

# Evaluation of surgical outcomes in treating severe and very severe carpal tunnel syndrome in gout patients at Viet Tiep Friendship Hospital

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## ABSTRACT

**Objective:** To evaluate the surgical outcomes of treating severe and very severe carpal tunnel syndrome (CTS) in patients with gout. **Methods:** This retrospective study involved the surgical release of the carpal tunnel and decompression of the median nerve in 40 patients (45 hands) diagnosed with severe and very severe CTS in the context of gout at the Huu Nghi Viet Tiep Hospital from January 2020 to June 2022. Symptom severity and hand function were assessed in all patients by using the Boston scoring system and clinical tests. **Results:** After 24 months post-surgery, the Boston score decreased significantly from 4.63 points to 3.2 points, with a noticeable reduction in numbness symptoms. However, recovery from muscle atrophy was slow. **Conclusion:** Surgical treatment of severe and very severe CTS in patients with gout contributed to symptom improvement and enhanced hand function, thereby enhancing the overall quality of life and daily activities.

**Keywords:** Carpal tunnel syndrome, Gout, Surgery

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## INTRODUCTION

In carpal tunnel syndrome (CTS), the median nerve is compressed as it passes through the carpal tunnel of the wrist. It is the most common peripheral nerve compression disorder. In individuals with longstanding gout, urate crystals not only deposit around the wrist joints, forming tophi, but also accumulate within the connective tissues and tendons surrounding the wrist, progressively narrowing the carpal tunnel. This not only leads to deformity and disability but also causes symptoms such as numbness, tingling, and discomfort. Patients not only experience reduced function but also serious sleep disturbances due to chronic pain and significant joint damage, particularly affecting the median nerve and flexor tendons of the fingers. These factors

present challenging prognostic factors for surgery (PT) and treatment outcomes. Several studies have assessed the outcomes of surgery for severe and very severe carpal in Vietnam. However, we were unable to identify any studies on surgery for the treatment of severe CTS in patients with gout. Therefore, we aimed to evaluate the outcomes of surgical treatment for severe and very severe CTS in patients with gout.

## METHODS

Forty patients (45 hands) diagnosed with severe and very severe gout underwent surgical procedures, including release of the annular ligament, removal of inflamed synovium, resection of gouty tophi in the wrist area, and median nerve decompression.

### Selection Criteria

Diagnosis of severe and very severe CTS based on clinical symptoms, numbness in the area innervated by the median nerve, thenar muscle atrophy, and positive results on at least two of the following tests: Phalen et al.

- Diagnosis of gout with clear clinical manifestations and laboratory confirmation.
- Boston Questionnaire score above 3.1 (indicating severe and very severe conditions).
- Electrophysiological measurements showing a median nerve motor latency difference (DMLD) > 2.66 ms.
- Sensory latency difference (DSLSD) of the median nerve > 4.13 ms.

**Exclusion Criteria**

Diagnosis of CTS at moderate or mild levels. Patients who did not consent to participate in the study.

Patients who do not meet the diagnostic criteria for gout.

**Research Methodology**

*Study Design:* Cross-sectional descriptive retrospective study

*Study Location and Duration:* From January 2020 to June 2022

*Sample Size:* Convenient sampling

**Data Collection Methods**

- Selection of patients according to inclusion criteria
  - Review of medical records and collection of patient information based on study records
  - Follow-up with patients for reassessment and evaluation of post-surgery outcomes
- Data analysis using SPSS 20.0 software

**RESULTS**

**General Characteristics of Subjects**

There were 36 males and 4 females. The mean age was  $54.4 \pm 10.6$  years, with the youngest being 41 years old and the oldest being 73 years old. The incidence of clinical symptoms during the Tinel, Phalen, and Durkan tests and thenar muscle atrophy showed no significant differences between age groups ( $p > 0.05$ ). The symptoms of thenar muscle atrophy were most prevalent in those over 60 years of age, accounting for 100% of the surgical cases. (Table 1)

**Table 1. Correlation Between Symptoms and Age Groups**

	<45 years (%)	45-60 years(%)	>60 years (%)	p
Tinel Test	80%	76,9%	100%	p>0,05
Phalen Test	100%	92,3%	88,9%	
Durkan Test	100%	88,5%	77,8%	
Muscle Atrophy	80%	84,6%	100%	

After 24 months, recurrence was observed in 12 hands, four patients experienced recurrence in both hands, and four patients experienced recurrence in one hand. (Table 2)

**Table 2. Positive Rates of Clinical Tests After Surgery (n=45 hands)**

	Tinel Test (+)		Phalen Test (+)		Durkan Test (+)	
	Amount	%	Amount	%	Amount	%
Preoperation	41	91,1	40	88,89	39	86,67
24 months postoperation	12	26,67	12	26,67	12	26,67

Before surgery, muscle atrophy was most prevalent in the group with grade 3 electromyography (EMG) damage. After 24 months, the rate changed from 81.2% to 53.1% in the grade 3 group. There was no change in the grade 4 group after surgery. (Table 3)

**Table 3. Muscle Atrophy Rates Before and After 24 Months Based on Electromyography Severity (n = number of hands)**

Electromyographic Damage Severity	n	Preoperative Muscle Atrophy		24-month-Postoperative Muscle Atrophy	
		n	%	n	%
Grade 3	32	26	81,2%	17	53,1%
Grade 3	13	13	100%	13	100%
<b>Total</b>	<b>45</b>	<b>39</b>	<b>88,1%</b>	<b>30</b>	<b>57,1%</b>

The number of patients who could detect a sensation at 2 points between 11-15 mm (normal sensation) increased significantly 24 months after surgery, from 0% before surgery to 53.4% after surgery. After 24 months, seven patients could not detect a sensation at one point and two patients could not detect any sensation. (Table 4)

The difference in mean Boston questionnaire scores before and after surgery was statistically significant (p = 0.024). (Table 4)

The mean motor latency difference of the median nerve decreased from 5.2 ms pre-surgery to 3.14 ms post-surgery (p=0,007). The mean sensory latency difference of the median nerve decreased from 3.34 ms pre-surgery to 2.25 ms post-surgery (p=0,027). (Table 4)

**Table 4. Improvement in Hand Skin Sensation After Surgery (n = 45 hands)**

	Preoperation		24 Months Postoperation	
	n	%	n	%
< 6 mm	0		2	4,4%
6-10 mm	0		10	22,3%
11-15 mm	0		24	53,4%
Got sensation at 1 point	32	71,1%	7	15,5%
No sensation	13	28,9%	2	4,4%
Changes in Boston Questionnaire Score	4,63±0,45*		3,2±1,74 (p = 0.024)	
Mean Motor Latency Difference (DMLD)	5,2±3,85		3,14±1,74 (p=0,007)	
Mean Sensory Latency Difference (DSLDD)	3,34±2,3		2,25±0,67 (p=0,027)	

## DISCUSSIONS

### Changes in Boston Questionnaire Scores Post-Surgery

The Boston Questionnaire score before surgery was  $4.63 \pm 0.45$ , which decreased to

$3.2 \pm 0.74$  after 24 months, with a statistically significant difference ( $p < 0.05$ ). Our results did not align with those reported by other researchers worldwide. Owing to the severity of the patient group, although there was a

reduction in the BQ score, it was not statistically significant.

Mallick (2007) studied 300 patients after CTS surgery and found a reduction in the SSS score by 2 points and FSS score by 1.59 points after 6 months [2]. Padua (2005) and Brown (1993) reported similar findings [3]. The discrepancy may be due to the relatively small sample size of our study.

### **Clinical Test Results Post-Surgery**

After 24 months, 12 hands tested positive in the clinical tests. This result is higher than those of other national and international studies [3]. Among these 12 hands, we observed that four patients had CTS in both hands and did not change their lifestyle, did not follow up, or treat their gout. They only returned when symptoms, such as numbness and burning sensations, appeared. We provided supportive treatment for gout and anti-inflammatory and pain-relief medications, resulting in a significant improvement in symptoms in three of the four patients. One patient was indicated for surgery but declined.

The positive test rates for all three clinical tests significantly decreased after 1 month, which is consistent with Nguyen Van Lieu (2012) [4] and Jacqueline (2013), who studied 74 patients, showing a reduction in Tinel's sign from 62% to 47% and Phalen's test from 87% to 62% after 1 month [5].

In our study, the clinical symptoms significantly decreased after surgery, especially after six months. The positivity rates in the tests markedly decreased by three months post-surgery, with a significant difference in symptom positivity before and after treatment (95% confidence interval).

### **Thenar Muscle Atrophy Symptoms Post-Surgery**

In our study group, grade 3 pre-surgery thenar muscle atrophy was observed in 26 of the 32 patients (81.2%), and grade 4 atrophy was observed in 13 of the 13 patients (100%). The condition improved to grade 3 atrophy after 24 months in 17 of 32 patients (53.1%). However, grade 4 atrophy did not improve.

The correlation between pre- and post-surgery atrophy rates by electromyographic severity showed that, due to the severity of the patients, atrophy primarily occurred in grades 3 and 4. After 24 months, thenar muscle atrophy remained prevalent in patients with symptoms for more than 2 years. Thus, greater electromyographic severity correlated with poorer recovery. Reports from global authors also indicate low recovery rates for muscle atrophy symptoms after 12 months of treatment [6].

### **Sensory Disturbances of the Hand Skin Post-Surgery**

Before surgery, none of the hands in our study had normal skin sensations (2-point discrimination < 6 mm). In the group with skin sensory disturbances (2-point discrimination between 11-15 mm), 24 hands improved from 0% to 53.4% after 24 months. The group that detected a sensation at one point decreased from 71.1% before surgery to 15.5% after surgery. Two patients could not detect any sensations at any point after 24 months. The slow reduction in sensory disturbances is due to the severe nature of patients' conditions. Lam CH (2010) reported higher recovery rates for sensory disturbances in a study of 52 Chinese patients [7].

### **Electrophysiological Results Post-Surgery**

The evaluation of median and ulnar nerve motor latency difference (DMLD) post-surgery at 24 months showed a gradual decrease from 5.2 ms before surgery to 3.34

ms, with statistical significance ( $p < 0.05$ ). Sensory latency difference (DSL<sub>D</sub>) between the median and ulnar nerves decreased from 3.14 ms before surgery to 2.25 ms after 24 months, also with statistical significance ( $p < 0.05$ ).

Our study highlights a significant improvement in electrophysiological parameters at 24 months postoperatively. Analysis of electromyographic improvement before and after surgery showed a marked improvement in severity after 24 months, with a statistically significant difference ( $p < 0.05$ ) (Table 3.6). This differs from the findings of Tugrul et al. (2011) [5], indicating that more severe patient conditions take longer to recover than those treated earlier.

### CONCLUSIONS

Surgical release of the transverse ligament for median nerve decompression in severe and very severe CTS significantly improves wrist joint function, with the Boston Questionnaire score decreasing from 4.55 points to 2 points. The clinical test results were negative. However, improvement in sensory disturbances and thenar muscle atrophy is slow in most patients.

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### CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this article.

### SOURCES OF FUNDING

None.

### CONSENT

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the

written consent is available for review by the Editor-in-Chief of this journal on request.

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