



## A radical innovative change in the practice of hand surgery using wide awake local anesthesia

Uri FARKASH, Orit BAIN, Paul SAGIV, Meir NYSKA

*From the Meir Hospital, Kfar-Saba, Israel*

**Wide-awake local anesthesia no tourniquet (WALANT) technique is characterized by using local anesthetic plus adrenaline administered into the operative field, enabling us to perform longer and complex hand procedures without the need of an anesthetist. We assessed the impact of integrating WALANT on the practice of hand surgery in our center. We retrospectively reviewed charts of all hand surgeries performed in the years 2011 and 2016. The number of trauma cases performed in the ambulatory OR increased from 56 cases in 2011 to 131 in 2016, and elective complex cases increased from 9 to 65. Number of elective procedures conducted in the main OR increased from 67 to 105, and trauma cases performed “off hours” decreased from 53 to 21. We conclude that WALANT enables us to better utilize our OR resources, to treat hand trauma patients on an outpatient basis, and to shorten the wait time for elective hand surgery.**

**Keywords :** wide-awake ; WALANT ; local anesthesia ; hand surgery ; operating rooms

### INTRODUCTION

Use of the tourniquet for hemostasis is common for most hand and finger surgeries conducted using local anesthesia. As most patients can tolerate cuff pressure of 250 mmHg for about 20 minutes (7), a tourniquet is considered an indispensable tool in hand surgery, especially for short-duration procedures. The wide-awake local anesthesia no tourniquet (WALANT)

technique was first introduced by Lalonde in 2007 (1) and is characterized by the following features: use of local anesthetic plus adrenaline administered into the operative field including digits ; use of larger volumes of local anesthetic to achieve a tumescent effect; avoidance of regional or general anesthesia, sedation, or the use of a tourniquet.

The advantages to this technique are that it eliminates the risks associated with general or regional anesthesia, and also reduces the discomfort associated with tourniquets. It is also possible to operate on patients who would have otherwise been denied surgery because of comorbidities. Finally, it is potentially possible to reduce costs by providing surgery as an outpatient procedure without the need for anesthetists, pre-assessment visits, and pre-operative investigations (2,10,14).

With WALANT, tourniquet time is no longer a determining factor in deciding whether a procedure

- 
- Uri Farkash<sup>1</sup>
  - Orit Bain<sup>2</sup>
  - Paul Sagiv<sup>2</sup>
  - Meir Nyska<sup>2</sup>

<sup>1</sup>Hand Surgery Unit, Department of Orthopedic Surgery, Assuta University Hospital, 7 Harefua Str, Ashdod 7747629, Israel, and Faculty of Health Sciences, Ben Gurion University of the Negev, Beer Sheva, Israel.

<sup>2</sup>Meir Medical Center, 59 Tchernichovski Str., Kfar-Saba 4428164, Israel.

Correspondence : Uri Farkash, 7 Harefua Str, Ashdod 7747629, Israel.

E-mail : urifarkash@gmail.com

© 2020, Acta Orthopaedica Belgica.

requires a local or general anesthetic. In addition, a non-sedated, comfortable patient is able to cooperate, allowing the surgeon to perform a real-time, dynamic assessment of hand function during the operation. This is particularly beneficial in surgery for fracture fixation, joint fusions, tendon repairs, tendon transfers, and tenolysis (8,11). Findings during the operation can be discussed with the unsedated, responsive, patient and post-operative instructions delivered and emphasized towards the end of the procedure.

The aim of this study was to assess the impact of integrating WALANT on the practice of hand surgery in our center. Our specific focus was on surgical room resource utilization. We hypothesize that WALANT will have the greatest impact on the treatment of hand trauma patients.

## PATIENTS AND METHODS

WALANT has been utilized in our department following a visit by Lalonde to our urban level II trauma center at the end of 2012. All hand surgeons in our department have gradually adopted this method of anesthesia. The option of WALANT is offered to all suitable hand surgery patients seen either in our clinic or presenting acutely. Patients deemed unsuitable were those with potential vascular compromise or those who had specifically declined any procedures under local anesthetic.

A retrospective chart review of all patients who underwent surgery in the main and/or ambulatory operating rooms (ORs) of the hospital by one of the hand surgery unit surgeons in the years 2011, and 2016, was conducted and all hand surgeries were included. Multiple procedures on a single patient on the same day (for example carpal tunnel and trigger finger release or repair of a flexor tendon and digital nerve) were counted only once, because in all cases these procedures were conducted under the same anesthesia. The study was approved by the institutional review board of our hospital.

Surgical cases were subdivided into “traditional” and “complex”. Carpal tunnel release, excisional biopsy of a ganglion, trigger finger release, De Quervain’s tenosynovitis release, or Kirschner wire removal were classified as “traditional hand

surgery” performed under local anesthesia; the other “complex” surgeries are those procedures frequently performed under general or regional anesthesia, and were subdivided into trauma cases (fixation of fractures, repair of tendons, nerves or ligaments of the hand) and elective cases (finger joint arthrolysis, tenolysis, neurolysis, elbow surgery for ulnar nerve entrapment or tendinopathy, fasciectomy of Dupuytren’s contracture, trapeziectomy for thumb carpometacarpal arthritis, and others).

In the data, surgeries were also subdivided according to the time, and day on which the procedure was performed. Hand surgeries performed during the scheduled time frame for the hand unit were considered “planned” surgeries, while surgeries performed outside this time frame, either in the morning or outside regular working hours, were considered “off-hour” surgeries.

## RESULTS

During the year 2011, hand surgeons in our department operated on 511 patients on 95 operating days on an outpatient basis in the ambulatory OR, with an average of 5.38 surgeries per day. Of these, 446 were “traditional” surgeries, and 65 were considered “complex”. Most “complex” surgeries were conducted for the treatment of extensor tendon lacerations (20 cases) or phalangeal fracture (20 cases). Surgeries for other trauma injuries (16 cases) and elective surgeries (9 cases) were rare (Figure 1).

During the year 2016, another operating day per week in the ambulatory OR was added; therefore the number of operating days was increased to 147. The number of patients treated was 637, and the average number of surgeries per day was 4.33. The number of “traditional” surgeries remained almost the same (441 patients). The number of trauma cases increased from 56 to 131, and the number of elective cases increased from 9 to 65 (Figure 1). Tables I and II list the types of trauma and elective surgeries performed under WALANT in the ambulatory OR during the study time period.

During the study period, the hand surgery unit had a scheduled weekly time frame in the major OR. In the year 2011, a total of 180 surgeries were performed in the major OR, 67 surgeries

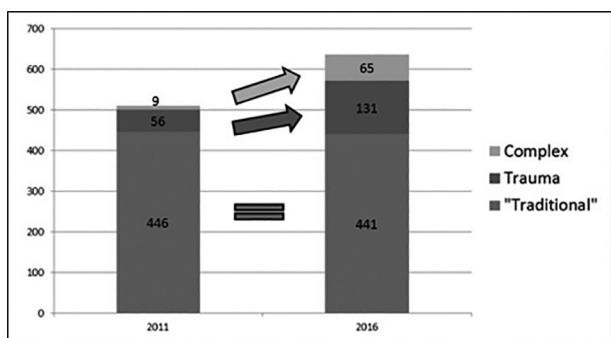


Figure 1. — Number of patients who underwent procedures in the ambulatory operating room during the years 2011 and 2016.

Table I. — Trauma hand surgeries with WALANT in the ambulatory OR

Year	2011	2016
Suture of flexor / nerve	9	53
Suture extensor	20	25
Fixation of phalangeal fracture	20	24
Fixation of carpal / metacarpal fracture	6	20
Repair of thumb collateral ligament	1	9

Table II. — Elective hand surgeries with WALANT in the ambulatory OR

Year	2011	2016
Arthrolysis / tenolysis	3	14
Neurolysis	2	13
Ulnar nerve release or transposition	-	15
Tennis / golf elbow	-	6
Trapeziectomy	-	3
Dupuytren's contracture	1	7
Other	3	7

were elective and 113 were for trauma; 53 of these surgeries were performed outside the scheduled time frame ("off-hour" surgeries) (Table III). In the year 2016, 161 surgeries were performed in the major OR, 105 surgeries were elective and only 56 were for trauma; 21 of these were performed "off-hour" (Table III). In the ambulatory OR, all surgeries were conducted during the scheduled time frame allocated to the hand unit.

Table III. — Hand surgeries in the main OR

Year	2011	2016
Total hand surgeries	180	161
Scheduled surgeries	127	140
Off-hour surgeries	53	21
Elective	67	105
Trauma	113	56

## DISCUSSION

Performing hand procedures using the wide awake technique has become increasingly popular worldwide, because it has many advantages to both patient and surgeon. From a patient perspective, there is typically no required preoperative anesthetist evaluation, less preoperative anxiety, decreased narcotic need, and avoidance of general anesthesia and its after effects (4). Benefits to the provider include active participation and assessment during the procedure along with decreased costs and increased efficiency compared with performing the same procedure in the operating room (8,12).

The introduction of the WALANT technique in our department has had a tremendous impact on our practice. Our hand surgery unit has several operating days in an ambulatory setting without an anesthetist, and only one OR per week using general anesthesia in the main OR. Traditionally, the ambulatory ORs were utilized only for short procedures such as carpal tunnel or trigger finger release or for distal finger trauma when a finger tourniquet can be used. Most hand trauma patients were admitted to the hospital and were required to wait (along with all other orthopedic trauma patients) for our weekly operating day or the availability of another OR. Now, we have more options available for scheduling procedures for hand trauma patients, and since these patients are usually mobile (not bedridden), they need not be admitted, and can have their surgery done on an outpatient basis. The number of trauma patients who underwent surgery in the ambulatory setting increased significantly, especially due to our ability to repair flexor tendons or nerve lacerations, and to repair fractures proximal to the metacarpophalangeal joints, under local anesthesia.

The type of elective surgeries in the ambulatory OR has also diversified. Longer and complex surgeries like neurolysis or fasciectomy, or procedures at the elbow level for tennis elbow or ulnar nerve release can be done safely, waiting time for the procedure has decreased, and pre-op evaluation has been minimized. Benefit is greatest for patients who need tenolysis or arthrolysis of stiff fingers; during their surgery they are able to cooperate and evaluate the active range of motion gained; this is crucial to their post-operative rehabilitation. The total number of "routine" procedures has not declined as a weekly operating day has been added. However the average number of procedures per operating day has decreased as a result of performing longer and more complex cases.

The effect of performing hand surgeries with WALANT has also had an impact on the major OR. The valuable weekly operating day in the major OR is utilized for complex elective cases that cannot be performed using local anesthesia, thereby decreasing the waiting period previously required for surgery. Fewer trauma surgeries are conducted "off-hours", thus freeing up OR time for other orthopedic trauma cases.

Patients respond very favorably to WALANT. Ruxasagulwong (16) showed that the WALANT technique offers increased comfort for patients while providing effective anesthesia and patient safety compared with the conventional technique. In a study by Teo et al (17) ninety-one percent of responders reported that the operation was less painful than, or comparable to, a dental procedure; 86% expressed the preference to be wide-awake if they needed to undergo hand surgery again, and 90% stated that they would recommend WALANT to a friend. After detailed explanations of treatment options, most of our patients agreed to have their procedure with local anesthesia; only rarely did patients insist on having surgery under general anesthesia. Even younger patients cooperated; the youngest child operated on using local anesthesia was a 9 year old girl who suffered a laceration of her tendons at the level of the wrist first dorsal compartment.

The advent of WALANT followed a reassessment of the safety consideration of local anesthesia

with adrenaline in digital surgery and also the introduction of clear guidelines to treat digital ischemia (3,5-6,9,13,15). Not only is adrenaline safe for use in treatment of the hand and digits, it allows for adequate hemostasis without the use of a tourniquet (18,19). Strict contraindications against the use of adrenaline in finger blocks stem from reports of digital gangrene; on closer examination however, most of these cases involved the use of cocaine or procaine with or without adrenaline (5). A large multicenter study showed that procedures performed under low-dose epinephrine are safe, demonstrating no instance of digital tissue loss or infarction (9). Recent case reports, however, describe ischemic adverse events associated with the use of lidocaine and epinephrine (20), and surgeons should be prepared to reverse vasoconstriction with phentolamine rescue if there is persistently inadequate perfusion of the fingertip. Since the implementation of the WALANT technique in our practice we saw only one case of digital ischemia during a fasciectomy procedure for severe Dupuytren's contracture, which resolved with mild finger flexion, indicating the ischemia was the result of stretching the digital vessels while straightening the fingers and not due to the adrenaline.

Performing hand surgery in an ambulatory setting reduces costs. Leblanc (12) performed a detailed analysis of salaries and materials involved in carpal tunnel release performed in the main OR versus the ambulatory setting in a Canadian hospital and showed that use of the main OR is almost four times as expensive. The main impact of WALANT in our practice has been transferring complex trauma and elective surgeries and not short procedures such as carpal tunnel release, from the main OR to the ambulatory setting. Although cost savings were probably achieved by shortening hospital stay and by providing an outpatient service without the need for anesthetists, it is beyond the scope of our study to evaluate this aspect. Patients belong to different HMOs which have different accounting agreements with the hospital, making the calculation of the financial impact of WALANT too complex.

In conclusion, the implementation of WALANT in our practice has had a tremendous effect. We are able to perform longer and complex procedures

in the ambulatory OR without the need of an anesthetist. This enables us to better utilize our resources, to treat trauma patients on an outpatient basis, and to shorten the wait time for elective surgery. In terms of the patient, our ability to provide safe surgery in a timely manner is the greatest benefit.

## REFERENCES

1. **Bezuhly M, Sparkes GL, Higgins A, Neumeister MW et al.** Immediate thumb extension following extensor indicis proprius-to-extensor pollicis longus tendon transfer using the wide-awake approach. *Plast Reconstr Surg.* 2007 ; 119 : 1507-1512.
2. **Bismil MSK, Bismil QMK, Harding D, Harris P, Lamyman E et al.** Transition to total one-stop wide-awake hand surgery service-audit: a retrospective review. *J RSM Short Rep.* 2012 ; 3 : 23.
3. **Chowdhry S, Seidenstricker L, Cooney DS, Hazani R, Wilhelmi BJ.** Do not use epinephrine in digital blocks: myth or truth? Part II. A retrospective review of 1111 cases. *Plast Reconstr Surg.* 2010 ; 126 : 2031-2034.
4. **Davison PG, Cobb T, Lalonde DH.** The patient's perspective on carpal tunnel surgery related to the type of anesthesia: a prospective cohort study. *Hand (N Y).* 2013 ; 8(1) : 47-53.
5. **Denkler K.** A comprehensive review of epinephrine in the finger: to do or not to do. *Plast Reconstr Surg.* 2001 ; 108 : 114-124.
6. **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 (NY).* 2007 ; 2 : 5-11.
7. **Green DP.** General principles. In: Wolfe SW, Hotchkiss RN, Pederson WC, Kozin SH, eds. *Green's Operative Hand Surgery.* 6th ed. Philadelphia: Elsevier Churchill Livingstone. 2011 : 3-24.
8. **Higgins A, Lalonde DH, Bell M, McKee D, Lalonde JF.** Avoiding flexor tendon repair rupture with intraoperative total active movement examination. *Plast Reconstr Surg.* 2010 ; 126 : 941-945.
9. **Lalonde D, Bell M, Benoit P, Sparkes G, Denkler K et al.** 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.
10. **Lalonde DH.** Reconstruction of the hand with wide-awake surgery. *Clin Plast Surg.* 2011 ; 38 : 761-769.
11. **Lalonde DH.** Wide-awake flexor tendon repair. *Plast Reconstr Surg.* 2009 ; 123 : 623-625.
12. **Leblanc MR, Lalonde J, Lalonde DH.** A detailed cost and efficiency analysis of performing carpal tunnel surgery in the main operating room versus the ambulatory setting in Canada. *Hand (N Y).* 2007 ; 2 : 173-178.
13. **Mustoe TA, Buck DW, Lalonde DH.** The safe management of anesthesia, sedation, and pain in plastic surgery. *Plast Reconstr Surg.* 2010 ; 126 : 165e-176e.
14. **Nelson R, Higgins A, Conrad J, Bell M, Lalonde D.** The Wide-Awake approach to Dupuytren's disease: Fasciectomy under local anesthetic with epinephrine. *Hand (NY).* 2010 ; 5 : 117-124.
15. **Nodwell T, Lalonde DH.** How long does it take phentolamine to reverse adrenaline-induced vasoconstriction in the finger and hand? A prospective randomized blinded study: The Dalhousie Project experimental phase. *Can J Plast Surg.* 2003 ; 11 : 187-190.
16. **Ruxasagulwong S, Kraissarin J, Sananpanich K.** Wide awake technique versus local anesthesia with tourniquet application for minor orthopedic hand surgery: a prospective clinical trial. *J Med Assoc Thai.* 2015 ; 98 : 106-110.
17. **Teo I, Lam W, Muthayya P, Steele K, Alexander S et al.** Patients' perspective of wide-awake hand surgery - 100 consecutive cases. *J Hand Surg Eur* 2013 ; 38 : 992-999.
18. **Thomson CJ, Lalonde DH.** Randomized double-blind comparison of duration of anesthesia among three commonly used agents in digital nerve block. *Plast Reconstr Surg.* 2006 ; 118 : 429-432.
19. **Thomson CJ, Lalonde DH, Denkler KA, Feicht AJ.** A critical look at the evidence for and against elective epinephrine use in the finger. *Plast Reconstr Surg.* 2007 ; 119 : 260-266.
20. **Zhang JX, Gray J, Lalonde DH, Carr N.** Digital Necrosis After Lidocaine and Epinephrine Injection in the Flexor Tendon Sheath Without Phentolamine Rescue. *J Hand Surg Am.* 2017 ; 42 : e119-e123.