforces misconceptions about the disease, feeling that perhaps the problem would not relieve without treatment. It provides false hope, which ultimately may decrease their health. Patients with worsened symptoms after recurrence are vulnerable to be medicalized through an escalation in the treatment ladder, which would be either accepting another injection or surgery.<sup>2</sup> We were curious about the patient's perceived pain severity after recurrence, leading the patient to undergo surgery precociously. We found that patients perceive both pain and disability greater when symptoms recur than before CSI, although it might be a misconception if each was measured at the actual time point. Moreover, the mean duration of pain relief after CSI was six months in our study, shorter than the expected spontaneous resolution of tennis elbow lasting > 1 year.<sup>19</sup> These findings may lead the provider to offer another treatment, and the

hopeless patient accepts another injection or precocious operation.

Tennis elbow condition is known to have a self-limited course of symptoms while no treatments proved to alter the natural history.<sup>2</sup> Because patients return unhappy about this situation, the provider may decide that additional treatment is necessary. There are often cognitive bias and stress contagion elements involved in offering other invasive treatments.<sup>20</sup> Evidence has shown that CSI was not different from placebo. Even sham surgery for the tennis elbow did not add any benefit compared to the surgical excision of the degenerative tissue.<sup>21</sup> It implies that patients probably did not need an injection first, and they do not need a second if recurred. All treatments for enthesopathy are discretionary and preference-sensitive, and neither the provider nor the patient should be placing all hope on injection or surgery. Instead, the hope should be placed first and foremost on time, which is an effective treatment of this illness.

We have a significant limitation in this study. The first limitation is the recall bias and catastrophizing the present condition, relying on patients' memory. In this study, patients perceived themselves to be worse after recurrence, but we are unsure if it was a misperception. Another limitation is the selection bias. We enrolled only the subset of patients who came with the recurrence after CSI. However, this might include only patients with more severe symptoms, while patients with mild recurrence may not have referred to the clinic. Another limitation was that injections were done mainly by providers out of our facility, which was out of our control. Moreover, we were not sure about the injection technique and the same corticosteroid material used. However, we believe that this heterogeneity does not affect the severity of pain perceived by the patients.

Dean et al. showed in a systematic review that local in vitro administration of corticosteroids reduced cell viability, cell proliferation, and collagen synthesis.<sup>22</sup> In addition, in vivo studies showed increased collagen disorganization, necrosis, and reduced mechanical properties when exposed to corticosteroids, which brings the effectiveness of corticosteroids into question.<sup>23</sup>

Despite that corticosteroid is not a disease modifier, some providers advocate CSI for short-term pain relief, hypothetically due to alteration in the release of noxious chemicals.<sup>24</sup> However, long-term follow-ups showed a higher surgery rate in patients with a history of receiving CSI.<sup>2</sup> Thus, it can be due to a more severe condition in patients receiving CSI. On the other hand, it might be

intuitive that CSI may result in recurrence with more severe symptoms because the repetitive movement is continued in the absence of pain while the pathology is still there, which is a license to abuse the elbow exerting more strain. This is also supported by the inhibiting effect of corticosteroids on collagen and granulation tissue production, which is potentially weakening instead of healing the tendinous attachment.<sup>24</sup> In light of these and several other side effects of corticosteroids, including hypopigmentation and skin atrophy, the literature suggests avoiding CSI unless short-term benefits are considered.<sup>1, 4, 16, 23, 25</sup> In our study, we did not look for steroid complications.

Our results indicated that the symptom-free duration lasted for about six months. This finding contrasts with the results reported by Sanders et al. in a 13-year cohort study on 576 patients with tennis elbow in the United States, of whom 19% had injections. They found the median time to recurrence of 20 months in 49 (8.5%) of patients, which is far higher than our study's.<sup>3</sup> This heterogeneity in patient selection suggests that probably our patient cohort included more severe symptom perceptions.

In the present study, the approximate duration of symptoms before receiving a CSI was around six months. Coombes et al. performed a blinded randomized placebo-controlled clinical trial on 165 adults with unilateral tennis elbow. They found that patients receiving CSI had lower recovery rates over a one-year follow-up period, lower health-related quality of life, higher intensity of pain and disability, and higher recurrence rates than placebo. They also found the median duration of symptoms before CSI to be 16 weeks.<sup>10</sup> Although our findings are comparable to the results reported by Coombes et al. regarding the worsening of symptoms after long periods, the average duration of symptoms before receiving CSI was higher in our patients.

We found no significant association between the time to recurrence and other variables, including sex, age, side, education, occupation, pre-injection VAS score, pre-injection QuickDASH, and symptom duration. Herolquet et al. in their study on 3710 French workers, reported that the recurrence of tennis elbow, although

significantly associated with high-perceived physical activities (> 2 hours a day) involving specific elbow or wrist movements, had no significant association with sex, age, and socio-professional categories.<sup>26,27</sup> In line with our findings, another study on the Japanese rural population revealed that tennis elbow had no relationship with age, sex, dominant hand, the heaviness of work, body mass index, smoking, or drinking.<sup>28</sup> Inconsistently, some studies have reported female gender was associated with poorer outcomes after non-surgical treatment of lateral epicondylitis, especially in the short term.<sup>29</sup> After the tennis elbow treatment, manual activity has reportedly been associated with worse outcomes, especially in longer follow-ups. Studies suggest that continuing manual work after treatment can slow the recovery and increase recurrence risk.<sup>30</sup> Some studies even reported non-physical work-related conditions associated with the recurrence of this condition.<sup>31</sup>

Although CSI seems to relieve or mask the pain in the short term, there is a considerable chance of recurrence, and patients may perceive more significant pain and disability that may lead to subsequent injection or precocious surgery. Time is an effective treatment for this illness. Shared decision-making is paramount, and patients have to be counseled regarding the natural history and expected prognosis of different treatments.

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