Wide-Awake Local Anesthesia No Tourniquet (WALANT) Technique: A Case Report Demonstrating Its Cost-Effectiveness in a Resource-Limited Setting

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Summary

Wide-Awake Local Anesthesia No Tourniquet (WALANT) offers a cost-effective alternative to general anesthesia (GA) for wound debridement, improving patient safety, surgical accessibility, and cost-efficiency. This study explores WALANT's cost-effectiveness and patient outcomes in a resource-limited setting. The patient, E.M., a 27-year-old woman, presented with left upper limb swelling, which began a week after Implanon device removal at another facility. Upon admission, she displayed severe sepsis symptoms, including a blood pressure of 100/58 mmHg, a heart rate of 144 beats per minute, a respiratory rate of 24 breaths per minute, and a temperature of 39.2℃. Her left upper limb showed swelling, redness, and shininess, leading to a diagnosis of necrotizing fasciitis with septic shock. Initially, wound debridement was conducted under GA. However, the patient' s choice to undergo WALANT for her second debridement saved her 89.1% of the cost of performing debridement under GA. This cost reduction significantly benefited the uninsured patient, alleviating the financial burden and also achieved a favorable patient outcome within the constraints of a resource-limited setting.

Keywords: Resource-limited country, Wounds, Wound management, Local anesthesia, Case report, WALANT

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Introduction

In low- and middle-income countries (LMICs), it is estimated that between 3383 and 6495 surgical operations per 100,000 people are not performed due to a lack of facilities, appropriate equipment, and skilled professionals (1). Nevertheless, patients with wounds in LMICs still deserve quality care, optimal clinical outcomes, and options for their management. This leaves medical professionals to navigate a delicate equilibrium in providing top-tier, cost-effective healthcare that achieves optimal patient outcomes. One of the surgical approaches that could improve wound care services is Wide-Awake Local Anesthesia No Tourniquet (WALANT) surgery. In WALANT surgery, the continuous presence of anesthetist may not be required (2). Local injection of a solution of lidocaine with epinephrine is used to control pain and preserve hemostasis of the operative field, respectively, without the need and discomfort of a tourniquet (3).

The purported benefits of WALANT surgery extend from the pre-operative, operative, and post-operative

phase. Pre-operatively, the standard patient evaluation may be fast-tracked (4). WALANT also expands access to surgical interventions for patients with comorbidities and minimizes anesthesia exposure (4). During the procedure, surgeon–patient communication and coordination can allow for better diagnostic assessments. Furthermore, anesthesia requirement and cost were reduced, with no need for anesthesia specialist providers (5). Post-operatively, WALANT has shown optimal patient satisfaction, reduced costs to the patient, reduced time for recovery, and this ultimately can free up operating room time.

In both a resource constrained setting and one where out-of-pocket medical expenses push patients below the poverty line (6), WALANT has the potential to provide a multitude of benefits, with the most important being decreased costs to the patient (1,3–5,7,8). WALANT, to our knowledge, is still uncommon practice in our country. In this case study, we examine the cost implications of offering WALANT to a patient in an LMIC with the aim of expanding the practice of WALANT in Kenya (and similar settings).

Case presentation

E.M., a 27-year-old female patient weighing 67.0 kg upon admission, presented with gradual swelling in the left upper limb that began a week prior to her admission after getting her Implanon device removed at a different facility. The Implanon removal took place 2 weeks prior to admission. The patient described a gradual increase in the size of the swelling, accompanied by fever, severe pain, and the inability to use the infected limb. Additionally, she reported that the limb began discharging serosanguineous fluid approximately 3 days prior to admission.

There was no history of trauma, hospitalization, food/drug allergy, or previous surgeries. The patient is a Para 2+0. There was no history of any systemic nor comorbid illness. The patient was a housewife and reports no history of smoking/drinking. She did not have public nor private health insurance.

Clinical findings

Upon admission, the patient appeared sick-looking, with a blood pressure of 100/58 mmHg, heart rate of 144 beats per minute, respiratory rate of 24 breaths per minute, a temperature of 39.2°C, and a Glasgow Coma Scale (GCS) score of 13. During the examination, swelling of the left upper limb was observed, along with redness and a shiny appearance. A necrotic scab measuring 10 × 12 cm was present on the medial aspect of the left arm, extending from the distal medial axilla to the proximal aspect of the cubital fossa of the left arm. The affected area was tender and warm to the touch. Distal pulses (brachial and radial) were present. The right upper limb appeared normal. The rest of the systemic examinations were unremarkable.

Timeline

Empirical amoxicillin 1 g and clavulanic acid 200 mg T.I.D. were started for the patient and later changed to piperacillin and tazobactam 4.5 g Q.I.D. according to the arteriogram. On day 2 post-admission, she had wound debridement under general anesthesia (GA). This delay was due to needing space in the theater. After the first surgery under GA, the patient became hemodynamically stable with a blood pressure of 119/51 mmHg and a pulse rate of 107 beats per minute. The patient's condition improved steadily and she became clinically stable (vital signs on the following day included a blood pressure of 119/51 mmHg and a pulse rate of 107 beats per minute).

On days 8 and 13, the patient had further wound debridement under local anesthesia using the WALANT method.

After day 13, subsequent wound cleaning and dressing were done in the patient's ward every 3 days using normal saline 0.9% and papain and urea (enzymatic debridement). On day 27, the patient was fitted with a vacuum dressing in preparation for skin grafting, which was carried out on day 41. The donor site was the left lateral thigh, which healed without complications. The skin grafting had 80% success. The patient was discharged home on day 63.

Diagnostic assessment

The initial investigations upon admission revealed the following: the white cell count was high with neutrophilia (12.83 × 10^9/L, 95.2% neutrophils), platelets were low (44 × 10^9), and normal hemoglobin was low (12.1 g/dL). The electrolyte assay revealed hyponatremia and hypokalemia (sodium 132.9 mmol/L, potassium 3.02 mmol/L), creatinine 59.2 µmol/L, and urea 4.84 mmol/L were normal. The patient's lactate levels upon admission were 5.2 mmol/L, and her blood gas analysis findings were consistent with lactic acidosis (pH = 7.28, HCO_3^- = 19 Meq/L, pCO_2 = 35 mmHg). Liver function tests demonstrated reduced total protein (38.9 g/L) and albumin (19.6 g/L) levels, and the C-reactive protein (CRP) was >250 mg/L.

The management plan included an urgent debridement, intravenous fluids (normal saline, 0.9%) continuous monitoring of vital signs, platelet transfusion, antibiotics, blood grouping and cross-matching (GXM) and a plastic surgery. Hematology, urea-electrolytes-creatinine, and CRP were repeated to monitor the patient's progress and response to treatment. During the initial surgical debridement under GA, wound swabs were taken for microbiological culture and sensitivity analysis. To control the infection, the patient was initially placed on amoxicillin 1 g and clavulanic acid 200 mg T.I.D.; however, wound culture and sensitivity results indicated mixed growth of *Proteus vulgaris* and *Klebsiella pneumoniae*. Therefore, the antibiotic regimen was revised to piperacillin and tazobactam 4.5 g Q.I.D. on day 6 post-admission.

Therapeutic intervention

The patient was diagnosed with necrotizing fasciitis at the site from which the Implanon contraceptive was removed. She underwent wound debridement on day 2 after admission under GA, but on days 8 and 13, she underwent two WALANT procedures.

The WALANT procedure was carried out in the designated procedure room within the General Surgery ward. Two General Surgery registrars and one Medical Officer were present for the procedure. One person was allocated the role of mixing the WALANT solution which consisted of 25 mL 2% lidocaine, 50 mL normal saline, and 1 mL adrenaline. This was injected into the subcutaneous space and allowed to take effect for 30 minutes. The wound was debrided and in total the procedure took 45 minutes. Papain and urea were applied and the wound was dressed. Morphine (10 mg/mL, 1mL; intramuscular) was administered after the procedure for pain management, as per the patient's preferences.

Outcome

Figure 1A–E demonstrates the wound before and after WALANT, and after skin grafting. After WALANT, the wound bed consisted of granulation tissue (Figure 1D). The wound demonstrated no signs of local infection, nor degeneration. The surrounding skin appeared normal in color and was normal in temperature without any swelling or tenderness. The graft took and the wound was clean and dry (Figure 1E), allowing the patient to be discharged on day 63 for follow-up in the surgery outpatient clinic. The patient was prescribed topical hydrocortisone for hypertrophic scar areas.

Figure 1. (A and B) Before WALANT debridement. (C and D) Pictures after WALANT procedure. (E) After skin grafting on day 41.

Table 1. Itemized bill for wound debridement under general anesthesia juxtaposed to the in-patient procedure of WALANT.

	GA			WALANT		
Description	**Rate (Ksh.)**	**Qty.**	**Amount (Ksh.)**	**Rate (Ksh.)**	**Qty.**	**Amount (Ksh.)**
Laboratory tests						
Blood grouping	400	1	400	400	1	400
CRP	500	1	500	500	1	500
LFTs	700	1	700	700	1	700
Full hemogram	800	1	800	800	1	800
UECs	900	1	900	900	1	900
General surgery fees						
Bed charge	1200	1	1200	1200	1	1200
Surgical toilet	28,300	1	28,300	0	0	0
Medical g ases fee						
Oxygen administration per hour	1000	1	1000	0	0	0
Pharmaceutical services fees						
Paracetamol 1g injection	95	1	95.24	0	0	0
Propofol injection, 10 mg/ mL	286	1	286.73	0	0	0
Sodium lactate compound (500 mL)	73	2	146.37	0	0	0
Tranexamic acid, 100 mg/ mL	55	2	110.28	0	0	0
Adrenaline injection	9	2	18.04	9	1	9
Atropine, 0.6 or 1 mg/ mL	20	2	40.1	0	0	0
Cefazolin, 1 g	161	2	322.82	0	0	0
Cisatracurium besylate, 2 mg/ mL	1729	2	3466.81	0	0	0
Dexamethasone, 4 mg/ mL	19	2	38.1	0	0	0
Ondansetron, 2 mg/ mL	29	1	29.07	0	0	0
Fentanyl injection , 50 µg / mL	79	1	79.02	0	0	0
Metronidazole injection, 500 mg	36	1	36.09	0	0	0
Glycopyrronium bromide, 200 µg /mL	107	3	321.82	0	0	0
Isoflurane per mL, 40 mL/hour	31	80	2486.32	0	0	0
Dexketoprofen, 50 mg/2 mL	154	1	154.39	0	0	0
Morphine sulfate, 10 mg/ mL 1 mL	81	1	81.21	0	0	0
Neostigmine methylsulfate, 2.5 mg/mL	85	1	85.22	0	0	0
Sodium chloride, 0.9%, 500 mL	78	1	78.2	78	1	78.2
IP&C fee	70	1	70	0	0	0
TSSU services fee						
TSSU pack	2600	1	2600	0	0	0
Lidocaine 2%, 20 mL	0	0	0	203	1	203
Sodium bicarbonate 8.5% 10 mL	0	0	0	32	1	32
Total (Ksh.)			**44 345.8**			**4822.2**
Total (USD)			**295.64**			**32.15**

This table contrasts the costs the patient would have incurred had she undergone her subsequent wound debridement under GA as opposed to WALANT. Conversion rate: 1 USD = 150 Ksh.

CRP, C-reactive protein; GA, general anesthesia; IP&C, infection prevention and control; Qty, quantity; UECs, urea-electrolytes-creatinine; WALANT, Wide-Awake Local Anesthesia No Tourniquet

Cost of procedures

The patient was not covered by any health insurance provider. Assuming that other costs to the patient remained constant (admission fees, plastic surgery, best costs, nutrition) that would be common to both procedures, we extracted the costs of wound debridement under GA versus WALANT from the bill (Table 1).

The cost comparison between procedures is as follows: Ksh. 44345.83 (USD 295.64) versus a total of Ksh. 4822.2 (USD 32.15). The itemized bills for each procedure are tabulated in Table 1. The percentage change was calculated as follows: $\frac{New\ value - Original\ value}{Original\ value} \times 100\%$, where the new value was the value of WALANT and original value was that under GA. Therefore, the WALANT procedure saved the patient 89.1% of the cost of undergoing debridement under GA for the second debridement.

Discussion

While the cost-effectiveness of WALANT has been previously expounded upon (3, 5, 8), it is imperative to undertake a dissection of local and context-specific cost analyses in ascertaining its pragmatic applicability within our setting. We found that, in the case of a patient diagnosed with necrotizing fasciitis (a condition warranting wound debridement), the patient's choice of in-patient WALANT procedure heralded a substantial 89.1% reduction of the cost compared to performing her second debridement under GA. This treatment substantially reduced the costs incurred by the patient, *in lieu* of undergoing all surgical debridement procedures under GA. It is important to recognize that if the patient had been admitted while clinically stable, WALANT would have been the initial course of action. However, in this particular case, using GA for the first debridement was unavoidable.

This cost reduction becomes more substantial considering that the patient was not covered by either a national or private health insurance provider. This predicament is not an isolated case, but the reality for many patients seen in our settings. It has been shown that only 17.1% of our citizens have any form of insurance, and of these, 88% are covered by the national insurance cover (9). As a result, WALANT allowed our patient to become eligible for skin grafting and provided her with the stability required for discharge while simultaneously shielding her from the brunt of a potentially crippling expense and poverty.

The implications of these findings are manifold. Firstly, the patient's clinical course from admission to discharge trajectory aligned with the medical objective of effecting wound debridement to allow for successful skin grafting. Secondly, the financial burden borne by the patient in pursuit of this desirable clinical outcome was almost entirely mitigated through the prudent implementation of WALANT. Thirdly, the potential incorporation of this innovative procedure into the local wound management algorithm holds promise for far-reaching wound management benefits to our populace, especially at our hospital (one of the largest and most prominent referral centers in our country) where this case study was conducted. This is crucial because, in our setting, patients grapple with both the potentially catastrophic impact of out-of-pocket health expenditures and a widespread lack of insurance cover (6, 9).

To realize the transformative potential of the third point, it is imperative that medical and surgical practitioners—especially surgical residents, general, plastic, and orthopedic surgeons—receive comprehensive training in WALANT. This should also be indicated as a fundamental requisite for the education and training of both medical officers and medical students. It is noteworthy that the drugs administered for WALANT are ensconced within the list of Essential Medicines outlined by the National Medical Supplies Authority, thus ensuring availability while being supplemented by government subsidies. Therefore, recognizing the economic advantages of WALANT is not a matter of resource scarcity, but rather a training challenge (3).

Attaining this widespread proficiency country-wide can also, potentially, lead to a concomitant reduction in referrals to higher-tier healthcare facilities, thereby alleviating the burden placed upon these establishments. The latter effect could potentially open up additional operating room capacity for more critical surgical procedures. This cascading effect may also save patient transportation costs and bed charges if the patient is

stable and WALANT is clinically warranted, since the procedure can be performed in an outpatient facility.

Patients eligible for WALANT are those who are clinically stable while contraindicated for those who are anxious and may not be able to cooperate with instructions (4). For this reason, pediatric patients are not candidates for this kind of surgery. Other patients who would not receive this technique include people with high cardiac risk, severe vascular disease, or allergies to the medication (4). Success rates for WALANT also vary depending on the procedure, anatomical site, and individual patient factors. However, it has been reported to have a low overall complication rate of 1.7% (10). The prevalence of its use in Africa has not been described in literature thus far, to our knowledge.

Our study is not without a limitation of selection bias. This underscores the need for further research, ideally involving larger sample sizes, controlled designs, and diverse patient populations. Such studies would enhance the generalizability of the findings in different medical contexts. In addition, we cannot exclude the possibility that performing the initial debridement under GA contributed to the successful outcome of the patient. Nonetheless, our focus is on the fact that the patient underwent both procedures (allowing comparison), did not have sufficient financial means, and still achieved a positive outcome due to augmenting our care plan and making WALANT an option for her.

Conclusion

This case study demonstrated that utilizing WALANT for a second debridement resulted in an 89.1% reduction in costs for the patient compared to debridement under GA. This finding underscores the potential of WALANT to provide quality medical care in resource-limited settings. While these results are promising, they are specific to this single case and warrant further investigation, potentially through a case series or case–control study. If these findings are corroborated on a broader scale, the implications could include significant clinical and budgetary benefits, suggesting WALANT as a more cost-effective alternative to standard wound debridement under GA in similar contexts.

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Patient Perspective

The patient was comfortable during the procedure and was pleased with the outcome.

Informed Consent

The patient was duly informed about this study and voluntarily consented. Ethical approval was sought and granted (MKU/ISERC/3622).

Authors' Contributions

Both authors conceptualized the study, performed the procedure, and reviewed the draft and final manuscript for publication.

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