

Wide-awake local anesthesia and no tourniquet (WALANT) in upper limb fractures

N. BANSAL¹, P. TIWARI², P. DEV³

¹Department of Orthopaedics, Government Medical College, Patiala, Punjab, India; ²Department of Orthopaedics, Maharishi Markandeshwar Medical College and Hospital, Solan, Himachal Pradesh, India; ³Department of Orthopaedics, Gian Sagar Medical College and Hospital, Patiala, Punjab, India.

Correspondence at: Punit Tiwari, Department of Orthopaedics, Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan, Himachal Pradesh, India, Phone: 9779911356, Email: punit_tiwari28@yahoo.com

Wide-awake local anesthesia and no tourniquet (WALANT), first used for hand surgery, has been sparingly described for use in fracture fixation of the upper limb. We present our experience using this technique. 26 patients with upper limb fractures (3 distal radius, 6 radial shaft, 11 ulnar shaft, and 6 olecranon fractures) were operated on using WALANT by three orthopedic surgeons. We used 35-40ml of 2% Lignocaine with 1:80000 Adrenaline(7mg/kg) diluted with normal saline. Numeric Pain Rating (NPR) scoring was done during injection and per-operatively, and the Likert scale was used for the surgeon's satisfaction. The average NPR score was reported as 0.65 (1-3) during injection and 0.15 (0-2) preoperatively. All three surgeons reported excellent satisfaction in all the cases operated on. No complication occurred due to anesthesia. WALANT is a much simpler option and can be safely used in place of general anesthesia or regional blocks for fixation of fractures of the upper limb, with added advantages of no need for a tourniquet and better intraoperative assessment of fracture fixation.

Keywords: walant, forearm, upper limb, trauma, orthopaedic, surgery.

INTRODUCTION

WALANT or wide-awake local anesthesia no tourniquet is a form of an extravascular block, without the painful tourniquet. A combination of local anesthetics like lignocaine and epinephrine is used to achieve anesthesia and hemostasis¹.

Both of these drugs have been used by dentists quite effectively without preoperative testing and no monitoring for many decades^{1,2}.

The technique is being used widely in hand surgeries for both bony and soft tissue procedures, and its efficacy and safety are well-established in the literature²⁻⁴. However, its use in fractures proximal to the wrist is not well recognized, and the literature is limited.

So, we decided to evaluate the use of this technique in treating fractures proximal to the wrist in the upper limb.

MATERIAL AND METHODS

The study was conducted from December 2020 to February 2021. 26 patients with upper limb fractures (3 distal radius, 6 radial shaft, 11 ulnar shaft, and 3 olecranon fractures) were included in the study.

Healthy adult patients with closed, simple, single bone fractures, time since injury <1 week, and without any other concomitant injuries were included in the study. Patients, aged < 18 years, with complex fracture patterns, more than one fractured bone, chronic injuries, and patients with peripheral vascular disease (to avoid the risk of ischemia) were excluded from the study. The study was approved by the institutional review committee and informed written consent was taken from all patients. The patients were operated on using WALANT by three orthopedic surgeons (one consultant and two senior residents). The patients were randomly assigned to three surgeons.

A preoperative shot of antibiotic (Cefuroxime 1.5gm) was given 1 hour before surgery.

We used 2% Lignocaine with 1:80000 Adrenaline (7mg/kg) diluted with normal saline. 35-40ml of the solution was injected. Approximately 10 ml was injected subcutaneously along the planned incision line with a 25 gauge needle. 8-10 ml was injected at three sites; the fracture site, proximal 1/3rd part of the proximal incision, and distal 1/3rd part of the distal incision, subperiosteally using a 25 gauge needle (Figure 1a, 1b, 1c, 1d).



Fig 1. — a: schematic diagram showing injection technique; b: injection sites for distal radius fractures; c: injection sites for olecranon fractures; d: injection sites for ulna fractures. e: intraoperative bloodless field in an ulnar shaft fracture after complete exposure; f: intraoperative bloodless field in an ulnar shaft fracture after plate fixation.

The drug was injected before sterile preparation and draping of the extremity, and this delay of 20 mins allowed the drugs to become effective.

The volar approach was used for distal radius and radial shaft fractures. The subcutaneous and posterior approach was used for ulna fracture and olecranon fracture, respectively. Plating was done for distal radius, radial shaft, and ulnar shaft fractures, and tension band wiring was done for olecranon fractures. Standard surgical technique was used for performing open reduction and internal fixation of the fractures.

The pain was evaluated at the time of injection and intraoperatively using the Numerical Pain Rating Score NPRS (1-10). The surgeon’s satisfaction was evaluated using the Likert scale (Table I). The technique was also evaluated for complications.

RESULTS

Of the 26 patients, 21 were male, and 5 were female. The average age of the patients was 30.2 years (Range 19 years-48 years, Interquartile Range (IQR) = 11, Median = 29). The mean surgical time was 37.9 mins (Range 28 mins to 57 mins, IQR = 10, Median = 37).

At the time of injection, the average NPRS reported was 0.65(7 patients reported NPRS of 1, 2 patients 2, 2 patients 3)

Table 1. — Surgeon satisfaction Likert scale

I. How did you find the quality of anesthesia achieved?				
Very Bad	Bad	Average	Good	Excellent
1	2	3	4	5
II. How did you find the quality of blood less surgical field?				
Very Bad	Bad	Average	Good	Excellent
1	2	3	4	5

The two patients who experienced NPRS of 3 at the time of injection also reported NPRS of 2 intraoperatively. Both were supplemented with 2-4 ml of the anesthetic solution at the pain site. All other patients reported an NPRS of 0 intraoperatively (Table II).

Most of the patients started to experience pain 3-4 hours postoperatively and were given nonsteroidal anti-inflammatory drugs (Ketorolac 30mg, IV, 8 hourly). All patients were discharged the next day.

All three surgeons reported excellent satisfaction in terms quality of anesthesia achieved with the technique and the blood-less operative field in all the cases.

We experienced no intraoperative or postoperative complications due to the anesthetic solution.

DISCUSSION

WALANT is being used quite commonly for fractures of the hand⁵⁻⁷. Fracture fixation under wide-awake surgery has proven to be safe for distal radius fracture⁸⁻¹¹. It has been sparingly used for other fractures of the upper limb.

Ahmad et al. evaluated the use of WALANT in fractures of the olecranon and clavicle and found the technique to be quite effective, without any complication^{12,13}.

In our series of patients, we also found the technique to be simple and effective in terms of anesthesia and bloodless operative field, as was evident from the surgeons’ reported excellent satisfaction (Figure 1e, 1f).

The pain experienced at the injection time was more during the initial few cases operated by each surgeon. It could also be due to the non-use of sodium bicarbonate which helps in neutralizing the acidic pH of lignocaine solution^{1,14}. Thus, we now advocate

Table II: Demographics and Results

Serial number	Age (Years)	Sex	Site of fracture	Operative time (Mins)	NPRS at the time of injection	NPRS Intraoperatively
1.	21	M	Olecranon	35	1	0
2.	19	M	Radial shaft	39	3	2
3.	24	M	Radial shaft	43	0	0
4.	26	M	Ulnar shaft	28	1	0
5.	35	M	Ulnar shaft	30	1	0
6.	33	M	Distal radius	44	1	0
7.	30	F	Olecranon	34	2	0
8.	27	F	Radial shaft	36	0	0
9.	22	M	Ulnar shaft	29	0	0
10.	33	F	Ulnar shaft	30	0	0
11.	41	M	Radial shaft	49	0	0
12.	28	M	Ulnar shaft	31	0	0
13.	42	M	Ulnar shaft	37	0	0
14.	36	M	Olecranon	39	2	0
15.	22	M	Radial shaft	40	0	0
16.	30	M	Ulnar shaft	42	0	0
17.	27	F	Olecranon	44	3	2
18.	43	M	Distal Radius	51	0	0
19.	31	M	Ulnar shaft	37	0	0
20.	48	M	Ulnar shaft	32	1	0
21.	23	M	Ulnar shaft	31	0	0
22.	26	M	Distal radius	57	1	0
23.	20	F	Olecranon	41	0	0
24.	37	M	Radial shaft	37	1	0
25.	27	M	Ulnar shaft	36	0	0
26.	34	M	Olecranon	35	0	0
Average	30.2			37.9	0.65	0.15

adding it. The recommended volume ratio of 8.4% sodium bicarbonate with 1:100,000 epinephrine to 1% lidocaine is approximately 1mL:10mL¹⁵.

We found that distracting the patient at the time of injection by pressing firmly on the skin proximal to the injection site and conversing with the patient to create sensory noise resulted in a low NPRS. Similarly, other techniques have been recommended to reduce pain at the time of injection^{1,16}.

Two patients who had the most pain during injection also experienced pain intraoperatively and were supplemented with 2-4 ml of the anesthetic solution. Both these patients were slightly anxious before and during the surgery. Pharmacological (Pre-surgery medication) and non-pharmacological interventions (such as enhanced preoperative information, music, and virtual reality) may be used to reduce anxiety for such patients¹⁷.

In our resource-limited tertiary care hospital, the availability of anesthetists was limited because of the ongoing COVID-19 pandemic due to the deployment of most anesthetists in intensive care units. This usually lead to a delay in providing surgical care for closed fractures of the upper limb. This technique decreases dependency on the anesthetists. It has even been recommended that WALANT should form a part of the surgical training curriculum¹⁸. In the author's experience, simple diaphyseal ulna fractures are most amenable to start using this technique.

The technique offers many advantages. The patient is wide awake and can perform active movements, thus helping in assessing the fixation and joint reduction intraoperatively.

It can be performed as a day-care procedure and has a short postoperative recovery time. WALANT is an economical alternative to general anesthesia and

regional blocks, which require a lot of specialized equipment, trained anesthetists, and multiple drugs, which adds to the cost.

This technique obviates the need for a tourniquet and thus avoids the complications associated with its use.

The comfort and painless experience while maintaining the patient's consciousness and minimizing hemodynamic disturbance is a considerable benefit of this method of anesthesia.

Our study is not without shortcomings. Lack of use of objective parameters for the calculation of blood loss, lack of postoperative assessment of pain, not having a comparison group, and small sample size were the main shortcomings of our study. As the patient is wide awake, an anxious patient may move intraoperatively. However, we did not face this issue in our study. The most common side effect associated with WALANT itself is syncope due to a vasovagal response. Another common reaction is increased anxiety in patients who fear being awake for the procedure. Epinephrine-induced cardiac ischemia may occur as a rare complication. Lignocaine may lead to systemic toxicity if inadvertently injected intravenously and may cause seizures and arrhythmias¹⁹.

CONCLUSION

WALANT is a much simpler, more effective, and safer option used in place of general anesthesia or regional blocks for fixation of fractures of the upper limb, with added advantages of no need for a tourniquet and intraoperative assessment of fracture fixation.

Ethical statement: Ethical approval was taken and all procedures performed in the study involving the human participants were in accordance with the ethical standards of the institutional ethical committee and with the 1964 Helsinki declaration and its later amendments.

Consent to participate: taken.

Consent to publish: taken.

REFERENCES

- Lalonde DH. *Wide Awake Hand Surgery*. 2016. Accessed December 28, 2021. <https://medone-plasticsurgery.thieme.com/ebooks/1957501>
- Lalonde D. Wide awake local anaesthesia no tourniquet technique (WALANT). *BMC Proc*. 2015; 9(S3):A81, 1753-6561-9-S3-A81.
- Lalonde D, Martin A. Tumescent Local Anesthesia for Hand Surgery: Improved Results, Cost Effectiveness, and Wide-Awake Patient Satisfaction. *Arch Plast Surg*. 2014; 41(4): p.312.
- Kurtzman JS, Etcheson JI, Koehler SM. Wide-awake Local Anesthesia with No Tourniquet: An Updated Review. *Plastic and Reconstructive Surgery - Global Open*. 2021; 26;9(3): p.e3507.
- Lin Y-C, Chen W-C, Chen C-Y, Kuo S-M. Plate osteosynthesis of single metacarpal fracture: WALANT technique is a cost-effective approach to reduce postoperative pain and discomfort in contrast to general anesthesia and wrist block. *BMC Surg*. 2021; 9;21(1): p.358.
- Chung S-R, Lee EY, Tan DMK. Corrective Osteotomies for Digital Overlap in Phalangeal and Metacarpal Fracture Malunion Using Wide Awake Local Anesthesia No Tourniquet (WALANT) Technique: A Technical Note. *J Hand Surg Asian Pac*. 2021; 26(3): p.485-9.
- Feldman G, Orbach H, Rinat B, Rozen N, Rubin G. Internal fixation of metacarpal fractures using wide awake local anesthesia and no tourniquet. *Hand SurgRehabil*. 2020; 39(3): p.214-7.
- Ahmad AA, Yi LM, Ahmad AR. Plating of Distal Radius Fracture Using the Wide-Awake Anesthesia Technique. *J Hand Surg Am*. 2018; 43(11): p.1045.e1-1045.e5.
- Huang Y-C, Hsu C-J, Renn J-H, Lin K-C, Yang S-W, Tarng Y-W, et al. WALANT for distal radius fracture: open reduction with plating fixation via wide-awake local anesthesia with no tourniquet. *J OrthopSurg Res*. 2018; 6;13(1): p.195.
- Orbach H, Rozen N, Rubin G. Open reduction and internal fixation of intra-articular distal radius fractures under wide-awake local anesthesia with no tourniquet. *J Int Med Res*. 2018; 46(10): p.4269-76.
- Abitbol A, Merlini L, Masmejean EH, Gregory T. Applying the WALANT technique to surgical treatment of distal radius fractures. *Hand SurgRehabil*. 2021; 40(3): p.277-82.
- Ahmad AA, UbaidahMustapa Kamal MA, Ruslan SR, Abdullah S, Ahmad AR. Plating of clavicle fracture using the wide-awake technique. *Journal of Shoulder and Elbow Surgery*. 2021; 29(11): p.2319-25.
- Ahmad AA, Sabari SS, Ruslan SR, Abdullah S, Ahmad AR. Wide-Awake Anesthesia for Olecranon Fracture Fixation. *Hand (New York, N, Y)*. 2021;16(3): p.402-6.
- Lalonde DH. Conceptual origins, current practice, and views of wide awake hand surgery. *J Hand Surg Eur*. 2017; 42(9): p.886-95.
- Frank SG, Lalonde DH. How acidic is the lidocaine we are injecting, and how much bicarbonate should we add? *Can J Plast Surg*. 2012; 20(2):71-3.
- Brown M., Bainbridge C., Wong J., Philips A., (2020) *Wide Awake Surgery Handbook*. <https://walant.surgery/wp-content/uploads/2020/03/Wide-Awake-Hand-Surgery-Handbook-v2.pdf> WALANT website.
- Wong, N., Yeung, A., Li, K. Y., McGrath, C. P., & Leung, Y. Y. Non-Pharmacological Interventions for Reducing Fear and Anxiety in Patients Undergoing Third Molar Extraction under Local Anesthesia: Systematic Review and Meta-Analysis. *International journal of environmental research and public health*. 2022; 19(18), 11162.
- Thakkar M, Bednarz B. Should WALANT surgery be included in the training curriculum? *Journal of Plastic, Reconstructive & Aesthetic Surgery*. 2020; 73(8): p.1575-92.
- Fish MJ, Bamberger HB. Wide-awake Local Anesthesia No Tourniquet (WALANT) Hand Surgery. [Updated 2022 Apr 21]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK570646/>