Trigger Finger or De Quervain Tenosynovitis after Surgical Treatment for Carpal Tunnel Syndrome*

Dedo em gatilho ou tenossinovite de De Quervain após tratamento cirúrgico da síndrome do túnel do carpo

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Rev Bras Ortop 2023;58(4):e611–e616.

Abstract

Objective To evaluate the open surgical treatment for carpal tunnel syndrome as a risk factor for the development of stenosing tenosynovitis that results in trigger finger and De Quervain disease.

Materials and Methods A retrospective study analyzing the medical records of patients submitted to open surgical release of carpal tunnel syndrome between 2010 and 2021 in a secondary- and tertiary-level hospital. The following data were collected: pathological history, duration of the follow-up after the surgical treatment for carpal tunnel syndrome, development of trigger finger or De Quervain tenosynovitis, affected fingers, and the interval between the end of surgery and symptom onset.

Results We evaluated 802 patients of both genders and with a mean age of 50.1 (± 12.6) years. The mean follow-up was of 13 (± 16.4) months. The mean time until the

Keywords
- carpal tunnel syndrome
- trigger finger
- De Quervain disease

* *Study developed at the Department of Orthopedics and Anesthesiology, Hospital das Clínicas, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo (HC-FMRP-USP), Ribeirão Preto, SP, Brazil.*

received
January 25, 2022
accepted
September 12, 2022

DOI https://doi.org/10.1055/s-0042-1757960.
ISSN 0102-3616.

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development of trigger finger was of 61.4 months, and of 73.7 months for De Quervain disease. The incidence of development of De Quervain disease was of 4.12%, and for trigger finger it was of 10.2%. The most affected digits were the thumb (47.6%), the middle (24.4%), and the ring finger (8.54%). Age was the only factor that showed an association with the risk of developing trigger finger, with an increase of 2% for each increase in age of 1 year.

Conclusion The incidence rates for the development of De Quervain disease (4.12%) and trigger finger (10.2%) after the surgical treatment for carpal tunnel syndrome were like those described in the literature. Only age was a factor that influenced the development of trigger finger.

Resumo

Objetivo Avaliar o tratamento cirúrgico aberto da síndrome do túnel do carpo como fator de risco para o desenvolvimento das tenossinovites estenosantes formadoras do dedo em gatilho e da doença de De Quervain.

Materiais e Métodos Estudo retrospectivo com análise dos prontuários de pacientes submetidos a liberação cirúrgica aberta da síndrome do túnel do carpo entre 2010 e 2021 em hospital de níveis secundário e terciário. Os seguintes dados foram coletados: histórico patológico, tempo de acompanhamento após o tratamento cirúrgico da síndrome do túnel do carpo, desenvolvimento de dedo em gatilho ou tenossinovite de De Quervain, dedos acometidos, e tempo decorrido entre o fim da cirurgia e o aparecimento dos sintomas.

Resultados Foram avaliados 802 pacientes de ambos os gêneros e com média de idade de 50,1 ($\pm$ 12,6) anos. O tempo médio de seguimento foi de 13 ($\pm$ 16,4) meses. O tempo médio de desenvolvimento de dedo em gatilho foi de 61,4 meses, e o da doença de De Quervain, de 73,7 meses. A incidência de desenvolvimento da doença de De Quervain foi de 4,12% e a de dedo em gatilho, de 10,2%. Os dedos mais acometidos foram o polegar (47,6%), o médio (24,4%) e o anular (8,54%). A idade foi único fator que demonstrou associação com o risco de desenvolvimento de dedo em gatilho, com aumento de 2% a cada ano a mais de idade.

Conclusão As taxas de incidência de desenvolvimento de doença de De Quervain (4,12%) e de dedo em gatilho (10,2%) após tratamento cirúrgico da síndrome do túnel do carpo foram semelhantes às descritas na literatura. Apenas a idade se apresentou como fator influenciador no desenvolvimento de dedo em gatilho.

Palavras-chave
- síndrome do túnel do carpo
- dedo em gatilho
- doença de De Quervain

Introduction

Carpal tunnel syndrome (CTS) is the most common peripheral nerve compression pathology, with a prevalence of 3.8%.[1] Compression of the median nerve occurs at the level of the wrist due to increased pressure within the osteofibrous tunnel.[2] The procedure for carpal tunnel decompression is in the specialty of hand surgery, and it involves opening of the transverse ligament of the carpus, increasing the width of the tunnel.[3]

In turn, trigger finger is characterized by pain and a palpable nodule at the level of the A1 pulley, which clinically presents as a locking of the flexor tendons in the attempt to move the finger.[4] De Quervain disease is a stenosing tenosynovitis of the first extensor compartment, which contains the tendons of the long abductor and short extensor of the thumb. Clinically, it presents with pain in the radial side of the wrist associated with edema and uncomfortable palpation of the first dorsal compartment.[5]

The presence of trigger finger associated with CTS suggests the possibility of a common pathological process.[6] However, the association between carpal tunnel decompression and the development of trigger finger has not been well established yet.[7]

Therefore, a considerable number of studies[7–10] have been able to identify the incidence of first-pulley stenosis, as well as the mean time until the onset of symptoms in patients undergoing surgical decompression of the median nerve in the wrist, with rates ranging from 5.2% to 31.7% and 4 to 6 months respectively.

In the context of the development of stenosing tenosynovitis of the first extensor compartment, the rates found were much lower, with an approximate incidence of 0.5% after the surgical release of the transverse carpal ligament.[11]

Table 1 Mean, median and standard deviation (SD) values for age, duration of the outpatient follow-up, and onset of pathologies after the surgical treatment for carpal tunnel syndrome

Variable	Average (± standard deviation)	Median [minimim–maximum]
Age (years)	50.1 (12.6)	50.0 [5.00–89.0]
Follow-up (months)	13.0 (16.4)	6.00 [0.07–108]
Time until the development of De Quervain disease (months)	11.6 (15.4)	6.00 [0.07–84.0]
Time until the development of trigger finger (months)	11.6 (15.4)	6.00 [0.07–84.0]

The present study evaluated the open surgical treatment for CTS as a risk factor for the development of stenosing tenosynovitis that results in trigger finger and De Quervain disease.

Methods

The present work was approved by the institutional Ethics in Research Committee (CAAE- 45203921.0.0000.5440).

We conducted a retrospective cross-sectional study of patients undergoing open surgical treatment for CTS in a secondary- and tertiary-level hospital.

All of the patients selected were operated on between January 2010 and December 2020, except for those previously treated for trigger finger or De Quervain disease, or those with a diagnosis concomitant to the CTS surgery, which were the only exclusion criteria.

Based on the analysis of the medical records of the patients, we collected sociodemographic data such as age, gender, pathological history, duration of the follow-up, development of trigger finger or De Quervain tenosynovitis after the open release of the transverse ligament of the carpus, the affected fingers, and the time between the end of the surgery and the onset of symptoms.

Statistical analysis

An exploratory data analysis was performed using summary measures (frequency, percentage, mean, standard deviation, minimum, median, and maximum). The factors associated with the time until the development of diseases after the surgical treatment for CTS were analyzed through Cox regression.

Survival analysis was used to study the time until the development of trigger finger and De Quervain tenosynovitis after the open treatment for compression of the median nerve in the wrist, but some patients did not develop either, and they were censored.

The Cox regression or the proportional risk model demonstrate the failure rate between covariates, and the interpretation of the coefficients is made through relative risk (RR). In the case of the present study, the objective was to model the rate of disease development in relation to age and isolated pathologies.

The level of significance adopted was of 5%.

Results

We collected data from 873 patients in total, and 71 of them (8.13%) were excluded because they had a diagnosis of trigger finger and/or De Quervain tenosynovitis concomitant with CTS.

Thus, 802 patients of both genders aged between 5 and 89 years were selected. ►**Table 1** shows the age in years, the duration of the follow-up, and the time until the development of the pathologies after the surgical release of the transverse carpal ligament, the last two in months. The mean age was of 50.1 years; the mean follow-up was of 13months, and the mean time until the onset of De Quervain disease and trigger finger was of 11.6 months.

►**Table 2** shows the variables of gender and affected side. There was a predominance of female patients in the initial population submitted to the surgical treatment for CTS (87%), and the most affected side was the right side (55.2%).

Regarding the pathological history at the time of the surgery, there was a higher prevalence of systemic arterial hypertension (SAH; 29.7%), followed by smoking (12.8%), and type-2 diabetes mellitus (DM2; 11.1%) (►**Fig. 1**).

Table 2 Distribution in frequency and percentage of gender and affected side

	Gender	Affected side
	Female = 698 (87.0%)	Right = 443 (55.2%)
	Male = 104 (13.0%)	Left = 359 (44.8%)
Total	100%	100%

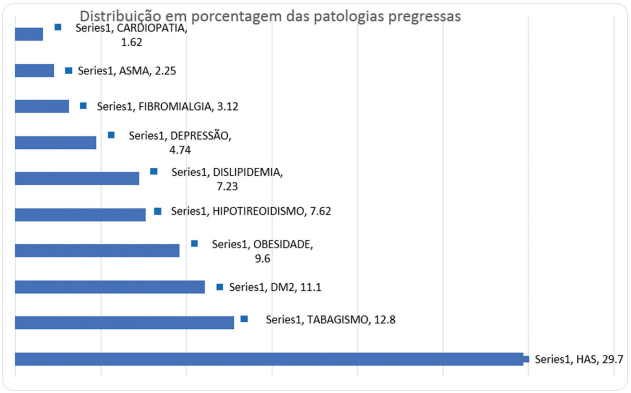

Fig. 1 Distribution of the previous pathologies in terms of frequency and percentage.

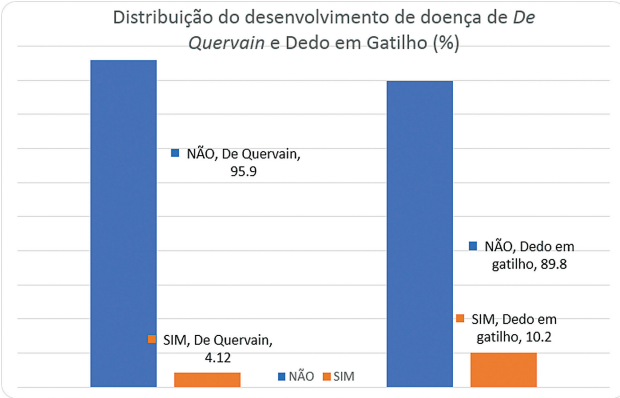

Fig. 2 Distribution, in terms of frequency and percentage, of the development of De Quervain tenosynovitis and trigger finger after the surgical treatment for carpal tunnel syndrome (CTS).

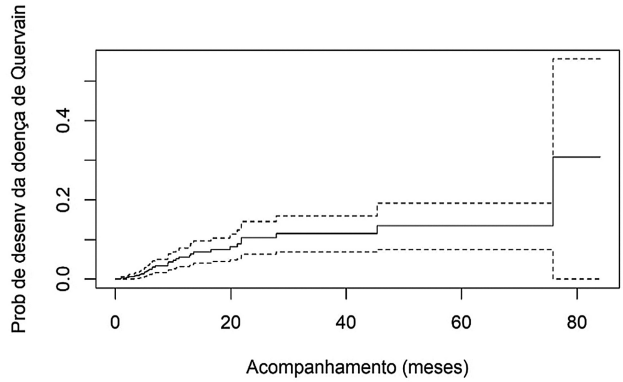

Fig. 3 Kaplan-Meier curves for the probability of developing De Quervain disease after the surgical treatment for CTS. The values of the estimates and their confidence intervals for P25, median, and P75 of the survival time are displayed using the "quantile" function.

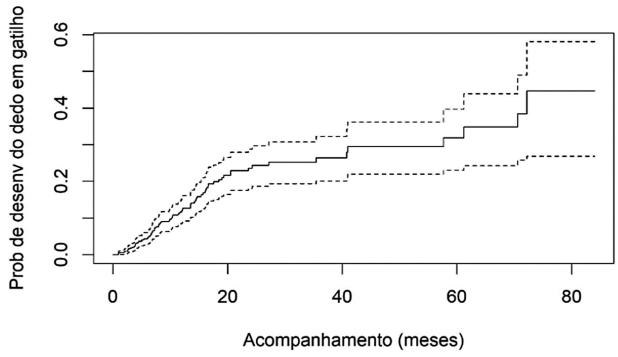

Fig. 4 Kaplan-Meier curves for the probability of developing trigger finger after the surgical treatment for CTS throughout time. The values of the estimates and their confidence intervals for P25, median, and P75 of the survival time are displayed using the "quantile" function.

The incidence of the development of tenosynovitis was of 4.12% for De Quervain disease, and of 10.2% for trigger finger (►**Fig. 2**).

Regarding the distribution of fingers affected by trigger after the surgery (►**Table 3**), there was a higher incidence for the thumb, both isolated (47.6%) and combined with other fingers (52.48%). The second most affected digit was the middle finger, with a value of 24.4% isolated and of 36.6% associated with other fingers. The third digit with the highest incidence was the ring finger, with a rate of 8.54% isolated, and of 14.64% combined with other fingers. The most common combination of affected digits was that of the middle and ring fingers: 6.1%.

►**Fig. 3** shows the Kaplan-Meier curves for the probability of developing De Quervain tenosynovitis after the surgery throughout the follow-up; after the analysis of the censored data, the mean tome was of 73.7 months (±2.08), and the probability of developing the disease in 12, 24, 36, 48 and 60 months was of 5.5%, 10.5%, 11.5%, 13.5%, and 13.5% respectively.

►**Fig. 4** shows the Kaplan-Meier curves for the probability of developing trigger finger after the surgery throughout the follow-up; after the analysis of the censored data, the mean time was of 61.4 months (±2.37), and the probability of developing the disease in 12, 24, 36, 48 and 60 months was of 11.9%, 23.6%, 26.5%, 29.5%, and 31.9% respectively.

Table 3 Distribution in frequency and percentage of the digits affected by trigger after the surgical treatment for carpal tunnel syndrome

Digit	N (%)
Thumb	39 (47.56%)
Thumb and index finger	1 (1.22%)
Thumb and middle finger	3 (3.65%)
Index finger	3 (3.65%)
Index and middle fingers	2 (2.44%)
Middle finger	20 (24.4%)
Middle and ring fingers	5 (6.10%)
Ring finger	7 (8.54%)
Pinkie or fifth finger	2 (2.44%)
Total	82 (100%)

The simple Cox regression was used to evaluate the influence of age, gender, and isolated pathologies on the risk of development of the two diseases (►**Table 4**). Neither age, gender, nor other pathologies were individually associated with the risk of developing De Quervain disease after CTS treatment. Regarding trigger finger, we observed that for each increase in one year in age, the risk of developing trigger finger increases by 2%. It was not possible to estimate the model for heart disease in the outcome of De Quervain disease, since none of the patients who developed this condition had heart disease.

For each disease, the multiple (multivariate) model was also calculated with age, gender, and pathologies. Considering the outcome of De Quervain disease, no variable remained in the model, that is, age, gender, and pathologies do not individually influence (as seen in ►**Table 4**) the risk of developing this disease after the open release of the transverse carpal ligament, nor if they are present in combination. In the model for trigger finger, after surgery for CTS, the only

Table 4 Cox regression to evaluate the factors associated with De Quervain disease and trigger finger after the surgical treatment for carpal tunnel syndrome

Variable	De Quervain disease			Trigger finger		
	RR	95%CI (RR)	*p*-value	RR	95%CI (RR)	*p*-value
Age	0.98	0.95–1.01	0.240	1.02	1.01–1.04	**0.012**
SAH	0.94	0.45–1.99	0.879	1.38	0.88–2.15	0.159
DM2	0.57	0.17–1.87	0.353	1.17	0.65–2.08	0.600
Obesity	0.52	0.12–2.18	0.371	1.00	0.50–2.01	0.992
Depression	2.28	0.69–7.48	0.175	1.52	0.61–3.76	0.365
Hypothyroidism	0.46	0.11–1.94	0.288	1.06	0.56–2.07	0.856
Dyslipidemia	0.98	0.30–3.21	0.968	1.80	0.98–3.33	0.059
Asthma	2.21	0.53–9.26	0.280	0.42	0.06–2.99	0.382
Fibromyalgia	1.53	0.36–6.42	0.561	0.61	0.15–2.50	0.496
Heart disease		–	–	1.52	0.49–4.84	0.477
Smoking	1.58	0.71–3.50	0.264	0.99	0.56–1.77	0.981
Gender	0.78	0.24–2.62	0.709	1.23	0.65–2.32	0.534

Abbreviations: 95%CI, 95% confidence interval; DM2, type-2 diabetes mellitus; RR, relative risk; SAH, systemic arterial hypertension.

variable that remained was age, that is, the gender of the patient or the fact that they presented any of the pathologies does not increase the risk of developing the disease.

►**Fig. 5** shows the Kaplan-Meier curve with the probability of developing trigger finger after the surgical treatment for CTS over time in two age groups; the groups were separated by the median (50 years), and we observed that the probability of developing this disease was higher in the group of patients older than 50 years.

Discussion

In their study, Hombal and Owen[7] identified an incidence of 22% of trigger finger in patients undergoing carpal tunnel decompression. The mean time until the onset of symptoms was of four to six weeks, with the thumb, ring and middle fingers being the most affected digits. According to these authors, the opening of the transverse carpal ligament enables the flexor tendons to snap back, increasing tension in the proximal pulleys.

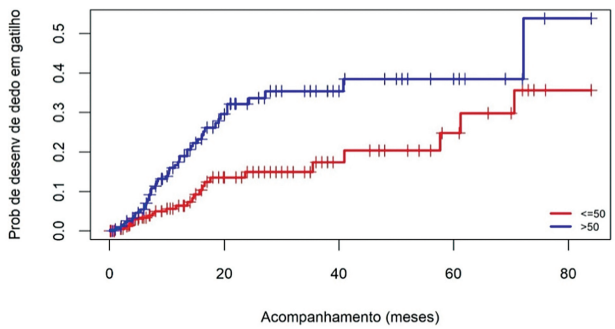

Fig. 5 Kaplan-Meier curve for the probability of developing trigger finger after the surgical treatment for CTS throughout time by age.

Hayashi et al.[8] found a rate of association of 31.7% between the development of trigger finger and the surgical treatment for CTS. The mean time until the occurrence was of 5.6 months, with the thumb being the most affected digit. In this study,[8] the researchers excluded patients with DM, rheumatoid arthritis, and chronic renal failure due to dialysis. According to Goshtasby et al.[9], the incidence of the development of trigger finger in patients with chronic diseases who underwent hand surgery was of 6.3%. The time until onset was of 4 months on average, with the thumb being the most affected digit (48.3%), followed by middle finger and index fingers.

After a systematic review, Lin et al.[2] found the mean prevalence of trigger finger after carpal tunnel release of 8.5%, and an incidence ranging from 5.2% to 31.7%. Added to this, the development of trigger finger can be diagnosed during the evolution of CTS. The time until the diagnosis of trigger finger after carpal tunnel release was of up to six months. The most affected digit was the thumb, with a reported incidence of up to 50%.[10]

For patients previously submitted to the surgical treatment for CTS, in the present study we found a rate compatible with those reported in the literature for the incidence of trigger finger (10.2%), which is approximately 5 times higher than the incidence reported in the literature for non-diabetic patients (2.2%).[11] This discrepancy draws attention to a possible positive correlation between the onset of triggering secondary to the surgical approach.

The mean time until the development observed was longer than previously reported (61.3 months), and the most affected digit was the thumb (47.6%), followed by the middle (24.4%) and ring (8.54%) fingers. Regarding the associations of digits, the most common was between the middle and ring fingers, with an incidence of 6.1%, followed by the thumb and middle finger (3.66%), and the index finger and middle fingers (2.44%).

The only variable that was shown to influence the development of trigger finger after open surgical release of CTS was age ($p = 0.012$). It has been shown that for every one-year increase in age, the risk of developing trigger finger increases by 2%. It is worth questioning whether the increase in this incidence is due to postoperative time or the natural increase in prevalence with aging.

Still within the chronological scope of the question, we observed that the average time until the development of the cases of tenosynovitis was much higher than the average of 13 months of follow-up of the patients evaluated in the present study, which leads us to wonder whether studies with longer follow-ups may yield different results.

In the context of the presence of previous pathologies and the gender of the patient, there was no influence on the development of trigger finger.

Regarding the incidence of De Quervain tendosynovitis after the surgical treatment for CTS, the literature reports a rate of 0.5%. For King et al.,[12] the release of the transverse carpal ligament is not a risk factor for the development of De Quervain tenosynovitis.

The incidence found in the present study for the development of De Quervain disease was of 4.12%, a rate substantially higher than that reported in scientific texts and higher than the overall incidence of the disease (0.5% to 1.3%).[13] The origin of this dissimilarity turns out to be difficult to determine due to the difficulty in identifying patients with tenosynovitis of the first compartment in early stages and those asymptomatic or little symptomatic, who may have undergone treatment for compression in the carpal tunnel without prior knowledge of this comorbidity.

The mean time until the development of this tenosynovitis was of 73.7 months, with no studies in English or Portuguese to make a comparison with this variable.

Conclusion

The incidence of trigger finger after the open surgical release of CTS found (10.2%) was equivalent to the rates already described in the literature, and the incidence found (4.12%) for the development of De Quervain disease under the same conditions was notably higher than that reported in the literature, but with no apparent association between the treatment and the phenomenon.

No relationship was observed involving gender and the comorbidities evaluated for both types of tenosynovitis, with age being the only variable that affected the incidence of trigger finger.

Financial Support
The authors declare that they have received no financial support from public, commercial, or non-profit sources.

Conflict of Interests
The authors have no conflict of interests to declare.

Acknowledgements
To Dr. Tardelli Lapaz da Silva Prudêncio, graduate resident physician of the Hand Surgery Program of Hospital das Clínicas, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo.

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