Published online: 2021-07-01

Onset of Trigger Finger after Carpal Tunnel Syndrome Surgery: Assessment of Open and Endoscopic Techniques*

Frequência do aparecimento de dedo em gatilho no pós operatório da síndrome do túnel do carpo em duas técnicas cirúrgicas: Aberta e endoscópica

Marcela Fernandes[1,2] João Carlos Belloti[1,2] Aldo Okamura[1,2] Jorge Raduan Neto[1,2] Rafael Tajiri[2] Flávio Faloppa[1] Vinícius Ynoe de Moraes[1–3]

[1] Orthopedics and Traumatology Department, Universidade Federal de São Paulo, São Paulo, SP, Brazil
[2] Hand Surgery Service, Hospital Alvorada, Moema, São Paulo, SP, Brazil
[3] Ortocity Serviços Médicos, São Paulo, SP, Brazil

Address for correspondence Vinícius Ynoe de Moraes, PhD, Rua Borges Lagoa, 786, São Paulo, SP, 04041050, Brazil (e-mail: vymoraes@gmail.com).

Rev Bras Ortop 2021;56(3):346–350.

Abstract

Objective The present study aimed to determine the frequency of trigger finger (TF) onset after surgery for carpal tunnel syndrome (CTS) using an open (OT) or an endoscopic technique (ET). As a secondary endpoint, the present study also compared paresthesia remission and residual pain rates in patients submitted to both techniques.

Methods Trigger finger onset and remission rates of paresthesia and pain at the median nerve territory was verified prospectively in a series of adult patients submitted to an OT procedure ($n = 34$). These findings were compared with a retrospective cohort submitted to ET ($n = 33$) by the same surgical team. Patients were evaluated with a structured questionnaire in a return visit at least 6 months after surgery.

Results Sixty-seven patients were evaluated. There was no difference regarding trigger finger onset (OT, 26.5% versus ET, 27.3%; $p = 0.94$) and pain (OT, 76.5% versus ET, 84.8%; $p = 0.38$). Patients submitted to OT had fewer paresthesia complaints compared with those operated using ET (OT, 5.9% versus ET, 24.2%; $p = 0.03$).

Conclusions In our series, the surgical technique did not influence trigger finger onset and residual pain rates. Patients submitted to OT had less complaints of residual postoperative paresthesia.

Keywords
- carpal tunnel syndrome
- paresthesia
- comparative study
- endoscopy
- trigger finger disorder

* *Study developed at the Medical Residence Service in Hand Surgery and Microsurgery, Hospital Alvorada, São Paulo, SP, Brazil.*

received
March 8, 2020
accepted
September 16, 2020
published online
September 25, 2020

DOI https://doi.org/10.1055/s-0040-1721834.
ISSN 0102-3616.

Thieme Revinter Publicações Ltda., Rua do Matoso 170, Rio de Janeiro, RJ, CEP 20270-135, Brazil

Resumo

Objetivo Determinar a frequência do aparecimento de dedo em gatilho (DG) no pós-operatório da síndrome do túnel do carpo (STC) em duas técnicas: aberta (TA) e endoscópica (TE). Como desfecho secundário, comparar as taxas de remissão da parestesia e dor residual entre as duas técnicas.

Métodos De forma prospectiva, verificamos o aparecimento de dedo em gatilho e taxa de remissão da parestesia e dor no território do nervo mediano em série de pacientes adultos operados pela TA ($n = 34$). Comparamos com coorte retrospectiva operada pela TE ($n = 33$), pela mesma equipe de cirurgiões. A avaliação dos pacientes ocorreu por meio de questionário estruturado em consulta de retorno, com mínimo de 6 meses de pós-operatório.

Resultados Sessenta e sete pacientes foram avaliados. Não houve diferença quanto ao aparecimento de dedo em gatilho (TA, 26,5% *versus* TE, 27,3%; $p = 0,94$) e dor (TA, 76,5% *versus* TE, 84.8%; $p = 0,38$). Os pacientes operados pela TA apresentaram menos queixas de parestesia do que os operados pela TE (TA 5,9% *versus* TE 24,2%; $p = 0,03$).

Conclusões Em nossa série, a técnica cirúrgica não influenciou o aparecimento de dedos em gatilho e dor residual. Os pacientes operados pela técnica aberta apresentaram menos queixa de parestesia residual pós-operatória.

Palavras-chave

- síndrome do túnel do carpo
- parestesia
- estudo comparativo
- endoscopia
- dedo em gatilho

Introduction

Carpal tunnel syndrome (CTS) is defined as a set of signs and symptoms resulting from median nerve compression at the wrist level.[1] This compression may be associated with tenosynovitis or anomalous structures within the carpal tunnel.[2] Carpal tunnel syndrome is the most prevalent compressive neuropathy, affecting $\sim$ 2.7% of the general population[3] It is more common in specific populations, such as diabetic patients and manual workers.[3]

The diagnosis of CTS is based on clinical history, symptoms, and specific maneuvers.[1] Common symptoms include numbness, paresthesia, pain, and loss of strength in the hand and the wrist. When indicated, surgical treatment is based on carpal tunnel decompression, using either an open or an endoscopic technique.[4–6]

Stenosing tenosynovitis at the flexor tendons of the fingers, that is, "trigger finger" (TF), is characterized by an inflammatory process involving the sheath of the flexor tendons at the first annular pulley (A1) level. Trigger finger is related to sheath thickening and to the potential development of a nodule at the flexor tendon. As a result, tendon diameter increases, leading to friction with the A1 pulley.[7] Some conditions are believed to predispose TF development, such as rheumatoid arthritis, diabetes, hypothyroidism, and amyloidosis.[8]

Trigger finger onset after CTS surgical treatment is common. Studies reported a frequency range from 10 to 13% in Jordanian, Brazilian, and American series.[9–11] Meanwhile, this cause-effect relationship has been discussed by several authors,[9–12] but details remain unclear.

Surgical treatment options include decompression by a traditional open approach, consisting in wide access to the skin and palmar fascia, or by an endoscopic approach.[2] We hypothesized, based on some previous studies,[10,11] that a minimally invasive technique, such as endoscopy, results in a lower frequency of TF because it spares structures such as the palmar fascia and the skin immediately anterior to the carpal transverse ligament, potentially mitigating the arc effect resulting from carpal tunnel decompression.[9–11]

The present study aimed to determine the frequency of TF onset after surgical CTS decompression using an open (OT) or an endoscopic technique (ET). As a secondary endpoint, the present study also compared paresthesia remission and residual pain rates in patients submitted to both techniques.

Materials and Methods

The present study was approved by the research ethics committee under the number 17597019.7.0000.5533. It was developed at the hand surgery medical residency service of the Hospital Alvorada-Moema (São Paulo, SP, Brazil) and Ortocity orthopedic clinics (São Paulo, SP, Brazil). This is a case series study with a prospective sample compared with a retrospective historical cohort.

The sample consisted of adult patients, $>$ 18 years old, from both genders, who were operated on by the team of hand surgeons (Moraes V. Y., Belloti J. C., Fernandes M., AO, Raduan Neto J.) using either the open or endoscopic techniques in São Paulo, SP, Brazil, and who completed the minimum postoperative follow-up of 6 months.

Patients with other hand conditions or deformities were not included in the study.

Inclusion criteria

- Patients undergoing open or endoscopic surgical treatment for CTS;
- Minimum postoperative follow-up of 6 months;
- No intraoperative complications

Exclusion criteria

- Patients who did not comply with participating in the study;
- Patients with TF prior to the surgical procedure for CTS (previous clinical diagnosis informed by the patient)

Data collection method

Patients operated using the open technique

This is a convenience sample from the specialized outpatient clinic. Initially, these patients were treated conservatively, with corticosteroids and nighttime orthosis, for a minimum period of 4 weeks. If the conservative treatment was unsuccessful, patients were operated on according to the following diagnostic criteria: 1) presence of nocturnal paresthesia at the median nerve territory; 2) loss of two-point discrimination capacity; 3) positive Phalen test; 4) positive Tinel sign at the carpal tunnel level; 5) paresthesia at the median territory; 6) loss of hand strength. Surgical treatment was indicated to patients with at least three of the aforementioned criteria.

Patients operated using the endoscopic technique (retrospective control)

We carried out a survey of patients operated using the endoscopic technique with the help of the surgical control records of the team. These patients were operated on from 2016 to 2019. They were identified and demographic data, including age, gender, occupation, dominant hand, pre-existing conditions, and disease/intervention data, were collected (**Annex 1**). Using these data, patients submitted to the ET were paired with those submitted to the OT for group comparison. Data collection was performed preferably in a face-to-face return visit. Alternatively, some contacts were made by telephone using a structured questionnaire.

Collection determination of pertinent variables

The diagnosis of TF was based on the following questions: 1) Is any finger stuck or presenting difficulty to "bend" or "stretch"?; 2) do you feel pain at the "base" or "root" of the fingers? Paresthesia and pain were diagnosed with the following questions: 1) Do you present a tingling sensation in your hands?; 2) do you present any hand discomfort disturbing your sleep?; 3) do you feel any pain or discomfort in the hands? One or more "yes" answers were considered "events" for the purposes of the present study.

Statistical Analysis

At the descriptive statistical analysis, continuous data were shown as mean values and their standard deviations (SDs), while categorical data were shown as absolute values and percentages. Inferential statistical analyses used nonparametric tests, namely the U Mann-Whitney test for continuous variables and the Fisher F test for categorical variables. Statistical significance was defined at $p < 0.05$ to determine differences between groups.

Results

Group characterization: open versus endoscopic technique

Sixty-seven patients were included. All subjects had a clinical diagnosis consistent with CTS. Thirty-three patients were operated using ET, and 34, OT. Their demographics are shown in ►**Table 1**.

Table 1 Sample characteristics and clinical outcomes: Open and Endoscopic Techniques

	Open Technique	Endoscopic Technique	*p-value*
Age (mean, standard deviation)	58.7 (3.5)	52.2 (3.7)	**0.02**
Female gender (n, %)	28 (82.4)	27 (81.8)	0.95
Right-sided dominance (n, %)	30 (88.2)	28 (84.8)	0.68
Comorbidities (n, %)	21 (61.8)	14 (42.4)	0.11
Diabetes (n, %)	9 (26.5)	8 (24.2)	0.83
Trigger finger (n, %)	9 (26.5)	9 (27.3)	0.94
Paresthesia improvement (n, %)	32(94.1)	25 (75.8)	**0.03**
Pain improvement (n, %)	26 (76.5)	28 (84.8)	0.38

Postoperative variables: trigger presence, pain improvement and paresthesia remission

Trigger finger occurred in 26.9% of the patients. There was no difference in the frequency of TF onset after different techniques: OT, 26.5% versus ET, 27.3%; $p = 0.94$. Regarding pain improvement, there was no difference between groups: OT, 76.5% versus ET, 84.8%; $p = 0.38$. For paresthesia improvement, the OT proved to be more effective than the ET (94.1% versus 75.8%; $p = 0.03$).

Discussion

It is known that patients with CTS are predisposed to TF, with a reported incidence of $\sim$ 0.2 to 31.7% in some studies.[9,11,13,14] However, few studies correlated TF onset to the postoperative period in CTS. A study[11] analyzing 132 operated hands found a 22% frequency of TF. In another prospective study with 164 hands, Hayashi et al.[14] found a TF frequency of 31.7%. Our series is consistent with the literature, with a TF frequency ranging from 26.5 to 27.3%. This finding strengthens the representativeness of our sample, despite its relatively small size. In this scenario, it seemed important to control comorbidities, especially diabetes, as there is a consensus that TF incidence is higher in diabetic patients, with a three-fold increase compared to nondiabetic subjects.[15] In our series, both groups were comparable in terms of comorbidities and diabetes frequency, corroborating the robustness of our results. Studies[10,11] suggest that carpal tunnel release would be a risk factor for TF development due to anatomical and mechanical changes. Transverse carpal ligament release is hypothesized to alter the biomechanics of the action of the flexor tendons, increasing its distal "attack angle" and resulting in greater friction at the osteofibrous tunnel entrance level. This event may contribute to TF onset or worsen a previous condition. As such, endoscopic release would represent less tissue damage due to the smaller access route and because it spares structures anterior to the carpal transverse ligament, such as the skin and palmar fascia.

However, our results did not prove this hypothesis, since the TF frequency was quite similar between groups.

We observed a statistical difference between groups regarding paresthesia improvement, indicating a better performance for the OT. Although this difference is robust, we must keep in mind that it can result from a measurement bias, since these cohorts are not simultaneous and present different disease evolution times. Several studies[16–19] compare the same interventions and outcomes. These authors report a similar rate of paresthesia or sensitivity improvement 6 to 12 months after surgery. With a population similar to ours, Okamura et al.[20] reported consistent, excellent results from the ET in objective functional outcomes and in the Boston questionnaire. Although this study includes a relevant number of patients, it lacks a comparison group. Regarding another relevant outcome, pain, we did not identify any benefit for any of the techniques. It must be considered that part of the literature refers to benefits of the ET, especially within the 1st month.[2]

Some observations must be made about the internal validity[21] of our findings: 1) this is a small sample, which may have limited the representativeness of our data; 2) there is a retrospective component regarding the initial diagnosis and conservative treatment; and 3) the nature of our study does not allow the attribution of a cause-effect relationship, but it establishes an association between both conditions.

Conclusion

In this sample, we demonstrate that the surgical technique does not seem to influence postoperative TF onset and pain. Patients submitted to the OT showed greater paresthesia remission when compared to the ET.

Financial Support
There was no financial support from public, commercial, or non-profit sources.

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

Acknowledgments
We are grateful to Giovanna Arcaro de Lima for her kind support.

References

1 Chammas M, Boretto J, Burmann LM, Ramos RM, Santos Neto FC, Silva JB. Síndrome do túnel do carpo - Parte I (Anatomia, Fisiologia, Etiologia e Diagnóstico). Rev Bras Ortop 2014;49(05):429–436
2 Chammas M, Boretto J, Burmann LM, Ramos RM, Santos Neto FC, Silva JB. Síndrome do túnel do Carpo - Parte II (Tratamento). Rev Bras Ortop 2014;49(05):437–445
3 Atroshi I, Gummesson C, Johnsson R, Ornstein E, Ranstam J, Rosén I. Prevalence of carpal tunnel syndrome in a general population. JAMA 1999;282(02):153–158
4 Verdugo RJ, Salinas RA, Castillo JL, Cea JG. Surgical versus non-surgical treatment for carpal tunnel syndrome. Cochrane Database Syst Rev 2008;(04):CD001552
5 Okamura A, Guidetti BC, Caselli R, Borracini JA, Moraes VY, Belloti JC. How doboard-certified hand surgeons manage carpal tunnel syndrome? a national survey. Acta Ortop Bras 2018;26 (01):48–53
6 Phalen GS. The carpal-tunnel syndrome. Seventeen years' experience in diagnosis and treatment of six hundred fifty-four hands. J Bone Joint Surg Am 1966;48(02):211–228
7 Ryzewicz M, Wolf JM. Trigger digits: principles, management, and complications. J Hand Surg Am 2006;31(01):135–146
8 Buch-Jaeger N, Foucher G, Ehrler S, Sammut D. The results of conservative management of trigger finger. A series of 169 patients. Ann Chir Main Memb Super 1992;11(03):189–193
9 El-Hadidi S. Is there a relation between carpal tunnel syndrome and trigger finger? BMC Proc 2015;9(Suppl 3):A65
10 Pires FA, Fernandes CH, do Santos JBG. Does the presence of trigger finger affect the outcome of surgical treatment of carpal tunnel syndrome? A preliminary prognostic study. J Hand Surg Eur Vol 2018;43(09):999–1001
11 Zhang D, Collins J, Earp BE, Blazar P. Relationship of Carpal Tunnel Release and New Onset Trigger Finger. J Hand Surg Am 2019;44 (01):28–34
12 Assmus H. [Tendovaginitis stenosans: a frequent complication of carpal tunnel syndrome]. Nervenarzt 2000;71(06):474–476
13 Shapiro S. Microsurgical carpal tunnel release. Neurosurgery 1995;37(01):66–70
14 Hayashi M, Uchiyama S, Toriumi H, Nakagawa H, Kamimura M, Miyasaka T. Carpal tunnel syndrome and development of trigger digit. J Clin Neurosci 2005;12(01):39–41
15 Fahey JJ, Bollinger JA. Trigger-finger in adults and children. J Bone Joint Surg Am 1954;36-A(06):1200–1218
16 Agee JM, McCarroll HR Jr, Tortosa RD, Berry DA, Szabo RM, Peimer CA. Endoscopic release of the carpal tunnel: a randomized prospective multicenter study. J Hand Surg Am 1992;17(06):987–995
17 Flores LP. [Endoscopic carpal tunnel release: a comparative study to the conventional open technique]. Arq Neuropsiquiatr 2005;63 (3A):637–642
18 Palmer DH, Paulson JC, Lane-Larsen CL, Peulen VK, Olson JD. Endoscopic carpal tunnel release: a comparison of two techniques with open release. Arthroscopy 1993;9(05):498–508
19 Urbaniak JR. Complications of treatment of carpal tunnel syndrome. In: Gelberman RH. Operative nerve repair and reconstruction. Philadelphia: Lippincott Williams & Wilkins; 1991:967–979
20 Okamura A, Meirelles LM, Fernandes CH, Raduan Neto J, Dos Santos JB, Faloppa F. Evaluation of patients with carpal tunnel syndrome treated by endoscopic technique. Acta Ortop Bras 2014;22(01):29–33
21 de Moraes VY, Ferrari PM, Gracitelli GC, Faloppa F, Belloti JC. Outcomes in orthopedics and traumatology: translating research into practice. Acta Ortop Bras 2014;22(06):330–333

Annex 1 Study questionnaire - Carpal tunnel syndrome and trigger finger onset

1–FULL NAME
_____
2–AGE
( ) YEARS OLD
3–GENDER
( ) MALE ( ) FEMALE
4–OPERATED HAND
( ) RIGHT ( ) LEFT
5–DOMINANT HAND
( ) RIGHT ( ) LEFT
6–PREVIOUS CONDITIONS
_____
7–WAS THERE TRIGGER FINGER ONSET?
( ) YES ( ) NO
8–HOW LONG AFTER SURGERY?
( ) MONTHS
9–DID TRIGGER FINGER OCCUR IN THE OPERATED HAND?
( ) YES ( ) NO
10 – WHICH FINGER WAS AFFECTED?
( ) 1^{st} ( ) 2^{nd} ( ) 3^{rd} ( ) 4^{th} ( ) 5^{th}
10–SURGERY WAS PERFORMED USING THE OPEN OR ENDOSCOPIC APPROACH?
( ) OPEN ( ) ENDOSCOPIC
11–DID CARPAL TUNNEL SYNDROME SYMPTOMS IMPROVE?
Pain
( ) YES ( ) NO
Paresthesia
( ) YES ( ) NO
Nocturnal Paresthesia
( ) YES ( ) NO