

Carpal Tunnel With Local Anesthesia Versus WALANT

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ABSTRACT

Objective: Surgeries with the WALANT technique have recently become popular. The main advantage of this technique is that it avoids using the tourniquet and eliminates the discomfort it generates. We hypothesize that carpal tunnel decompression with local anesthesia and a pneumatic tourniquet, performed by an experienced surgeon in a short surgical time, allows us to obtain similar outcomes to the WALANT technique surgery. **Materials and Methods:** We designed a prospective clinical comparative cohort study. We included twenty-three patients (30 hands) with carpal tunnel syndrome. Two groups of patients were randomized. Group 1 consisted of patients operated on with local anesthesia, and Group 2 included those operated on with the WALANT technique. We carried out a statistical analysis. **Results:** All the variables showed statistically significant differences concerning the preoperative values for the two groups. Regarding the relationship between those two groups, the functional outcomes of pain and degree of postoperative satisfaction did not show statistically significant differences. **Conclusions:** In our study, carpal tunnel decompression performed with local anesthesia with a tourniquet and those achieved with the WALANT technique had similar outcomes. In the hands of experienced surgeons, local anesthesia with a tourniquet may be sufficient to perform the procedure, thus avoiding the few but complex complications of epinephrine.

Keywords: Carpal tunnel; carpal tunnel decompression; WALANT; local anesthesia; tourniquet.

Level of Evidence: II

Túnel carpiano con anestesia local versus WALANT

RESUMEN

Objetivo: Las cirugías con WALANT han ganado gran popularidad hoy en día. La ventaja principal que ofrece esta técnica es la de prescindir del torniquete y así eliminar las molestias que este genera. Nuestra hipótesis es que la descompresión del túnel carpiano con anestesia local y manguito neumático, realizada por un cirujano experimentado, en un tiempo quirúrgico corto, permite obtener similares resultados que con la cirugía con WALANT. **Materiales y Métodos:** Se diseñó un estudio de cohortes prospectivo comparativo clínico. Se incluyeron 23 pacientes (30 manos) con síndrome del túnel carpiano. Se asignó a los pacientes en forma aleatorizada, a 2 grupos: grupo 1, operados con anestesia local y grupo 2, operados con WALANT. Se realizó un análisis estadístico. **Resultados:** Todas las variables mostraron diferencias estadísticamente significativas respecto a los valores preoperatorios para los dos grupos. Respecto a la relación entre los dos grupos, los resultados funcionales de dolor y grado de satisfacción posoperatorios no mostraron diferencias con significancia estadística. **Conclusiones:** En nuestro estudio, la descompresión del túnel carpiano con anestesia local y torniquete y la realizada con WALANT arrojaron similares resultados. En cirujanos con experiencia posiblemente la anestesia local con torniquete sea suficiente para realizar el procedimiento, y así evitar las bajas, pero complejas complicaciones de la epinefrina.

Palabras clave: Túnel carpiano; descompresión; WALANT; anestesia local; torniquete.

Nivel de Evidencia: II

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How to cite this article: Gallucci G, Rosa Y, Brandariz R, Cerrutti W, Tanoira I. Carpal Tunnel With Local Anesthesia Versus WALANT. *Rev Asoc Argent Ortop Traumatol* 2022;87(3):335-340. <https://doi.org/10.15417/issn.1852-7434.2022.87.3.1430>

INTRODUCTION

Carpal tunnel syndrome (CTS) is one of the most common conditions in hand surgery. During carpal tunnel release, it is essential to obtain a bloodless surgical field to correctly identify anatomical structures and avoid iatrogenic injury. A pneumatic tourniquet or cuff is often used to minimize bleeding and improve the vision of the surgical field. This procedure can sometimes cause pain, discomfort, and intolerance when sedation, block, or general anesthesia is not used.¹⁻³

Some reports with volunteers indicate a good tolerance to the cuff ranging between 13 and 25 minutes.^{4,5} Both studies also report better tolerance with the cuff on the forearm than on the arm. However, some surgeons favor tourniquetless procedures, suggesting that a similar bloodless surgical field can be achieved by administering xylocaine with epinephrine.

Although data from several retrospective studies confirm the safety of not using a tourniquet,^{6,7} 57% of Canadian surgeons and up to 95% of US surgeons continue to use a tourniquet for these minor procedures and, in many cases, administer sedation.^{8,9}

Today, surgeries with WALANT (*Wide Awake Local Anesthesia No Tourniquet Technique*) have gained great popularity. Some of the main advantages offered by this technique compared to conventional anesthesia are: it allows the patient to be actively involved in the surgical procedure and the use of epinephrine manages to dispense with the tourniquet, thus avoiding the discomfort it generates.

Although significant economic benefits have been reported in favor of WALANT compared to surgeries with sedation,^{10,11} actual patient satisfaction and functional outcomes between surgeries with local anesthesia and those with WALANT have not been published.

We hypothesize that carpal tunnel decompression (CTD) with local anesthesia and a pneumatic cuff performed by an experienced surgeon, involving a short surgical time, allows us to obtain similar outcomes as surgery with WALANT.

The objective of this article is to communicate the short-term results of CTD by comparing surgery with local anesthesia and surgery with WALANT. Likewise, the intraoperative outcomes between both groups are evaluated.

MATERIALS AND METHODS

A comparative, prospective, cohort clinical study was designed during the period from February 2020 to June 2021. 23 patients (30 hands) with CTS were included. The inclusion criteria were: age >18 years, isolated CTS without associated diseases, clinical and electromyographic diagnosis of CTS, and willingness to participate in the study. The Team Maker online program was used to randomly create two groups: patients operated on with local anesthesia (group 1, G1) and patients operated on with WALANT (group 2, G2). Each group included 15 CTSs. Seven patients underwent surgery on both sides simultaneously.

Our Center does not have a medical research committee to approve the protocol, but it was approved by the Service's Professional Ethics Committee. All patients were operated on by the same surgeon (specialist in hand surgery).

Preoperative evaluation included the visual analog scale for pain, with a range of 1 to 10; the DASH¹² questionnaire (Disabilities of the Arm, Shoulder and Hand) and the Weber two-point discrimination test. Anesthesia was administered with a 25G needle and 15 cm³ of 2% xylocaine (G1) or 2% xylocaine with epinephrine at the same dose (G2) were injected. Sodium bicarbonate was not administered in any case. In G2 patients, surgery started 15 m after anesthesia. G1 patients were operated on through blood flow restriction with an elastic bandage and a pneumatic tourniquet at 220 mmHg.

Surgical time was tracked from the start of the incision to wound closure. Surgery consisted of CTD by opening the flexor retinaculum. No associated procedure was performed on the nerve. Immediately postoperatively, pain at the time of administration of anesthesia was assessed. In addition, satisfaction with the procedure was assessed using a visual analog scale. Specifically, in G2, the pain of the pressure exerted by the pneumatic cuff was also evaluated. All of these immediate preoperative and postoperative evaluations were performed by a person not involved in the surgery.

The patients were given instructions to determine the pain at 6 h and 24 h after the procedure. After four days, satisfaction with the procedure was assessed using a visual analog scale, with a range of 1 to 10 (where 10 is the greatest satisfaction). After 15 days and a month, the pain was evaluated again. In this last control, the functional outcome was evaluated with the DASH questionnaire. No patient was lost to follow-up.

Statistical analysis

Continuous variables are presented as median with interquartile range; and categorical variables, as proportions. Normality for continuous variables and the existence of extreme values for ordinal and quantitative categorical variables were reviewed. The t-test was used for continuous variables. The χ^2 or Fisher's test was applied to the categorical variables according to the distribution of the variable. A p-value <0.05 was considered statistically significant. As all consecutive patients were included within the proposed study period, no sample calculation was performed. All statistical analyses were performed with the Stata 15 program.

RESULTS

Ten patients were men and 13 women. The average age was 60 years (range: 45-79) in G1 and 62 years (range: 42-87) in G2. Seven patients underwent bilateral CTD. [Table 1](#) details the demographic characteristics of the series. Although the mean operative time of G1 was less than that of G2 (156 ± 30 vs. 186 ± 54 seconds), the difference was not statistically significant.

Table 1. Demographic characteristics

	Global (n = 30)	Local anesthesia (n = 15)	WALANT (n = 15)	p
Age, median (IQR), years	60 (42-87)	60.33 (45-79)	61.53 (42-87)	0.79
Female sex, n (%)	13 (63)	9 (60)	10 (66)	0.7
Right affected side, n (%)	18 (60)	8 (53.33)	10 (66.67)	0.45
Right dominant side, n (%)	29 (96.6)	15 (100)	14 (93)	0.3
Surgery time, min, mean \pm SD	2.89 \pm 0.75	2.6 \pm 0.5	3.1 \pm 0.9	0.08
Preoperative Weber test, mean \pm SD	6.96 \pm 1.94	7.06 \pm 1.27	6.86 \pm 1.24	0.66
Preoperative DASH, mean \pm SD	45.76 \pm 20.33	52.53 \pm 23	39 \pm 15.15	0.06
Preoperative VAS, mean \pm SD	7.63 \pm 2.12	7.73 \pm 2.05	7.53 \pm 2.26	0.80

SD = standard deviation, DASH = Disabilities of the Arm, Shoulder and Hand questionnaire, VAS = visual analog scale.

In G1, the tourniquet pressure pain score was, on average, 2. Immediate satisfaction with the procedure was 9.4 in G1 and 9.6 in G2. The pain score at 6 and 24 hours was 4 and 2 in G1, and 5 and 3 in G2, respectively. On the fourth day, satisfaction was 8.4 in G1 and 8.6 in G2. At 15 and 30 days, the pain score was 0.8 and 0.4 in G1, and 1.2 and 0.5 in G2, respectively. The DASH score was 26 in G1 and 18 in G2. All these variables showed statistically significant differences with respect to the preoperative values for the two study groups ([Table 2](#)).

Table 2. Assessments in the preoperative period and one month after surgery.

	Local			WALANT		
	Preoperative period	Postoperative period (month)	p	Preoperative period	Postoperative period (month)	p
DASH, mean \pm SD	52.53 \pm 23	26 \pm 14.89	0.0008	39 \pm 15.15	18.4 \pm 10.2	0.0002
VAS, mean \pm SD	7.73 \pm 2.05	0.4 \pm 0.13	<0.0001	7.53 \pm 2.26	0.5 \pm 0.51	<0.0001

SD = standard deviation, DASH = Disabilities of the Arm, Shoulder and Hand questionnaire, VAS = visual analog scale.

Regarding the relationship between the two groups, the functional outcomes of postoperative pain and degree of satisfaction did not show statistically significant differences (Table 3). No infectious complications were detected. One patient in group 1 operated on both sides suffered from mild hypotension in the immediate postoperative period and recovered within the hour following the procedure.

Table 3. Postoperative functional outcomes, satisfaction and pain

	Local	WALANT	p
DASH, mean \pm SD	26 \pm 14.89	18.4 \pm 10.2	0.11
VAS, mean \pm SD	0.4 \pm 0.13	0.5 \pm 0.51	0.5
Satisfaction, mean \pm SD	9.4 \pm 0.63	9.66 \pm 0.61	0.39

SD = standard deviation, DASH = Disabilities of the Arm, Shoulder and Hand questionnaire, VAS = visual analog scale.

DISCUSSION

The main objective of this study was to compare the postoperative outcomes of two groups of patients undergoing a CTD with or without a tourniquet.

WALANT surgeries have undergone great development in recent years, despite the fact that lidocaine infiltration with epinephrine has been performed for a long time.

In selected patients, avoiding sedation can be very beneficial from several aspects, including costs and the possibility for the patient to participate actively, thus stimulating the doctor-patient relationship. Therefore, CTD with local anesthesia is a good therapeutic option.

Regarding the use of local anesthesia with a tourniquet compared to WALANT, some publications demonstrate the advantages of the latter. In a prospective randomized study of CTD and trigger finger surgeries, Saleh et al.¹³ reported better outcomes in terms of intraoperative patient comfort when a tourniquet was not used. In a systematic review, Olaiya et al.¹⁴ reported similar results and concluded that patients operated on with WALANT had less perioperative discomfort because the tourniquet was not used. However, overall satisfaction was similar in both groups.

Gunasagaran et al.¹⁵ reported that intraoperative comfort was better in patients operated without a tourniquet. Although that study included carpal tunnels, trigger fingers, and ganglion cysts, the surgery lasted 16 min in the tourniquet group and 17 min in the WALANT group. To our knowledge, these times are at the limit of tolerance to the tourniquet and, therefore, it is logical that, in their publication, they reported more intolerance and more surgical discomfort in patients operated on with local anesthesia and a tourniquet. The authors did not clarify what level of experience the surgeons had, but we consider this aspect essential to reduce surgical times and increase tolerance to the tourniquet.

Some studies have been published on tourniquet tolerance time and, according to these investigations, surgeries lasting >17 min are associated with pain and tourniquet intolerance.¹⁶ In our series, immediate satisfaction with the procedure was high and similar in both groups (9.4 and 9.6, respectively) and when tolerance to the tourniquet was specifically evaluated, we obtained a low pain score, with an average of 2/10. Therefore, patients tolerate the tourniquet well as long as the procedure does not take too long.

The fact that the latency time of epinephrine (up to 30 m) is not needed to achieve the necessary vasoconstriction and that surgery can start more quickly by placing the tourniquet, can also contribute to speeding up surgical times.

Although the rate of complications with the use of epinephrine is low, some cases of digital ischemia have been published after the injection of this substance.

Zhang et al.¹⁷ reported a case of gangrene at the tips of the fingers (which were amputated) after the release of three trigger fingers. Zhu et al.¹⁸ reported on a patient with CTD and trigger finger who developed prolonged ischemia that could be controlled by administering phentolamine at 2 pm to reverse the vasoconstrictive effect. Sometime later, it was discovered that the patient had an intolerance to cold. Therefore, WALANT should be avoided in patients with any vascular insufficiency.

Despite these possible complications, we consider that WALANT is extremely useful in some procedures, such as tendon repair or tendon transfers, where a longer surgical time is needed, and it offers us the benefits of evaluating the intraoperative range of motion.¹⁶

Our study has certain advantages: it has two groups with similar demographic characteristics, the preoperative evaluations were carried out by an author not involved in follow-up, and despite the low number of patients, all completed the evaluation, with no loss to follow-up. However, it also has certain limitations, such as not having a large group of patients and that all postoperative evaluations were performed by the intervening surgeon.

In our study, CTD with local anesthesia and a tourniquet, and with WALANT, produced similar outcomes. For experienced surgeons, local anesthesia with a tourniquet may be sufficient to perform the procedure, thus avoiding the few but complex complications of epinephrine. For surgeons with less experience and longer surgical time, the use of epinephrine without the tourniquet may improve intraoperative patient comfort.

Conflict of interest: The authors declare no conflicts of interest.

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