WALANT – EFFICIENT AND SAFE TECHNIQUE - KEY TREATMENT IN COVID-19 PANDEMIC

Madalina-Cristina Fotea[1], Stefana Luca[1,2], Dorin Alexandru Sumanaru[1], Oxana Madalina Grosu[1,2], Andra Bulgaru Iliescu[1], Alexandru Filip[2,3], Mihaela Poroch[2], Vladimir Poroch[2,4], Roxana Maria Pinzaru[2,3], Claudiu Carp[2,3], Mihaela Mitrea[2,5]

[1]Department of Plastic Surgery and Reconstructive Microsurgery, "Sf. Spiridon" Emergency County Hospital, Iasi, Romania
[2]"Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania
[3]Department of Orthopaedics and Traumatology, "Sf. Spiridon" Emergency County Hospital, Iasi, Romania
[4]Department of Palleative Care, Regional Institute of Oncology, Iasi, Romania
[5] Department of Morphological Science I, "Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania

Corresponding author: Stefana Luca *e-mail:*stefana.luca08@gmail.com

ABSTRACT

Aim of the study The aim of the study was to confirm the effectiveness and safety of wide awake local anesthesia no tourniquet (WALANT) technique in hand surgery, as well as its necessity and importance during the COVID-19 pandemics. Material and methods A retrospective study was performed between March 2020 and September 2021 to evaluate advantages of WALANT, taking into consideration the rules imposed by the pandemic context. This study included 360 patients, treated for acute and chronic hand diseases. A statistical investigation was performed using SPSS 20.0 version software and applying the ANOVA regression, evaluating demographic, anatomical and surgical variables. Results: 234 males and 126 females, treated for acute hand trauma (metacarpal and phalanx fractures, tendon and nerves lesions) and chronic hand diseases such as carpal tunnel syndrome (CTS) dupuytren's disease (DD), trigger finger (TF), soft tissue and bone tumors. The average patient waiting time from admission in the operating room was 13.95 minutes, while the mean time of onset of local anesthesia was 12.15 minutes. No complications such as distal digital bleeding, hematoma, the necessity of using the antidote, or necrosis occurred, the outcomes were very good and the patient satisfaction high. Conclusions: The WALANT technique can be considered the "gold standard" in hand surgery anesthesia during the COVID-19 pandemic, ensuring a correct and safe surgical treatment in the restrictive conditions imposed by the epidemiological context.

Key words: WALANT, HAND SURGERY, COVID19, LOCAL ANESTHESIA

INTRODUCTION

During the COVID-19 pandemic, the need to improve hospital efficiency and reduce hospitalization time and costs lead to the implementation of minimally invasive surgical techniques. Thus, an increasing number of hand surgical interventions have been performed using the WALANT technique. Lalonde was the first to introduce this technique of local anesthesia with 1% lidocaine and 1:100,000 epinephrine in order to avoid the use of the tourniquet and patient sedation and, at the same time to ensure the comfort of both the patient and the surgeon [1,2].

From the onset of the COVID-19 pandemic, the restrictive pandemic practices made patient admission and surgical treatment more challenging, as the length of hospitalization and the number of staff with whom the patient came in contact needed to be reduced. Surgical specialities were instructed to postpone all elective surgeries and to reallocate staff to the intensive care

units and COVID-19 wards as necessary in order to provide hospital capacity, protective equipment, and ventilators for an anticipated increase in the number of COVID-19 patients. The restructuring of the healthcare system had a significant impact on non-urgent surgical volumes, surgical wait times, medical training (i.e., less case engagement), and patient outcomes (e.g. increases in pain) [3,4].

WALANT has proven to be a key treatment in the COVID epidemiological context, as it decreases the length of hospitalization, costs and required medical personnel, thus favoring the appropriate treatment of both emergencies and chronic pathologies. Furthermore, it provides a better intraoperative evaluation of active movements with immediate assessment of lesion correction, with better patient comfort and satisfaction [5].

Our study included a number of 360 patients who underwent hand surgery using the WALANT technique. We analyzed the technique's advantages, efficiency, applicability, and overall outcome in acute and chronic hand pathologies during the COVID-19 pandemic.

MATERIAL AND METHODS

We studied a group of 360 patients, who underwent surgical treatment with the WALANT anestetic technique for acute and chronic hand pathologies at Sf. Spiridon" Emergency County Hospital, Iasi, Romania, during the COVID-19 pandemic, between March 2020 and September 2021. All patients in the study signed the informed consent form. The study was approved by the Hospital Ethics Committee. Inclusion criteria in the study were: patients over 18 years old with Dupuytren disease (DD), carpal tunnel syndrome (CTS), trigger finger (TF), soft tissue tumors of the hand without skin involvement with diameter less than 5 cm (STT) and hand trauma with flexor or extensor tendons lesions (TL), digital collateral nerves lesions (NL) without concomitant vascular damage, metacarpals and phalanges fractures. Exclusion criteria included patients under 18 years old, patients with mangled hand injuries with vascular trauma of the hand with devasculatization, infections, and underlying vascular disease. Each of these patients underwent day surgery under local anesthetic consisting of 1% lidocaine and 1:100,000 epinephrine. The buffering solution of 8.4% sodium bicarbonate was never utilized. The maximum dose used was 7 mg/kg. To inject the anesthetic, a thin (27 G) needle was inserted perpendicular to the skin fold formed between the surgeon's thumb and index finger. Initially, 0.3-0.5 mL were injected just below the dermis. After the patient no longer complained of pain, the remaining anesthetic was injected by advancing the needle more deeply (about 1 cm). The amount of anesthetic solution used did not exceed 20 mL for CTS and 15 mL for each digital ray affected by DD. In TF cases, no more than 1 mL of anesthetic solution was injected. The onset of anesthesia took 6 to 15 min. In all cases, the protective equipment was used in accordance with the specific rules recommended during the COVID-19 pandemic and the rules of asepsis and antisepsis.

We conducted an objective analysis of the preoperative, intraoperative, and postoperative period characteristics: (number of required medical personnel, hospitalization time and costs), subjective analysis of the efficacy of surgery, and patient pain levels using the Visual Analogue Scale (VAS) score, and description of the adverse effect presented were performed.

The statistical analysis included demographic, anatomical and surgical variables. The ANOVA regression was applied, establishing a 95% CI and significance F of 95%. Pearson's r was calculated, its positive values showing a

direct correlation between the two variables and the negative values exemplifying an inverse, indirect correlation. The further away the coefficient r is from zero, the stronger the correlation, directly or indirectly. A p-value <0.05 was considered statistically significant.

RESULTS AND DISCUSSIONS

Of the 360 study patients (tab. I), 234 males and 126 females, 172 (47.78%) lived in the urban area, 124 (34.44%) recorded acute injuries, and the remaining 48 (13.33%) patients had chronic conditions; 188 (52.22%) lived in rural areas, 156 (43.33%) documented acute injuries, and 72 (20%) had chronic diseases.

Data of the patients with chronic diagnosis (fig. 1) showed the following: DD - 40 patients, 38 male and 2 female, CTS - 24 patients, 2 male and 22 female, TF - 6 cases, all female, and 10 cases of soft tissue tumors (fig. 4) (4 case of glomus tumor of the nail bed and 6 cases of lipomas of the hand, of which 6 male and 4 female patients. In this group, the right hand was affected in 36 cases and the left hand in 44 cases. The group of patients presenting acute injury (fig. 2) had trauma of different etiologies which resulted in lesions of flexor tendons in 30 cases (22 male and 8 female patients), trauma of the extensor apparatus in 56 cases (38 men and 18 women), nerve lesions (ulnar or median nerves without vascular damage, or digital collateral nerves) in 30 cases (20 male and 10 female), 68 metacarpal fractures (46 male and 22 female patients) and 96 phalangeal fractures (62 male and 34 female patients). In the group with acute hand injury, the right hand was affected in 126 cases and the left hand in 154 cases.

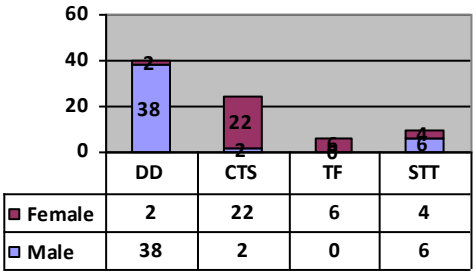

Figure 1. Distribution of cases by diagnosis (chronic diseases)

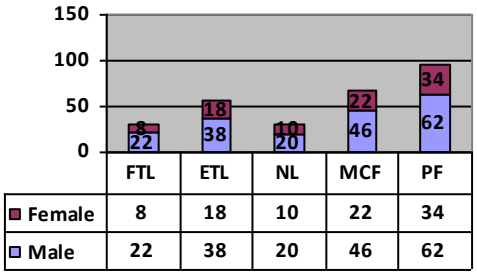

Figure 2. Distribution of cases by diagnosis (acute injury)

Demographical data.

Gender distribution (234 males and 126 females) showed a predominance of male patients (64.44%), with an M:F ratio of 1.81. The distribution by area of residence showed a predominance of urban patients (65.00%), with a U:R ratio of 1.80. The age histogram showed that the most affected age groups were 31-40 years and 41-50 years (fig. 3). 71.66% of patients admitted to the use of alcohol and 47.5% to the use of tobacco.

Clinical data.

The study group counted 80 (22.22%) patients with chronic pathologies and 280 (77.78%) with acute injuries. The distribution by type of diagnosis revealed that phalanx fractures were the most common diagnosis (96 cases - 26.67% of total cases), followed by metacarpal fractures (68 cases - 18.89%) among acute injuries and DD was the most common diagnosis (40 cases -11.11%) among chronic pathologies.

Table I. Descriptive statistics of study group demographical and clinical characteristics.

	Total Cases	Gender		Community		Hand		Stimulants	
Chronic		Male	Female	Rural	Urban	Right	Left	Alcohol	Tobacco
DD	40	38	2	48	72	36	44	20	28
CTS	24	2	22					8	16
TF	6	0	6					2	4
STT	10	6	4					3	3
Acute									
FTL	30	22	8	156	124	126	154	24	19
ETL	56	38	18					39	18
NL	30	20	10					26	16
MCF	68	46	22					58	29
PF	96	62	34					78	38

M=male, F=female, DD=Dupuytren's disease, CTS=carpal tunnel syndrome, TF=trigger finger, STT=soft tissue tumors, FTL=flexor tendon lesions, ETL=extensor tendon lesions, NL=nerve lesions (digital collateral, median and ulnar), PF=phalangeal fractures, MCF=metacarpal fractures

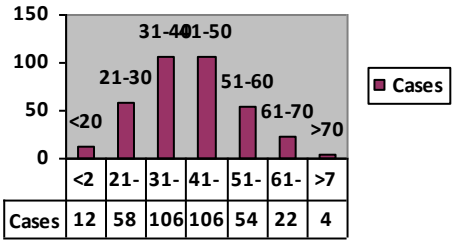

Figure 3. Age histogram

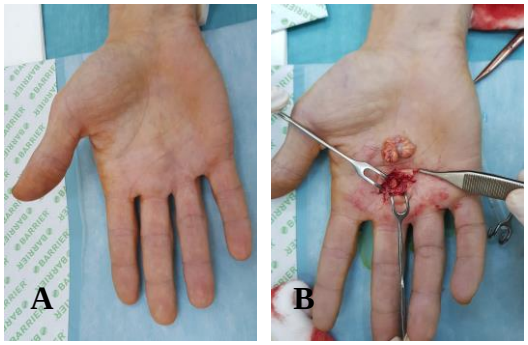

Figure 4. Palmar tumor A. Preoperative aspect, B. Intraoperative aspect

Mean onset time of anesthesia was 12.15 minutes, faster in patients with flexor pollicis longus (FPL) tendon rupture (10.67 minutes) and longer in those with DD (13.19 min), but with statistically insignificant differences ($p > 0.05$). Mean waiting time was 13.95 min, the shortest in patients with FPL tendon rupture (10.00 minutes) and longest in those with dd (15.92 min). Mean waiting time was 13.95 min, the shortest in patients with FPL tendon rupture (10.00 minutes) and longest in those with DD (15.92 min). Most patients (91.1%) did not report local pain, but 7.22% of them described it as moderate and 1.67% as intense (tab. II).

Regardless of the underlying illness, all procedures were completed without any complications of bleeding, ischemia or necrosis.

There was minimal bleeding during the surgeries, therefore there was no need for a tourniquet. Intravenous sedation was not added to the anesthesia. Patients were comfortable and satisfied upon discharge. They were pleased with the technique's efficiency and effectiveness, the short waiting period, and the early discharge. This type of anesthesia allowed for short hospital stays ranging from a few hours to 24 hours (for those with cardiovascular disease or other comorbidities requiring longer postoperative follow-up). Most patients (59.17%) have been discharged after less than 8 hours (tab. II). Each studied patient had interaction with a maximum of 4-5 persons from the time they entered the hospital through surgery and discharge, with numbers affected by whether or not the surgical team included a surgical assistant. A different type of anesthesia would have required at least two members of the anesthesia team (an anesthesiologist and an assistant) to be added to the 4-5 individuals the patient interacted with, and their time in the operating room would have been at least 30

Table II. Surgical variables

DD=Dupuytren's disease, CTS=carpal tunnel syndrome, TF=trigger finger, STT=soft tissue tumors, TFPL=flexor pollicis longus (FPL) tendon

Variables	Value	Number	%
Length of hospital stay (hours)	<8	213	59,17
	12	17	4,72
	24-28	42	11,67
	36-48	76	21,11
	72-78	12	3,33
Anesthesia installing	<10 min	42	11,67
	10-14 min	216	60
	15-20 min	48	28,33
	Mean total group (max/min)	**12.15 (20/8)**	**n/a**
	Mean TF (max/min)	12.23 (15/8)	n/a
	Mean CTS (max/min)	11.54 (15/8)	n/a
	Mean DD (max/min)	13.19 (20/10)	n/a
Waiting time	<10 min	21	5,83
	10-14 min	153	42,5
	15-20 min	186	51,67
	Mean total group (max/min)	14.2 (20/5)	n/a
	Mean TF (max/min)	10.33 (18/7)	n/a
	Mean CTS (max/min)	13.41 (20/8)	n/a
	Mean DD (max/min)	15.82 (19/8)	n/a
	Mean TFLP (max/min)	10 (10/10)	n/a
Local pain	0	328	91,1
	1	26	7,22
	2	6	1,67

minutes longer necessary to conduct loco-regional anesthesia and a lengthier hospital stay is needed for patient monitoring following the surgery. Using WALANT, hospitalization time is reduced, there are fewer interactions between patients and medical staff, and hence a decreased risk of getting infected with SARS-CoV-2. Moreover, the patient's intraoperative comfort is increased by avoiding the pain caused by the tourniquet, while the surgical treatment is of the same quality, and costs are lower.

In 2013, Lalonde demonstrated the safety of the anesthetic solution of 1% lidocaine with 1:100,000 adrenaline, while also conducting studies on large groups throughout time. Lalonde reported a need for 25 minutes post-injection to achieve the vasoconstriction effect for optimal surgical field visualization [1,6]. In our study, the maximum anesthesia induction time was 15 minutes, with an average of 12.79 minutes. The injection technique is described in the literature and has been performed accordingly for our study [1].

Figure 5. Injection site for the WALANT technique A. for CTS, B. for DD

This technique, which we now know as WALANT, has gained a great interest in recent years, as it avoids the need of using sedatives and tourniquets, while being able to collaborate intraoperatively with the patient [7, 8].

The advantages of using the WALANT technique have been described and demonstrated over time by multiple studies performed on large groups of patients, WALANT being used for a multitude of pathologies in several surgical specialties, including tendon transfers (by allowing intraoperative collaboration with the patient in order to assess the length and positioning of the tendons), orthopedic surgeries (fractures of the distal extremity of the radius, clavicle fractures, malleolar fractures), providing a better intraoperative evaluation of active movements with immediate assessment of lesion correction, with better patient comfort and satisfaction [9-14]. Also, a primary source of adrenergic stimulation during minor oral surgery is the local anesthetic's epinephrine content, which is frequently employed in various dental procedures [15-19]. WALANT's simple approach (fig. 5) minimizes healthcare inequities, making it perfect in an ambulatory situation. Surgical treatment is available to patients who live distant from the hospital or in an area with low access to healthcare. Reduced patient expenses, fewer time missed at work, and shorter waiting times for surgical appointments are further advantages [20].

WALANT offers patients the chance to undergo surgical therapy during the COVID-19 pandemic without taking up crucial operating room time for emergency situations. Also, because it may be done outside of the central operating theater, it reduces exposure between patients, the medical staff and all the hospital context [21]. With the WALANT technique, patients with chronic diseases that require surgery during the COVID-19 pandemic can be promptly treated surgically. This is essential because postponing surgery for diseases like soft tissue and bone tumors of the hand, carpal tunnel syndrome, or dupuytren's disease may worsen the condition. These patients would be delayed in the present epidemiological situation as a result of altered hospitalization policies and reduced financial resources in the area [22, 23, 24].

CONCLUSIONS

WALANT proved to be safe, convenient and reliable, with no postoperative complications. The WALANT technique, apart from the fact that it is an efficient and useful anesthetic technique in hand surgery and not only, is the only way that during the pandemic emergency surgical interventions were carried out in compliance with the restrictive conditions imposed, and patients with chronic diseases could be operated on, avoiding their postponing and implicitly aggravating the disease. The WALANT technique can be considered the "gold standard" in hand surgery anesthesia during the COVID-19 pandemic, ensuring a correct and safe surgical treatment in the restrictive conditions imposed by the epidemiological context.

Acknowledgements

REFERENCES

1. Lalonde DH, Wong A. Dosage of local anesthesia in wide awake hand surgery. J Hand Surg Am 2013; 38: 2025-2028.
2. Pertea M, Grosu OM, Veliceasa B, Velenciuc N, Ciobanu P, Tudor R, Poroch V, Lunca S. Effectivenessand Safety of Wide Awake Local Anesthesia no Tourniquet (WALANT) Technique in Hand Surgery.Rev. Chim. 2019, 70, 3587–359
3. Hobday D, Welman T, O'Neill N, Pahal GS., A protocol for wide awake local anaesthetic no tourniquet (WALANT) hand surgery in the context of the coronavirus disease 2019 (COVID-19) pandemic. Surgeon. 2020 Dec;18(6):e67-e71.
4. Georgieva G, Srbov B, Nikolovska B, Tusheva S, Jovanovska K, Jovanoski T, Dzonov B, Gjorgova ST, Pejkova S. WALANT as an Optimal Approach in Hand Surgery during Pandemics. Prague Med Rep. 2022;123(2):88-94.
5. Hobday D, Welman T, O'Neill N, Pahal GS. A protocol for wide awake local anaesthetic no tourniquet (WALANT) hand surgery in the context of the coronavirus disease 2019 (COVID-19) pandemic. Surgeon. 2020 Dec;18(6):e67-e71.
6. Lalonde DH. Latest Advances in Wide Awake Hand Surgery. Hand Clin. 2019 Feb;35(1):1-6
7. Pertea M, Poroch V, Grosu OM, Lunca S. Study on Epinephrine Used in Local Anesthesia Controversy and certainty. Rev. Chim. 2018, 69, 169–171
8. Thakkar M, Bednarz B. Should WALANT surgery be included in the training curriculum? J Plast Reconstr Aesthet Surg. 2020 Aug;73(8):1575-1592.
9. Coroaba A, Chiriac AE, Sacarescu L, Pinteala T, Minea B, Ibanescu SA, Pertea M, Moraru A, Esanu I, Maier SS et al. New insights into human hair: SAXS, SEM, TEM and EDX for alopecia areata investigations. PeerJ 2020;8:e8376.
10. Sîrbu PD, Petreus T, Munteanu F, Pertea M, Lunca S, Poroch V, Botez P. Clinical Experience with a Macroporous Synthetic Bone Substituite (Eurocer) in the Treatment of the Patients with Bone Defects.In Proceedings of the International Conference on Advancements of Medicine and Health Care throughTechnology IFMBE Proceedings 2011, Cluj-Napoca, Romania, 29 August–2 September 2011; Volume36, pp. 358–368.
11. Veliceasa B, Filip A, Pertea M, Popescu D, Carp C and Alexa O. Omega plate for the treatment of acetabular fractures involving the quadrilater plate. Exp Ther Med 2021,22:1064
12. Alexa O, Pertea M, Malancea RI, Puha B,Veliceasa B. Our experience in the surgical treatment of acetabular fractures using "spring plate" technique. Rev. Med. Chir. Soc. Med. Nat. Iasi. 2019, 123, 275–281

13. Chiriac, O.M. Grosu, C. Terinte, M. Perţea. Calcific uremic arteriolopathy (calciphylaxis) calls into question the validity of guidelines of diagnosis and treatment. J Dermatol Treat, 31 (5) (2020), pp. 545-548
14. Hurjui LL, Gradinaru I, Dorus C, Tanase DM, Armencia A, Hurjui I, Tarniceriu CC, Mitrea M, Lozneanu L, Balcos C, Șerban IL. Oral Mucosa – Pathophysiological and Pharmacotherapeutic Aspects Romanian Journal of Oral Rehabilitation 13 (4) 2021, page 108-114.
15. Mitrea M, Niculescu S, Dmor A, Al Hage WE, Florea C, Saveanu IC, Balcos C, Forna NC (2021). Esthetic rehabilitation with implants-supported fixed dentures after periodontitis. Romanian Journal of Oral Rehabilitation. Volume 13, Issue 1, page 102-113, 2021.
16. Mitrea M, Walid EA, Saveanu CI, Hurjui LL, Niculescu S. Review of literature concern reconstruction of the mandible and the maxilla-past, present and future. Romanian Journal of Oral Rehabilitation. Volume 12, Issue 3, Page 115-123, 2020.
17. Mitrea M, Rusu C, Gradinaru I, Armencia AO, Niculescu S, Tarniceriu CC, Hurjui LL, Jipu R, Walid EA, Ion H. Case report and literature review regarding reconstruction of fracture mandible with implants. Romanian Journal of Oral Rehabilitation. Volume 12, Issue 2, Page 220-228, 2020.
18. Mitrea M, Dmour A, Crauciuc DV, Niculescu S, Cobzaru RG, Hurjui LL. A Five Years Prospective Study of Dentigerous Cyst. Revista de chimie. Volume 69, Issue 11, Page 3064-3067, 2018.
19. Serban VP, Mitrea, M, Sindilar A, Crauciuc DV, Niculescu S, Lupusoru RV, Hurjui LL. Volume Analysis a Novel Tool to Determine Mandibular Cyst Dimensions Using CBCT Technique. Revista de chimie. Volume 69, Issue 8, Page 2054-2060, 2018.
20. Fish MJ, Bamberger HB. Wide-awake Local Anesthesia No Tourniquet (WALANT) Hand Surgery. 2022 Apr 21. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–. PMID: 34033408.
21. Neto PJP, Moreira LA, Las Casas PP. Is it safe to use local anesthesia with adrenaline in hand surgery? WALANT technique. Rev Bras Ortop 2017; 52: 383-389.
22. Far-Riera AM, Pérez-Uribarri C, Sánchez Jiménez M, Esteras Serrano MJ, Rapariz González JM, Ruiz Hernández IM. Prospective study on the application of a WALANT circuit for surgery of tunnel carpal syndrome and trigger finger. Rev Esp Cir Ortop Traumatol (Engl Ed). 2019 Nov-Dec;63(6):400-407.
23. Tan E, Bamberger HB, Saucedo J. Incorporating Office-Based Surgery Into Your Practice With WALANT. J Hand Surg Am. 2020 Oct;45(10):977-981.
24. Alves RS, Consoni DAP, Fernandes PHO, et al. Benefits of the walant technique against the covid-19 pandemic. Acta Ortop Bras. 2021;29(5):274-276.