

Use of the WALANT technique in osteosynthesis of the distal radius: Description of a case

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Abstract

Distal radius fractures are the most common fractures of the upper limb. It is a common fracture in the elderly and the indication of an osteosynthesis by locked plate is often posed in view of the osteopenia. Surgical fixation of distal radius fractures under local anesthesia with the patient wide awake without a tourniquet allows intraoperative testing of fixation stability under active mobilization. This technique allows elderly people with extensive comorbidities to avoid the adverse effects commonly associated with general anesthesia or axillary blocks. The WALANT anesthesia technique (awake local anesthesia without tourniquet) consists of an injection of a local anesthetic of lidocaine and epinephrine into the operating field and without the use of a tourniquet. This article reports the detailed management under WALANT of osteosynthesis of the distal radius in an elderly patient presenting with extensive comorbidities.

Keywords: WALANT; Distal Radius; Anesthesia, Plate

1. Introduction

Distal radius fractures are the most common fractures of the upper limb [1]. Distal radius fracture is often associated with high-energy trauma in young adults or osteoporotic injury in the elderly [2].

One of the treatment options for distal radius fracture is plate fixation for unstable fractures. General anesthesia and regional nerve blocks have been described as anesthetic techniques for plate fixation of distal radius fractures. The two previous methods of anesthesia are not free of risks (intravascular injection, neurotoxicity). plate osteosynthesis is very often performed under tourniquet to minimize bleeding and allow better visualization of the surgical field [3]. General anesthesia and surgery can cause decompensation of pre-existing defects in elderly patients [4]. Substitution of general or loco-regional anesthesia using a tourniquet by local anesthesia without tourniquet: WALANT (Wide-Awake Local Anesthesia No Tourniquet) is an anesthesia option described by the Canadian surgeon Donald H. Lalonde. It is described for many elective interventions of the hand and wrist such as tendon ruptures and the release of entrapment syndromes [5].

It is based on the injection of buffer diluted lidocaine with epinephrine into the surgical site. The tourniquet, a source of discomfort, becomes useless because the epinephrine acts as a chemical tourniquet and the addition of 8.4% sodium bicarbonate reduces the pain of injection.

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There is evidence that the use of epinephrine at the right doses is safe in the extremities in patients without peripheral vascular disease [6].

WALANT is a safe and effective anesthesia technique for many upper limb surgeries. Patient satisfaction is high because preoperative tests and hospitalization are not required. Postoperative recovery is rapid and procedures can be performed on an outpatient basis [7]

The WALANT technique is rarely used for osteosynthesis of the distal radius, we describe in this article the technique of performing this local anesthesia in an elderly patient with several comorbidity factors.

2. Illustrative case

This was a 90-year-old patient with a history of complete arrhythmia–atrial fibrillation, insulin-requiring diabetes and arterial hypertension.

The patient had suffered a fall from her height which caused her pain and a deformation of the left wrist without skin opening.

Plain radiographs of the left wrist showed a left distal radius fracture with posterior displacement associated with an ulnar styloid fracture. An indication for surgical reduction of the distal radius fracture was raised. Given the age and history of the patient, we proposed to perform the surgery under WALANT with the informed consent of the patient and her family.

3. Prerequisite: Bone innervation

There is a remarkably rich and heterogeneous sensory innervation in the bone marrow, mineralized bone and periosteum. The periosteum has the densest sensory innervation, followed by bone marrow and then mineralized bone [8].

The subperiosteal injection technique blocks the immunoreactive substance P-fibers. The anesthetic will pass through the Volkmann and Havers canal to block sensory fibers in the marrow and mineralized bone when injected subperiosteally [7].

3.1. Technique of anesthesia

The equipment needed includes (Fig 1) two 20 mL ampoules of 1% lidocaine with 0.0005% epinephrine, an 8.4% sodium bicarbonate ampoule, a 27 and 23 gauge needle, 2 x 20 mL syringes, a antiseptic and sterile compresses.



Figure 1 Necessary for anesthesia (40 ml= 36 ml lidocaine 1%-epinephrine 0.005mg per ml + 4 ml Sodium bicarbonate 8.4%)

Preparation of the anesthesia solution: each of the two 20 mL syringes contains 18 mL of premixed solution of 1% lidocaine + 0.0005% Adrenaline supplemented to 20 mL with 2 mL of 8.4% sodium bicarbonate. Total required for anesthesia: 36 mL 1% lidocaine + 0.0005% adrenaline buffered with 4 mL of 8.4% sodium bicarbonate. We only use 40 ml of the prepared solution because we strictly respect the safety limit of 7 mg/kg for lidocaine with epinephrine [9]. The Intralipid antidote (3 mg/kg) was ready to be administered in the operating room if necessary. Patient monitoring included vital signs and visual analog scale (VAS) recorded every 10 minutes.



Figure 2 The injection points: red (Henry's approach) yellow (2 radial edge injection points)

The approach used is Henry's approach (figure 2). We inject 10 ml along the incision line (along the flexor carpi radialis tendon: FCR) using a 27 gauge needle, including 5 ml subcutaneously and 5 ml under the antebrachial fascia . 20 ml of solution divided between two injection sites on the lateral edge of the radius, starting from proximal to distal. Using a 23 gauge needle, we injected 2 ml of the solution on the lateral side of the radius subcutaneously then 4 ml in front and 4 ml behind the radius (Figure 3) at each of the 2 points of radial injections. These two injections are administered under the periosteum to achieve the desired effect of painless surgery during reduction and osteosynthesis of the distal radius fracture. Injection into the radial artery can be avoided by systematically aspirating before the injection and by palpating the trajectory of the artery. Then, we injected 5 ml of solution into the radial fracture site and 5 ml into the associated ulnar styloid fracture to allow reduction maneuvers without ulnar pain.

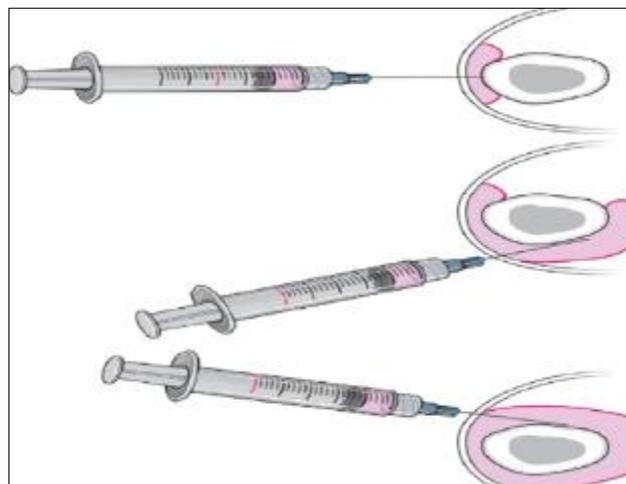


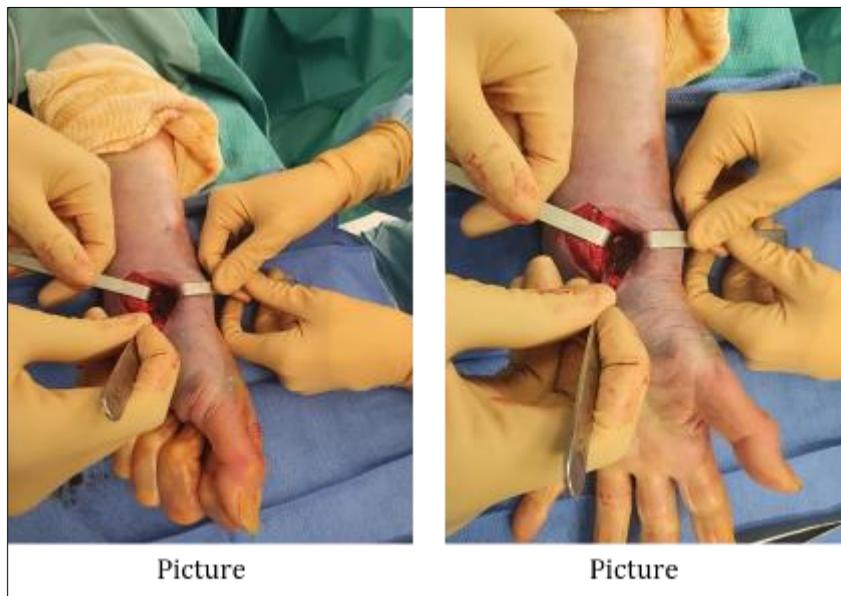
Figure 3 Transverse section of the distal radius for injection at the level of the subperiosteal layer. Of the 10 ml for each marking, 2 ml are given to the radial edge of the radius and 4 ml each to the palmar and dorsal sides of the distal radius[10]



Figure 4 How the injection of the product on the radial edge in our patient

3.2. Surgical technique

The first step consists in verifying the absence of pain by stimulating the skin on the path of the incision then during the reduction maneuvers, confirming that the anesthesia has succeeded, then in quantifying the intraoperative pain using a visual analogue scale (VAS) during the stages of skin incision, fracture reduction and plate fixation. You must wait at least 30 minutes before incising [11]. The surgery is guided by the EVA score which must be zero throughout the procedure. No tourniquet is used during surgery and there is no bleeding (Figure 5 and 6). The patient's vital signs are recorded throughout the surgery. No additional local anesthesia is needed during the operation if EVA is zero. However, if the patient reports pain, additional local anesthesia can still be given provided the toxic dose is not exceeded the dose limit of 7 mg/kg[9]. The reduction anatomical is made and fixed by a locked plate placed palmar and placed under fluoroscopic control. Intraoperative fixation stability is assessed during the WALANT procedure by actively mobilizing the wrist in three planes. Active motor tests of the muscles innervated by the median and radial nerves were carried out.



Figures 5 and 6 The patient's active movements intraoperatively

3.3. Postoperative care

Immediately after surgery, the patient is monitored for 1.5 hours to detect any adverse effects of lidocaine and epinephrine. Analgesics can be administered before the anesthesia is lifted.

The wrist is immobilized with a removable splint in case of pain and the patient is encouraged to immediately mobilize their wrist.

4. Advantages of the WALANT

Conventional practice for surgical procedures under general anesthesia or loco-regional anesthesia is to use a tourniquet and release it at the end of the procedure to ensure hemostasis.

Under WALANT, bleeding is minimal and there is no soft tissue turgidity, which facilitates skin closure.

Another advantage is the ability to perform intraoperative active motor testing with an awake patient. This avoids prolonged postoperative immobilization and reduces the risk of non-union displacement.

When Chih Liu et al [12] report that osteosynthesis of the distal radius under WALANT brings less fluctuation in the perioperative hemodynamic state compared to the same osteosynthesis under general anesthesia.

Ruben Dukan et al [13] compared osteosynthesis of the distal radius under axillary block and under WALANT. They demonstrated that WALANT allows an earlier return to work after plate osteosynthesis of the distal radius. Patients who received this type of anesthesia were able to return to full labor between 10 to 17 days after surgery. At 3 months, clinical recovery was also in favor of WALANT anesthesia; but at 6 months the clinical results were similar in the two groups. In general, WALANT avoids several inconveniences of general anesthesia or loco-regional anesthesia, reduces hospitalization time, allows early recovery and allows surgery in patients with severe comorbidities, such as morbid obesity, diabetes and lung diseases.

Meta-analysis by Brian Rigney [14] shows that the WALANT technique for fixation of distal radius fractures is a safe and effective technique that surgeons can consider using, especially for patients who are not suitable for the general anesthesia or in centers where there is a lack of access to specialized anesthesia equipment and care.

5. Conclusion

The WALANT technique offers a simple and safe alternative to traditional anesthetic techniques for open reduction and plating of distal radius fractures. Compliance with ethical standards. It is a technique to control blood loss by the effects of local anesthesia mixed with haemostatic agents. Without a tourniquet, the procedure prevents the discomfort associated with tourniquet pain. The WALANT eliminates postoperative care in the recovery room and makes it possible to operate on elderly patients with high risks of general anesthesia.

Compliance with ethical standards

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Disclosure of conflict of interest

The author declares no conflict of interest

Statement of informed consent

This work was carried out with the informed consent of the patient and her family.

References

- [1] JC MacDermid, JA McClure, L Richard, KJ Faber, et S Jaglal, « Fracture profiles of a 4-year cohort of 266,324 first incident upper extremity fractures from population health data in Ontario », *BMC Musculoskelet. Disord.* nov. 2021; 22(1): 996.
- [2] JW Karl, PR Olson, et MP Rosenwasser, « The Epidemiology of Upper Extremity Fractures in the United States, 2009 », *J. Orthop. Trauma.* août 2015; 29(8): e242-244.
- [3] Y-C Huang et al., « WALANT for distal radius fracture: open reduction with plating fixation via wide-awake local anesthesia with no tourniquet », *J. Orthop. Surg.* août 2018; 13: 195.
- [4] G Minto et B Biccard, « Assessment of the high-risk perioperative patient », *Contin. Educ. Anaesth. Crit. Care Pain.* févr. 2014; 14(1): 12-17.
- [5] A Abitbol, L Merlini, EH Masméjean, et T Gregory, « Applying the WALANT technique to surgical treatment of distal radius fractures », *Hand Surg. Rehabil.* juin 2021; 40(3): 277-282.
- [6] E Hagert et D Lalonde, « [Time to bury the adrenaline-myth!--Safe use of adrenaline anesthesia in hand surgery and orthopedics] », *Lakartidningen.* févr. 2015; 112: C4MC.
- [7] AA Ahmad, LM Yi, et AR Ahmad, « Plating of Distal Radius Fracture Using the Wide-Awake Anesthesia Technique », *J. Hand Surg.* Nov 2018; 43(11): 1045.e1-1045.e5.
- [8] DB Mach et al., « Origins of skeletal pain: sensory and sympathetic innervation of the mouse femur », *Neuroscience.* 2002; 113(1): 155-166.
- [9] PJ Pires Neto, L de A Moreira, et PP de Las Casas, « Is it safe to use local anesthesia with adrenaline in hand surgery? WALANT technique », *Rev. Bras. Ortop.* juill. 2017; 52(4):383-389.
- [10] D LaLonde, *Wide Awake Hand Surgery*, Thieme. New York: Thieme Medical Publishers, 2011; 2(1).
- [11] DE Mckee, DH Lalonde, A Thoma, et L Dickson, « Achieving the optimal epinephrine effect in wide awake hand surgery using local anesthesia without a tourniquet », *Hand N. Y. N.* déc. 2015; 10(4): 613-615.
- [12] W-C Liu et al., « Less Fluctuation in Hemodynamics of the Wide-Awake Local Anesthesia No Tourniquet Technique Than General Anesthesia in Distal Radius Plating Surgery: A Prospective Case-Control Study », *J. Clin. Med.* févr. 2022; 11(4): 1123
- [13] R Dukan, E Krief, et R Nizard, « Distal radius fracture volar locking plate osteosynthesis using wide-awake local anaesthesia », *J. Hand Surg. Eur.* oct. 2020; 45(8): 857-863.
- [14] B Rigney, C Casey, C McDonald, E Pomeroy, et MS Cleary, « Distal radius fracture fixation using WALANT versus general and regional anesthesia: A systematic review and meta-analysis », *The Surgeon*, févr. 2022,