

Comparison of Simultaneous with Staged Carpal Tunnel Syndrome Surgery

Abstract

Background: There are advantages and disadvantages for bilateral simultaneous carpal tunnel release (CTR) surgery and also lack of clinical guidelines about this type of surgery. This study aimed to compare the activity level and level of satisfaction post surgery among people who have undergone unilateral and bilateral simultaneous release surgery.

Methods: This longitudinal descriptive study was conducted on 60 patients with bilateral CTS, who were candidates for surgery based on the inclusion and exclusion criteria of the relevant statistical population. A total of 30 patients who wanted to perform bilateral simultaneous CTR surgeries and 30 patients who wanted to perform unilateral CTR surgery were operated by an orthopaedic specialist. The ADL-IADL questionnaire was completed before the surgery, three and 14 days after the surgery.

Results: The ADL-IADL questionnaire showed no significant difference between the two groups in the dependency score of the samples before surgery, three and 14 days after surgery. In the checklist used to evaluate the satisfaction of the results of the surgery in daily life tasks, 95% of patients expressed high or moderate satisfaction with their surgery, while only 5% expressed neither satisfaction nor dissatisfaction.

Conclusion: According to the results, the ability to perform daily life tasks, especially in observing personal hygiene in patients, who underwent bilateral simultaneous surgery three days after the surgery, did not significantly differ from those who underwent unilateral surgery. Most of the patients who underwent bilateral surgery were satisfied with this type of surgery. Finally, in this study, bilateral simultaneous CTR was suggested for people with bilateral CTS.

Keywords: Carpal tunnel syndrome, Patient satisfaction, Operative procedures, Median nerve, Patient outcome assessment

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Introduction

Carpal tunnel syndrome is the most common compressive neuropathy in the upper limbs with a prevalence of 4-5% so that in 60-87% of cases, symptoms appear rapidly in both limbs ^(1, 2). Surgery can be performed staged or simultaneously for both sides in people with bilateral CTS. One of the practical advantages of the bilateral simultaneous release surgery is reducing costs and recovery time after the surgery ^(3, 4, 5). The observed disadvantages of the bilateral simultaneous release surgery include the immediate disability caused by the surgery of both hands ⁽⁵⁾. Despite the high prevalence of bilateral carpal tunnel syndrome, there are few studies on clinical guidelines related to surgeons' decision-making regarding treating this disease. Many doctors believe that staged carpal tunnel release is better without definitive evidence. According to an observational study conducted by the American Society of Hand Surgeons (2014), 85% of hand surgeons rarely or never operated patients with symptomatic bilateral CTS ^(6, 7). This study aimed to compare the patients' ability to perform daily activities of life after the surgeries and their satisfaction level between people, who performed unilateral and bilateral release surgery simultaneously.

Methods

This longitudinal descriptive study was conducted on 60 patients with bilateral CTS candidates for surgery, who were selected by the census. The inclusion criteria were patients with bilateral carpal tunnel syndrome (referring to a non-governmental orthopaedic treatment center), who were candidates for carpal tunnel release surgery for one year (September 2020 to September 2021). A total of 30 patients had bilateral simultaneous CTR surgeries and 30 patients had unilateral CTR surgeries performed by an orthopaedic surgeon.

All patients underwent open carpal tunnel release surgery after local anesthesia using the "MINI-PALM" approach. After the surgery, a Bulk Pack Gauze was placed on the surgery site and bandaged from 5 cm proximal to the wrist to the distal fold of the palm so that the fingers were free. The cephalixin capsules (every 6 hours for five days) and 400 mg gelophene capsules (every 12 hours for three days) were prescribed. Two days after the surgery, the bandage was opened, and 14 days later, the stitches were removed. The inclusion criteria included 18 to 80 years of age, bilateral CTS based on clinical examinations, moderate to severe bilateral CTS based on electro diagnostic studies⁽⁸⁾, and lack of response to medical treatment for more than two months. The exclusion criteria were a history of CTS, peripheral polyneuropathy based on EMG/NCV, trauma to the hand, reluctance to undergo bilateral simultaneous surgery after being fully informed about the procedure, people who missed their first post-operative visit, having two or more trigger fingers required treatment in one hand, and pregnancy. The questionnaires were completed by patients before surgery (first visit), three days (second visit to remove bandage) and 14 days after surgery (third visit to remove sutures). The questionnaire of physical activities (daily living activity - instrumental activity of daily living)⁽⁹⁾ was completed by the patients during the first, second, and third visits and overall satisfaction checklist with the surgery results

in the third visit. The Persian version of the Physical Activities Questionnaire (ADL-IADL) assesses people's degree of dependence or independence in performing daily activities (daily life activities, instrumental life activities). In this 16-item questionnaire, the first seven questions are related to daily life activities, and the next nine are related to instrumental life activities. Higher scores indicate greater independence of the respondent in performing daily physical activities and vice versa.

Statistical analysis:

The data were entered into Excel and analyzed using SPSS Software Version 24 after data collection. The description of the variables was presented using central statistical indicators. Grouped variables were compared using chi-square and Fisher's exact test, and the results of the two groups were compared using an independent T-test or its non-parametric equivalent.

Results

A total of 60 patients with bilateral CTS were included in the study, 30 of whom underwent bilateral simultaneous CTR surgery and 30 underwent unilateral CTR surgery. The average age of the patients was 54.83 ± 11.6 years (range 32-75), and there was no significant difference between the two groups (Table 1 & Figure 1). Based on the ADL-IADL questionnaire results, no significant difference was observed between the two groups in comparing the dependence or independence score of the samples (ADL-IADL) before, three days after and 14 days after surgery (Table 2). No significant difference was observed between the two groups regarding comparing the frequency of people needing complete help (with P-value=0.08) and mild help (with P-value=1) in doing personal hygiene tasks three days after surgery. Based on the surgery satisfaction checklist in daily life tasks, 66.7% (N=20) of the patients in the bilateral group and 63.3% (N=19) in the unilateral group were very satisfied with the surgery result. In addition, 26.7% (N=8) of the patients in the bilateral group and 33.3% (N=10) in the

unilateral group were somewhat satisfied with the surgery result. Moreover, 6.7% (N=2) of the patients in the bilateral group and 3.3% (N=1) in the unilateral group were neither satisfied nor dissatisfied with the surgery result. The amount of very dissatisfied and somewhat dissatisfied people was zero (P-value=0.83 based on Fisher's Exact Test). Therefore, no significant difference was observed between the two groups.

A total of 86.7% (26 people) in each group chose the answer "very likely" and 13.3% (4 people) chose the answer "somewhat likely" in response to the question of choosing the same type of surgery again (P-value=1 based on Fisher's Exact Test). Therefore, no significant difference was observed between the two groups.

Table 1: Characteristics of patients before surgery

Patient Information		Unilateral Surgery Group	Simultaneous Bilateral Surgery Group	P-value
Number		30	30	
Years (age)		55.4±11.2	56±11.51	0.80
Females (percentage)		90.0% (N=27)	86.7% (N=26)	1
-BMI body mass index (Kg/M2)		26.6±2.8	26.6±3.5	0.88
Right-handed		76.7% (N=23)	80.0% (N=24)	1
Diabetes		20.0% (N=6)	43.3% (N=13)	0.096
Hypothyroidism		13.3% (N=4)	16.7% (N=5)	1
Rheumatoid Arthritis		13.3% (N=4)	13.3% (N=4)	1
Drug use		10% (N=3)	6.6% (N=2)	1
Job	Employee	26.7% (N=8)	26.7% (N=8)	1
	Manual worker	20.0% (N=6)	20.0% (N=6)	1
	House maker	53.3% (N=16)	53.3% (N=16)	1

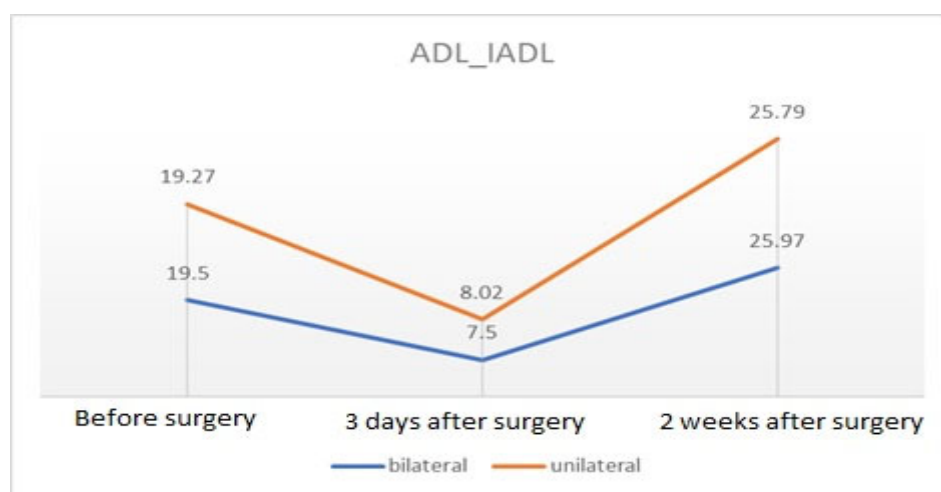


Figure 1: The independence or dependence scores of the samples in performing daily life tasks in two groups during the visits. Therefore, this graph demonstrates a reduction in patients' dependency on the second visit. Independence on day fourteen is more than on the first day, indicating improvement.

Table 2: Non-parametric statistical test (Mann-Whitney Test) and comparison between quantitative variables of the study between bilateral and unilateral groups

Visits	Group	Score of Activities of daily living (ADL)	P-value	score of instrumental Activities of daily living (IADL)	P-value	The score of independence or dependence of the samples in doing daily life tasks (ADL-IADL)	P-value
Before surgery	Simultaneous bilateral surgery	11.19±2.15	0.281	8.31±2.43	0.322	19.5±3.97	0.818
	Unilateral surgery	10.62±1.49		8.65±2.07		19.27±2.88	
Three days after surgery	Simultaneous Bilateral surgery	3.98±1.17	0.211	3.52±0.93	0.218	7.5±1.79	0.155
	Unilateral surgery	4.18±0.6		3.85±0.72		8.02±0.86	
Two weeks after surgery	Simultaneous bilateral surgery	12.99±1.1	0.658	12.98±2.97	0.952	25.97±3.58	0.953
	Unilateral surgery	1.07±13.06		1.95±12.73		25.79±2.52	

Discussion

This study compared the ability of patients in performing daily life activities after CTR surgery and their satisfaction level between people, who performed unilateral and bilateral release surgery at the same time. The data showed the patients' inability to perform daily life activities on the third day after surgery. However, there was no significant difference between the bilateral simultaneous surgery and unilateral surgery groups.

The dependence or independence score variable of the samples in performing daily life tasks (ADL-IADL) has not been investigated in similar studies. According to Osei et al. ⁽⁶⁾, using Boston Questionnaire and quick DASH results, patients who underwent bilateral surgery at the same time, within the first two days after surgery, became unable to perform some daily tasks other than personal hygiene. For the rest of the days, there was no difference between the two groups in doing daily life tasks ⁽⁶⁾. According to our study, there was no significant difference between the two groups in terms of the number of people who needed help with personal

hygiene immediately after surgery. In addition, 95% of patients were very satisfied or somewhat satisfied with the result of their surgery, and 5% were neither satisfied nor dissatisfied. Moreover, 93.4% of patients who underwent bilateral simultaneous surgery were very satisfied and somewhat satisfied with the surgery results. The results of this study are almost consistent to those of DeGeorge et al. ⁽¹⁰⁾ (97% of patients were satisfied and very satisfied with the results of surgery), Herisson et al. ⁽⁷⁾ (92.5% of patients were satisfied with the results of surgery), Wang et al. ⁽³⁾ (the average level of satisfaction with the bilateral simultaneous surgery was 9.6 out of 10), Weber and Boyer ⁽¹¹⁾ (94% of people who had bilateral simultaneous CTR surgery were satisfied with the overall results of the surgery), Dickson et al. ⁽¹²⁾ (patients in both groups were highly satisfied with their surgery).

A high willingness to repeat bilateral surgery was observed in our study in patients who underwent bilateral simultaneous surgery, a sign of patients' satisfaction. The results of this variable are almost in line with those of Herisson et al. ⁽⁷⁾ (96% of people mentioned the desire to do this procedure again), Wang et al. ⁽¹¹⁾ (100% of people mentioned the

desire to do this procedure again). Studies have revealed that the desire to repeat bilateral surgery at the same time was lower than Like Dickson et al.⁽¹²⁾ (80% of people who underwent bilateral surgery had the desire to do this type of surgery again) and Weber and Boyer's study⁽¹¹⁾ (75% of these people mentioned that they wanted to do this type of surgery again).

Conclusion

The results of this study indicated the ability to perform daily life tasks in patients who underwent bilateral simultaneous CTR surgery. On the third and 14 days after surgery, there was no significant difference among patients who underwent unilateral surgery, and most patients were satisfied with this type of surgery. Finally, this study suggests simultaneous CTR surgery in patients with bilateral CTS.

References

1. Mondelli M, Giannini F, Giacchi M. Carpal tunnel syndrome incidence in a general population. *Neurology*. 2002; 58(2):289-94. doi: 10.1212/wnl.58.2.289. PubMed PMID: 11805259.
2. Atroshi I, Gummesson C, Johnsson R, Ornstein E, Ranstam J, Rose'n I. Prevalence of carpal tunnel syndrome in a general population. *JAMA*. 1999; 282(2):153-8. doi: 10.1001/jama.282.2.153. PubMed PMID: 10411196.
3. Wang AA, Hutchinson DT, Vanderhooft JE. Bilateral simultaneous open carpal tunnel release: a prospective study of postoperative activities of daily living and patient satisfaction. *The Journal of hand surgery*. 2003; 28(5):845-8. doi: 10.1016/s0363-5023(03)00257-0. PubMed PMID: 14507517.
4. Nesbitt KS, Innis PC, Dubin NH, Wilgis EF. Staged versus simultaneous bilateral endoscopic carpal tunnel release: an outcome study. *Plastic and reconstructive surgery*. 2006; 118(1):139-45. doi: 10.1097/01.prs.0000221073.99662.39. PubMed PMID: 16816686.
5. Fehring EV, Tiedeman JJ, Dobler K, McCarthy JA. Bilateral endoscopic carpal tunnel releases: simultaneous versus staged operative intervention. *Arthroscopy: The Journal of Arthroscopic & Related Surgery*. 2002; 18(3):316-21. PubMed PMID: 11877620.
6. Osei DA, Calfee RP, Stepan JG, Boyer MI, Goldfarb CA, et al. Simultaneous Bilateral or Unilateral Carpal Tunnel Release?: A Prospective Cohort Study of Early Outcomes and Limitations. *J Bone Joint Surg Am*. 2014; 96(11):889-896. doi: 10.2106/JBJS.M.00822. PubMed PMID: 24897736; PubMed Central PMCID: PMC4049241.
7. Herisson O, Dury M, Rapp E, Marin-Braun F. Bilateral carpal tunnel surgery in one operation: Retrospective study. *Hand surgery rehabilitation*. 2016; 35(3):199-202. doi: 10.1016/j.hansur.2015.12.012. PubMed PMID: 27740462.
8. Todnem K, Sand T. Neurography for diagnosing carpal tunnel syndrome. *Tidsskr Nor Laegeforen*. 2013; 133(2):170-3. doi: 10.4045/tidsskr.12.0103. PubMed PMID: 23344602.
9. HABIBI SOULA A, NIKPOUR S, SEYED ALSHOHADAEI M, HAGHANI H. Health promotion behaviours and Quality of life among elderly people: A crosssectional survey 2006. *JOURNAL OF ARDABIL UNIVERSITY OF MEDICAL SCIENCES (JAUMS)*. 2008; 8(1):29-36.
10. Degeorge B, Coulomb R, Kouyoumdjian P, Mares O. Bilateral simultaneous endoscopic carpal tunnel release: Mean time to resume activities of daily living and return to work. *Hand surgery and rehabilitation*. 2018 Jun 1; 37(3):175-9.
11. Park KW, Boyer MI, Gelberman RH, Calfee RP, Stepan JG, Osei DA. Simultaneous bilateral versus staged bilateral carpal tunnel release: a cost-effectiveness analysis. *J Am Acad Orthop Surg*. 2016; 24(11):796. PubMed PMID: 27668663; PubMed Central PMCID: PMC5539762.
12. Dickson DR, Boddice T, Collier AM. A comparison of the functional difficulties in staged and simultaneous open carpal tunnel decompression. *Journal of Hand Surgery (European Volume)*. 2014; 39(6):627-31. doi: 10.1177/1753193413509938. PubMed PMID: 24170490.