



2023

Section: Plastic surgery

Safety and Efficiency of Wide-Awake Local Anaesthetic No Tourniquet (WALANT) in Hand Surgery

Mubarak Hemdan Thabet

Department of Plastic and Reconstructive Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt,
drmubarak92@gmail.com

Samy Abd Elsattar Eleowa

Department of Plastic and Reconstructive Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Kallad Mohamed Abd Elfattah Sholkamy

Department of Plastic and Reconstructive Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Follow this and additional works at: <https://aimj.researchcommons.org/journal>



Part of the [Medical Sciences Commons](#), [Obstetrics and Gynecology Commons](#), and the [Surgery Commons](#)

How to Cite This Article

Thabet, Mubarak Hemdan; Eleowa, Samy Abd Elsattar; and Sholkamy, Kallad Mohamed Abd Elfattah (2023) "Safety and Efficiency of Wide-Awake Local Anaesthetic No Tourniquet (WALANT) in Hand Surgery," *Al-Azhar International Medical Journal*: Vol. 4: Iss. 5, Article 18.

DOI: <https://doi.org/10.58675/2682-339X.1822>

This Original Article is brought to you for free and open access by Al-Azhar International Medical Journal. It has been accepted for inclusion in Al-Azhar International Medical Journal by an authorized editor of Al-Azhar International Medical Journal. For more information, please contact dryasserhelmy@gmail.com.

ORIGINAL ARTICLE

Safety and Efficiency of Wide-awake Local Anaesthetic No Tourniquet (WALANT) in Hand Surgery

Mubarak Hemdan Thabet*, Samy Abd Elsattar Eleowa,
Kallad Mohamed Abd Elfattah Sholkamy

Department of Plastic and Reconstructive Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Abstract

Background: Hand surgery under general or local anaesthesia with a tourniquet application has been changed in recent years. Wide-Awake Local Anaesthetic No Tourniquet (WALANT) involves the patient wide awake, local anaesthetic, often combined with epinephrine, and without tourniquet utilisation.

Aim of the work: Investigate the safety and efficiency of wide-awake local anaesthesia with no tourniquet in hand surgery.

Patient and methods: This study was a prospective observational study that has been conducted at the plastic surgery department, El-Hussin Hospital, Al Azhar University from April 2021 to September 2022. Thirty patients are included in this study (24 male and 6 female) by using WALANT mixture (1 ml epinephrine, 50 ml lidocaine 2%, 50 ml normal saline and 10 ml 8.4% sodium bicarbonate). Intraoperative assessment of pain by using visual analogue scale (VAS) and monitoring of vital signs, assessment of epinephrine efficiency by number of blood soaked gauzes, assessment of duration lidocaine effect, assessment of any signs or symptoms of toxicity of epinephrine and lidocaine.

Results: There were not any symptoms or signs of lidocaine toxicity or local digital ischemia to all patients. Objective assessment of pain through vital signs was at normal range furthermore, VAS score was ranged between 0 and 1 with mean 0.13 ± 0.346 . number of blood-soaked gauzes was ranged between 2 and 5 gauzes; the duration of the lidocaine effect ranged from 3 to 6 h.

Conclusion: WALANT technique was safe and efficient for patients. It is another tool in hand surgeries for a bloodless surgical field.

Keywords: Epinephrine, Hand surgery, WALANT

1. Introduction

Hand surgical procedures are ordinary techniques in our practice. The bloodless surgical field is vital to the health care provider to perform a hit surgical procedure. Traditionally, the tourniquet is a tool that is used to decrease blood loss and reap a bloodless surgical discipline in hand surgeries below distinct modalities of anaesthetic techniques. Gunasagaran J. et al.¹ pointed out that the tourniquet changed into the primary motive of intraoperative ache when he finished the visible

Analogue Scale (VAS) on operated sufferers with a tourniquet or without tourniquet, the VAS score became twice as excessive in patients with a tourniquet.¹

Fading away the epinephrine danger inside the finger idea has authorized us to use epinephrine as a haemostatic with lidocaine as a cultured in hand surgery, consequently, we are able to use such a combination to perform tendon repairs on wide wakeful cozy sufferers and not using a tourniquet.²

Hand surgery below popular or local anaesthesia with a tourniquet application has been changed in

Accepted 21 November 2022.
Available online 30 December 2023

* Corresponding author. Department of Plastic and Reconstructive Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.
E-mail address: drmmubarak92@gmail.com (M.H. Thabet).

<https://doi.org/10.58675/2682-339X.1822>

2682-339X/© 2023 The author. Published by Al-Azhar University, Faculty of Medicine. This is an open access article under the CC BY-SA 4.0 license (<https://creativecommons.org/licenses/by-sa/4.0/>).

latest years. Tang J.B.³ declared that ‘Tendon surgery is precise’ as it needs to ensure tendon gliding after surgical treatment. Under nearby anaesthesia blended with epinephrine, we can do tendon surgical procedures without a tourniquet. Therefore, such extensive-awake neighbourhood anaesthesia with no tourniquet (WALANT) surgical procedure is beneficial for reaching commentary intraoperatively of active motion which enables surgeons to attain the fine tendon tour and stumble on tendon repair gapping or any gliding difficulties and correct them before skin closure accordingly reducing the occurrence of headaches occurring with the conventional methods.³

Wide-Awake Local Anaesthetic No Tourniquet (WALANT) involves the patient wide awake, local anaesthetic, often combined with adrenaline, and without tourniquet utilisation.⁴

This work aimed to investigate the safety and efficiency of wide-awake local anaesthesia with no tourniquet in hand surgery.

2. Patients and methods

2.1. Patients

This study was a prospective observational study that has been conducted at the plastic surgery department, Al-Hussein university hospital, Al Azhar University from April 2021 to September 2022. Thirty patients had various hand surgeries were included in this study (22 male and 8 female) by using WALANT mixture (1 ml epinephrine, 50 ml lidocaine 2%, 50 ml normal saline and 10 ml 8.4% sodium bicarbonate).

2.2. Inclusion criteria

Co-operative patients and fit for surgery, aged from more than 16 years old till less than 60 years old.

2.3. Exclusion criteria

Uncooperative patients, age group less than 16 years old or more than 60 years old. Patients with low-flow finger perfusion states, or with connective tissue disease, suspicious malignancy, or hand infection.

2.4. Methods

2.4.1. Preoperative patient assessment

Thirty patients were seen at the emergency room and outpatient clinic and thorough physical

examination and history taking were conducted. All patients were fully conscious alert oriented to time, place, and person; they were vitally stable; they were cooperative with average intelligence. Local examination of all patients revealed intact distal vascularity with average capillary refill time (2–6 s). All patients’ wounds were closed primarily with no need for skin reconstruction. All patients had pre-operative routine laboratory assessment. (CBC, blood sugar, LFTs, KFTs, coagulation profile).

2.4.2. Demographic data of patients

Table 1 Demographic data of all patients. Age was ranged between 16 and 58 years with mean value 32.93 ± 10.349 years. Male cases were 22 (73.3%) while female cases were 8 (62.0%). Occupation shows that 6 (20.0%) were Housewife, 6 (20.0%) were Student, 8 (26.7%) were Driver, 8 (26.7%) were worker and 2 (6.7%) were tailor. Educational level show that 6 (20.0%) had high educational level, 12 (40.0%) had intermediate educational level and 12 (40.0%) had low educational level. Risk factors show that 18 (60.0%) were smoker and 5 (16.3%) were addicted. The majority had the right hand is the dominant hand (**Fig. 1**).

2.4.3. Operative strategy

After photographic documentation and preoperative markings (**Fig. 2**), WALANT mixture was infiltrated slowly in a tumescent manner in the subcutaneous tissue of the planned incision area using 27-gauge syringe to diminish the pain

Table 1. Demographic data of all patients.

	Number (percent)
Age (years)	
Range	16–58
Mean \pm S.D.	32.93 ± 10.349
Gender	
Male	22 (73.3)
Female	8 (26.7)
Occupation	
Housewife	6 (20.0)
Student	6 (20.0)
Driver	8 (26.7)
Worker	8 (26.7)
Tailor	2 (6.7)
Educational Level	
High	6 (20.0)
Intermediate	12 (40.0)
Low	12 (40.0)
Special habits	
Smoking	18 (60.0)
Addiction	5 (16.3)
Dominant Hand	
Right	28 (93.3)
Left	2 (6.7)

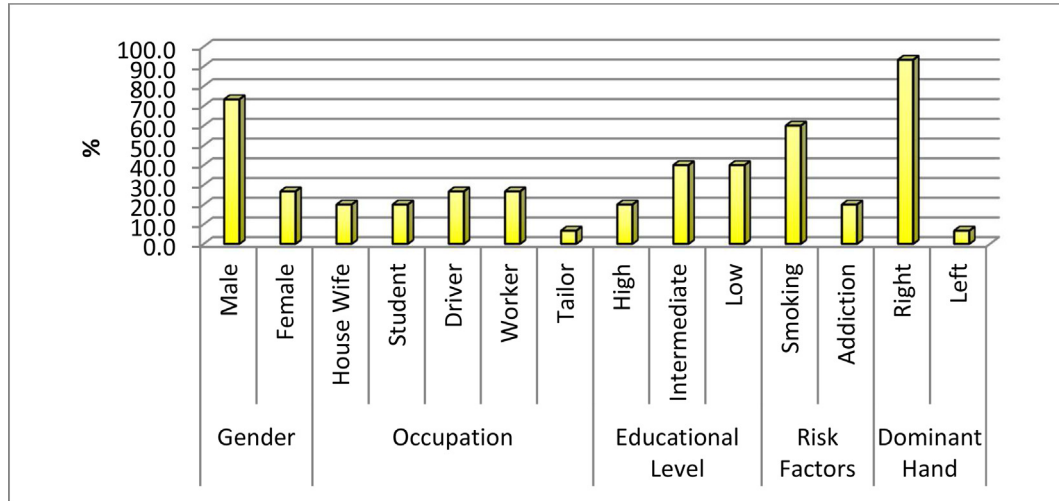


Fig. 1. Chart showing the distribution of patient according to demographic data.



Fig. 2. Preoperative documentation and marking of patient had carpal tunnel syndrome.



Fig. 3. Infiltration of WALANT mixture.

associated with local anaesthetic injections (Fig. 3). Surgical procedures were primary tendon repair, secondary tendon repair, excision of simple ganglion and inclusion cyst, release of carpal tunnel (Fig. 4) or trigger finger.

Intraoperative assessment of the amount of injected WALANT mixture and duration of operation. WALANT efficiency was assessed by objective pain assessment through monitoring of vital signs (heart rate and blood pressure), and subjective pain

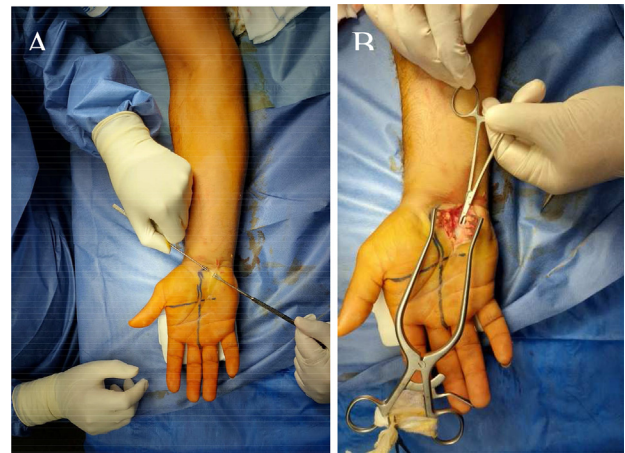


Fig. 4. Surgical release of carpal tunnel.

assessment by using Visual Analogue Scale (VAS) (Fig. 5) at the end of each procedure by allowing each patient to mark his or her pain felt after injection on a straight line where each end defines the extremes of pain (no pain at all to worst pain imaginable).⁵ Assessment of epinephrine effect by the number of blood soaked gauzes (Fig. 6). Assessment of duration of lidocaine effect. Intraoperative assessment of WALANT safety through observing any signs or symptoms of lidocaine toxicity or signs of local digital ischemia.

2.5. Statistical analysis of the data

The Statistical Program for Social Science (SPSS) version 15.0 was used to analyze the data. The mean \pm standard deviation (SD) was used to express quantitative data. Frequency and percentage were used to express qualitative data. The central value of

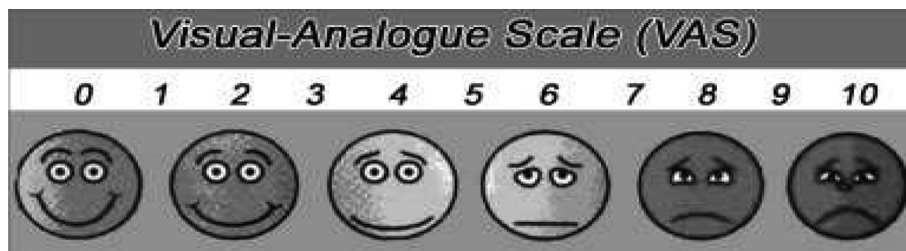


Fig. 5. The visual analogue scale used by patients to quantify their pain felt after injection on a straight line where each end defines the extremes of pain (no pain at all to worst pain imaginable).⁵



Fig. 6. Blood soaked gauzes.

a discrete set of numbers, namely the sum of values divided by the number of values, is called the Mean (average). The standard deviation (SD) is a measure of a set of values' dispersion. A low SD implies that the values are spread out over a wider range; whereas a high SD suggests that the values are close to the set's mean.

3. Results

Thirty patients with various hand surgeries were done by using WALANT technique and were followed for at least 6 h postoperatively. From findings demonstrated in (Table 2) it is noted that 3 (10%) patients diagnosed as carpal tunnel syndrome, 3 (10%) patients diagnosed as trigger finger, 5 (16.7%) patients had hand swelling like simple ganglion (3 patients), inclusion cyst (2 patients), 12 (40%) patients diagnosed as extensor tendon injury, 5 of them were at zone V, 3 were at zone VII and 4 were at zone VIII, 4 (13.4%) patients diagnosed as flexor tendon injury at zone II, 2 (6.6) patients had old tendon injury, and finally 1 (3.3%) patient had amputated distal phalanx. Type operations to the pervious patients were 16 (53.4%) primary tendon repair, 6 (20%) release of carpal tunnel or trigger finger, 5 (16.6%) swelling excision, 2 (6.6%)

secondary tendon repair and 1 (3.3%) completion of amputation. The amount of Injection was ranged between 10 and 20 ml with mean value 14.00 ± 4.235 ml. Duration of operation was ranged

Table 2. Operation data.

	Number (Percent)
Diagnosis	
Carpal tunnel	3 (10)
Trigger finger	3 (10)
Inclusion cyst	2 (6.7)
Simple ganglion	3 (10)
Extensor tendon injury zone V	5 (16.6)
Extensor tendon injury zone VII	3 (10)
Extensor tendon injury zone VIII	4 (13.4)
Flexor tendon injury zone II	4 (13.4)
Old cut of extensor tendon	1 (3.3)
Old cut of flexor tendon	1 (3.3)
Amputated distal phalanx	1 (3.3)
Operation Type	
1ry tendon repair	16 (53.4)
Release	6 (20)
Excision	5 (16.6)
2ry tendon repair	2 (6.7)
Completion of Amputation	1 (3.3)
Amount of Injection	
Range	10–20
Mean \pm S.D.	14.00 ± 4.235
Duration of operation	
Range	20–30
Mean \pm S.D.	26.67 ± 4.795

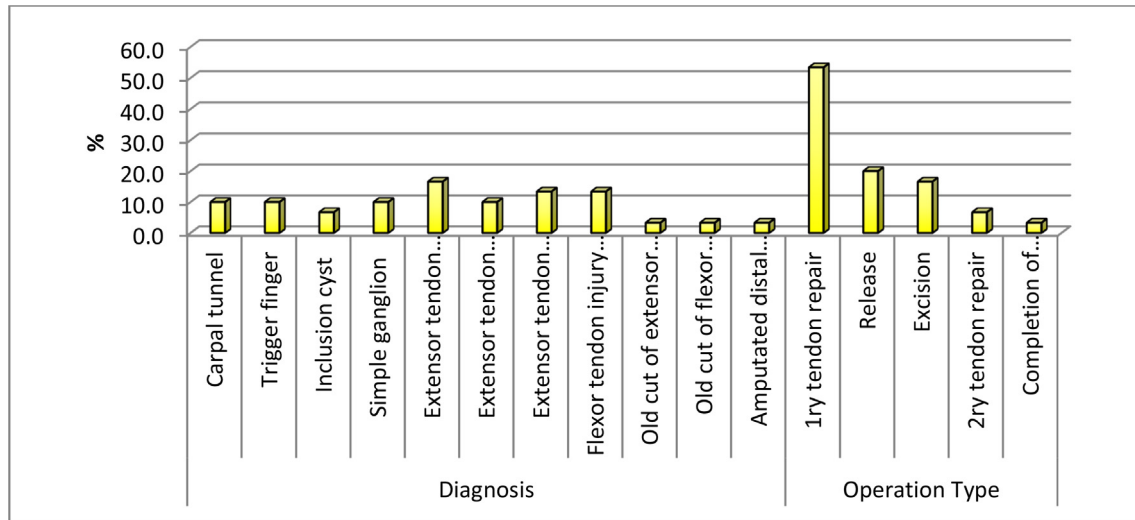


Fig. 7. Chart demonstrating the operation data of patients.

between 20 and 30 min with mean value 26.67 ± 4.795 min (Fig. 7).

From findings demonstrated in (Table 3) it is noted that objective assessment of pain through heart rate was ranged between 81 and 95 beat/min with mean value 88.53 ± 4.361 beat/min, while through blood pressure was ranged between 110 and 125 with mean value 118.60 ± 4.014 for systolic blood pressure and ranged between 75 and 87 with mean value 79.80 ± 3.347 for diastolic blood pressure. Subjective assessment of pain by using VAS scale was ranged between 0 and 1 with mean value 0.13 ± 0.346 . Epinephrine efficiency was assessed by amount of blood loss that was ranged between 2 and 5 gauzes with mean value 3.00 ± 0.983 gauze. Local anaesthesia efficiency was assessed by duration of local anaesthesia working that was ranged between 3 and 6 h with mean value 4.17 ± 0.634 h.

Safety of WALANT technique was done by observing local anaesthesia and epinephrine toxicity but from findings demonstrated in (Table 4) there

Table 3. Assessment of efficiency of WALANT.

	Min.–Max.	Mean \pm S.D.
Objective assessment of pain		
Heart Rate	81–95	88.53 ± 4.361
Blood pressure		
Systolic blood pressure	110–125	118.60 ± 4.014
Diastolic blood pressure	75–87	79.80 ± 3.347
Subjective assessment of pain		
VAS	0–1	0.13 ± 0.346
Epinephrine		
Amount of blood loss	2–5	3.00 ± 0.983
Local anaesthesia		
Duration of local anaesthesia	3–6	4.17 ± 0.634

Table 4. Assessment of safety of WALANT.

	Number (Percent)
Epinephrine	
Local digital ischemia	
No	30 (100)
Yes	0 (0)
Local anaesthesia	
Local anaesthesia toxicity	
No	30 (100)
Yes	0 (0)

were not any symptoms or signs of local anaesthesia toxicity or local digital ischemia to all patients.

4. Discussion

For many years, hand surgeries were done by using local and regional anaesthesia techniques or with general anaesthesia. There are many risks and complications associated with general and regional anaesthesia like allergic reactions and systemic toxic side effects, and they are contraindicated in some patients have comorbidities. Traditionally, regional and local anaesthesia techniques are commonly used for many surgical procedures of the hand and wrist with the application of tourniquet to provide good haemostasis in the surgical field.⁶

However, the tourniquet has many unfavourable outcomes with local anaesthesia: patients can experience entire paralysis within 7 min and tolerate cuff stress of 250 mmHg for about 20 min and extended tourniquet use may additionally motive nerve harm, mainly to neurological defects. And it has aspect outcomes that include muscle harm, nerve damage pores, skin damage, and post-tourniquet thrombosis and bleeding.⁷

A more recent technique presently being utilized by more and more hand surgeons is the WALANT technique. It's miles a combination of a nearby anaesthetic which includes lidocaine or bupivacaine and epinephrine to result in anaesthesia and haemostasis inside the surgical discipline.⁸

The current study was aimed to investigate the safety and efficiency of WALANT technique in different hand surgeries.

In this study, the locally injected epinephrine was highly effective and adequately sufficient to give good haemostasis in the surgical field during the whole procedure with no single case of epinephrine-related complications. Our finding was in accordance with Lalonde and Martin⁴ who demonstrated that the safety of epinephrine infiltration in WALANT technique.⁴

Also, Perteau et al.⁹ and Mann et al.¹⁰ stated that the use of epinephrine also increases the duration of the analgesic effect, which may delay or decrease the need for opiates in the postoperative period.^{9,10}

Epinephrine could be used to instead of tourniquet for haemostasis. Previously, there were a myth about epinephrine that it should not be injected into the fingers, as there were reported cases of finger necrosis. Epinephrine was thought to cause devastating complications when used for hand surgery. The acidity of procaine increased from un proper storage, and this was the cause of finger necrosis, not from using epinephrine.¹¹

Besides, the locally injected anaesthesia was highly effective and adequately sufficient as well to give co-operative nonsedated patients during the whole procedure with no single case of lidocaine-related complications nor need to another anaesthetic method. Our finding was in accordance with Perteau et al.,⁹ O'Neill et al.,¹² and Pires Neto et al.,¹³ they stated that the use of lidocaine in WALANT technique was safe and efficient in hand surgeries.^{9,12,13}

The current study clarifies that WALANT technique associated with minimal pain sensation with co-operative adult patients. Objective assessment of vital signs to all patients was at the normal range and subjective assessment using VAS scale was from 0 to 1 with Mean \pm S.D. 0.13 ± 0.346 . These observations were ongoing with Delgado et al.,¹⁴ MacNeilla and Mayich.¹⁵

The COVID-19 epidemic found that unnecessary publicity to sufferers ought to be prevented. That is provided by means of WALANT by using heading off both the working room and overnight remains within the hospitals. There are no intubation exposure dangers, and less team of workers participants are needed to facilitate room turnover.¹⁶

Patients ought to get to talk to their general practitioner throughout the surgery for post-operative recommendations on the way to look after the hand to get higher outcomes and fewer headaches. Time spent on intraoperative patient training also can lower the time spent inside the workplace on affected person schooling. Additionally, the affected person may want to see repaired structures working at some stage in the surgical operation after lack of function which includes tendon damage. This visible memory enables encourages the affected person to input up-operative remedy and restoration. Patients with sore elbows, shoulders, or backs can position themselves effectively for the hand as there's no tourniquet or anaesthesiology system in the manner.¹⁷

Surgeons can regulate the repaired tendons by staring at energetic motion in cozy, cooperative patients earlier than pores and skin closure. That is lowering the difficulty rate like tendon rupture and tocolysis. No want to apply cautery for most instances because epinephrine haemostasis is superb. Cautery simplest opened as required, no longer as a habitual. This will increase efficiency and productivity and reduces expenses. This may reduce operative time and the cost of the cautery system, and in all likelihood even prevent postoperative hematoma.¹⁸

Despite of the great advantages of WALANT technique, it is absolutely contraindicated in unco-operative patients (more common with children), and relatively contraindicated in anxious patients or patients had needle phobia or preference for general anaesthesia. Also, Hypercoagulable patients or patients, which had peripheral vascular disease or lidocaine hypersensitivity, or liver diseases or ongoing infection are should not use WALANT with them.¹⁹

4.1. Conclusion

WALANT technique was very efficient to all patients as almost there were no pain sensation during the operation or postoperative, normal range of vital signs, minimal bleeding after proper haemostasis. WALANT technique was very safe to all patient with proper usage of epinephrine and local anaesthesia dosage as there were not any signs or symptoms of toxicity. It is another tool with surgeons to provide a bloodless surgical field.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article.

Sources of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

The authors declared that there were NO conflicts of Interest.

References

1. Gunasagaran J, Sean ES, Shivdas S, Amir S, Ahmad TS. Perceived comfort during minor hand surgeries with wide awake local anaesthesia no tourniquet (WALANT) versus local anaesthesia (LA)/tourniquet. *J Orthop Surg*. 2017;25:1–4. <https://doi.org/10.1177/2309499017739499>.
2. Fitzcharles-Bowe C, Denkler K, Lalonde D. Finger injection with high-dose (1:1,000) epinephrine: does it cause finger necrosis and should it be treated? *Hand (N Y)*. 2007;2:5–11. <https://doi.org/10.1007/s11552-006-9012-4>.
3. Tang JB. Wide-awake primary flexor tendon repair, tenolysis, and tendon transfer. *Clin Orthop Surg*. 2015;7:275–281. <https://doi.org/10.4055/cios.2015.7.3.275>.
4. Lalonde D, Martin A. Epinephrine in local anesthesia in finger and hand surgery: the case for wide-awake anesthesia. *J Am Acad Orthop Surg*. 2013;21:443–447. <https://doi.org/10.5435/JAAOS-21-08-443>.
5. Figueiredo RR, Azevedo AA, Oliveira Pde M. Correlation analysis of the visual-analogue scale and the Tinnitus Handicap Inventory in tinnitus patients. *Braz J Otorhinol*. 2009;75:76–79. [https://doi.org/10.1016/s1808-8694\(15\)30835-1](https://doi.org/10.1016/s1808-8694(15)30835-1).
6. Steiner MM, Calandrucchio JH. Use of wide-awake local anesthesia No tourniquet in hand and wrist surgery. *Orthop Clin N Am*. 2018;49:63–68. <https://doi.org/10.1016/j.ocl.2017.08.008>.
7. Lee JP. *ICU Quick Drug Guide*. Elsevier Health Sciences; Amsterdam, Netherlands: 2020.
8. Lalonde DH. Latest advances in wide awake hand surgery. *Hand Clin*. 2019;35:1–6. <https://doi.org/10.1016/j.hcl.2018.08.002>.
9. Perteau M, Grosu OM, Veliceasa B, et al. Effectiveness and safety of wide awake local anesthesia no tourniquet (WALANT) technique in hand surgery. *Rev Chem*. 2019;70:3587–3591. <https://doi.org/10.37358/RC.19.10.7602>.
10. Mann T, Hammert WC. Epinephrine and hand surgery. *J Hand Surg Am*. 2012;37:1254–1256. <https://doi.org/10.1016/j.jhsa.2011.11.022>. quiz 1257.
11. Lalonde D, Bell M, Benoit P, Sparkes G, Denkler K, Chang P. A multicenter prospective study of 3,110 consecutive cases of elective epinephrine use in the fingers and hand: the Dalhousie Project clinical phase. *J Hand Surg Am*. 2005;30:1061–1067. <https://doi.org/10.1016/j.jhsa.2005.05.006>.
12. Kurtzman JS, Etcheson JL, Koehler SM. Wide-awake local anesthesia with no tourniquet: an updated review. *Plast Reconstr Surg Glob Open*. 2021;9(3).
13. Pires Neto PJ, 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. <https://doi.org/10.1016/j.rboe.2017.05.006>.
14. Delgado DA, Lambert BS, Boutris N, et al. Validation of digital visual analog scale pain scoring with a traditional paper-based visual analog scale in adults. *J Am Acad Orthop Surg Glob Res Rev*. 2018;23:e088. <https://doi.org/10.5435/JAAOSGlobal-D-17-00088>.
15. MacNeill AL, Mayich DJ. A physiological assessment of patient pain during surgery with wide-awake local anesthesia. *J Orthop*. 2019;19:158–161. <https://doi.org/10.1016/j.jor.2019.11.046>.
16. 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;18:e67–e71. <https://doi.org/10.1016/j.surge.2020.06.015>.
17. Thompson Orfield NJ, Badger AE, Tegge AN, Davoodi M, Perez MA, Apel PJ. Modeled wide-awake, local-anesthetic, No-tourniquet surgical procedures do not impair driving fitness: an experimental on-road noninferiority study. *J Bone Joint Surg Am*. 2020;102:1616–1622. <https://doi.org/10.2106/JBJS.19.01281>.
18. Warrender WJ, Lucasti CJ, Ilyas AM. Wide-awake hand surgery: principles and techniques. *JBJS Rev*. 2018;6:e8. <https://doi.org/10.2106/JBJS.RVW.17.00142>.
19. Tahir M, Chaudhry EA, Zaffar Z, et al. Fixation of distal radius fractures using wide-awake local anaesthesia with no tourniquet (WALANT) technique: a randomized control trial of a cost-effective and resource-friendly procedure. *Bone Joint Res*. 2020;9:429–439. <https://doi.org/10.1302/2046-3758.97.BJR-2019-0315.R1>.