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# BYPASSING THE TOURNIQUET: CLINICAL, OPERATIONAL, AND ECONOMIC OUTCOMES OF WIDE-AWAKE LOCAL ANESTHESIA VERSUS TRADITIONAL METHODS FOR CARPAL TUNNEL SYNDROME AND TRIGGER FINGER

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## ABSTRACT

**Background:** Carpal tunnel syndrome and trigger finger are common hand conditions generally treated with local anesthesia and a pneumatic tourniquet. However, tourniquets commonly induce ischemic pain, requiring intravenous sedation or general anesthesia. The wide-awake local anesthesia no tourniquet technique (using lidocaine with epinephrine) avoids the use of tourniquets and sedation. **Purpose:** To critically review the existing literature that compares the clinical, workflow, and cost-benefit of the wide-awake local anesthesia no tourniquet procedure to local anesthesia with a pneumatic tourniquet for carpal tunnel syndrome release and trigger finger release. **Methods:** We reviewed the literature and extracted comparative data on pain, complication rates, time, and institutional cost. **Results:** The wide-awake local anesthesia no tourniquet technique has equal or improved clinical results to local anesthesia with a pneumatic tourniquet. This technique eliminates tourniquet ischemia and associated pain and opioid use. This approach simplifies the surgical procedure by moving it to procedure rooms, which leads to a 50% reduction in room turnover. Financially, it leads to institutional cost savings of 52% to greater than 70% per case. Complications are limited and statistically similar. And it facilitates intraoperative motor testing to ensure full anatomical release. **Conclusion:** Wide-awake local anesthesia no tourniquet is a safe, effective and economical paradigm. Tourniquets and main operating theatre use are avoided to increase efficiency and reduce costs, thus improving patient access to this common surgery.

**KEYWORDS:** WALANT, LAWT, Carpal tunnel Syndrome, Trigger finger, Hand surgery.

## INTRODUCTION

Carpal tunnel syndrome (CTS) and trigger finger (TF) represent the two most common hand disorders in surgical practice that are associated with significant disability. CTS is well-recognized as the most prevalent peripheral-nerve compression syndrome, occurring in millions of people worldwide each year.[1] Likewise, TF is a significant burden as a primary cause of hand pain and mechanical dysfunction, with the locking and catching of the affected finger on excursion of the flexor tendons, estimated to occur in 2.6% of the population during their lifetime.[2] When nonoperative measures (such as splinting or steroid injections) fail to alleviate symptoms, surgical treatment in the form of carpal tunnel release (CTR) or trigger finger release (TFR) remains the definitive treatment to resolve patient symptoms.[1,2]

Traditionally, the ability to create a bloodless and well-visualized surgical field in these minor hand procedures has been heavily dependent on the use of local anesthetic and a pneumatic tourniquet.[2,3] A hemostatic field allows clear visualization for the identification of vulnerable structures and prevention of iatrogenic injury.[3] Unfortunately, tourniquet use is often accompanied by considerable patient discomfort, ischemia, and intolerance, often requiring the supplementation of

monitored anesthesia care (MAC), IV sedation and even general anesthesia.[2,4] Apart from patient discomfort, applying a tourniquet is also associated with potential physiological complications, such as compression nerve injuries, local muscle injury, and even vascular trauma.[2]

In order to avoid the myriad of logistical and physiological complications that arise with tourniquet use and sedation, the wide-awake local anesthesia no tourniquet (WALANT) approach has become increasingly popular worldwide.[1,2] First described by Lalonde and associates in 2005, the WALANT technique involves the injection of a local anesthetic (most commonly 1% lidocaine) mixed with epinephrine (most commonly 1:100,000) and buffered with 8.4% sodium bicarbonate subcutaneously to provide both deep anesthesia and vasoconstriction.[1,4,5] This achieves successful hemostasis and eliminates the need for a tourniquet and/or additional sedation.[2,3]

WALANT has proven a safe, economical, and efficient approach.[1,6] It has significant cost savings in health care, less use of main operating room resources, and very little waste.[1,4] And, given the awake condition of the patient during surgery, it is possible to perform dynamic intraoperative movement tests to confirm the adequacy of the tendon or pulley release prior to closure.[4] This systematic review critically appraises and synthesises the available evidence of the WALANT versus traditional local anaesthesia with tourniquet (LAWT) techniques for surgical treatment of CTS and TF, in terms of clinical outcomes, surgical efficiency, economic and safety considerations.

## LITERATURE REVIEW

### Clinical outcomes and perioperative pain management

Perhaps the most important clinical benefit of the WALANT procedure is that a tourniquet is not required, and thus there is no ischemia and tourniquet pain, which translates into excellent intraoperative and postoperative pain scores and patient satisfaction.[1,2,3] In a meta-analysis of TFR surgeries, Levit et al. found a decrease in the pain of local injection for the WALANT group (mean difference [MD]: -1.69; 95% confidence interval [CI]: -4.14 to 0.76) and significantly lower postoperative pain scores than the LAWT group.[2] In a randomized controlled trial, Lee et al. corroborated these results, observing markedly lower consumption of analgesics after surgery in the WALANT group during the first 48 hours.[10]

Likewise, Gallucci et al. reviewed 60 cases of CTS, WALANT versus LAWT. They reported similar WALANT versus LAWT Visual Analog Scale (VAS) pain scores following injection (3.0 vs. 3.9, respectively) and identical top-level immediate postoperative satisfaction scores (9.3 vs. 9.2).[3] From a surgeon's standpoint, Mohd Rashid et al. examined the visibility and hemostasis during surgery, stating that 74% of WALANT cases provided "good visibility" compared to only 44% using LAWT, ultimately showing that the vasoconstrictive effect of epinephrine is as good as a pneumotourniquet.[9]

### Workflow efficiency and procedure timings

There are significant implications for workflow when shifting from main operating rooms (OR) to minor procedure rooms (PR) or outpatient clinics for WALANT surgeries.[1,4] The injection of lidocaine and epinephrine carries the mandatory waiting time (around 26 minutes [min]) for optimal hemostatic effects; however, total institutional volume is universally improved.[4]

Levit et al. showed that although time for preoperative patient preparation was considerably longer for WALANT (MD: +26.43 min), time for recovery was profoundly shortened (MD: -27.72 min) as patients safely avoid the post-anesthesia care unit (PACU).[2] There was no significant difference in the time taken to perform the surgery.[2] Moreover, Maliha et al. noted that PR turnover time for WALANT TFR cases was less than half that of main OR cases (31.1 min vs. 65.3 min), allowing for higher volumes of cases in a single day.[4] Kamal et al. developed a clinical pathway for WALANT CTS, noting a 34% decrease in the time patients spent in the health care facility.[12] The time comparisons are outlined in Table 1 and visualized in Figure 1.

**Table 1: Comparison of procedural timings between WALANT and LAWT techniques.**

| Study | Procedure | Parameter | WALANT Cohort | LAWT Cohort | P-Value |
|---|---|---|---|---|---|
| Levit et al.[2] | TFR | Preoperative Preparation Time | +26.43 min (MD) | Baseline | < 0.01 |
| Levit et al.[2] | TFR | Postoperative Recovery Time | -27.72 min (MD) | Baseline | < 0.01 |
| Maliha et al.[4] | TFR | Room Turnover Time | 31.1 ± 11.1 min | 65.3 ± 17.7 min | < 0.001 |
| Maliha et al.[4] | TFR | Total Operative Time | 21.4 ± 7.0 min | 23.5 ± 14.3 min | 0.942 |
| Gallucci et al.[3] | CTR | Total Operative Time | 3.09 ± 0.53 min | 2.36 ± 0.57 min | 0.082 |

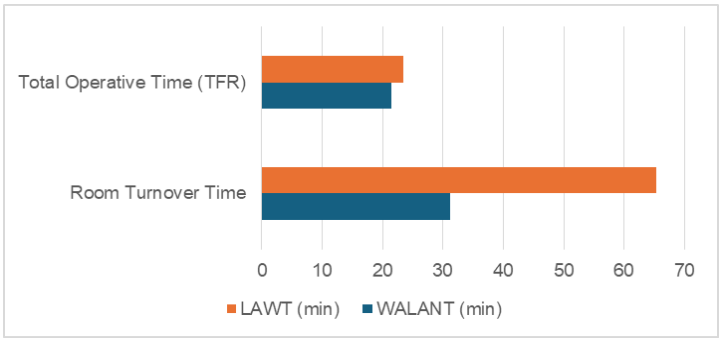


**Figure 1: Workflow times: WALANT vs. LAWT.**

**Eeconomic impact and resource optimization**

The cost-effectiveness of WALANT—especially in an ambulatory setting with minor field sterility—is well documented by many health economic studies.[1,4] The fact that an anesthesiologist, unique OR ventilation (e.g., laminar airflow) and extensive sterile draping are not required greatly reduces institutional costs.[1] Leblanc et al. calculated the cost of a CTR in an ambulatory setting to be nearly 25% that of the same procedure in a main OR.[6] Likewise, Kazmers et al. reported a six-fold reduction in institutional cost when moving to clinic-based WALANT.[7]

Maliha et al. estimated the cost savings in a large metropolitan hospital, where the cost of the special single use instrument tray used for a WALANT PR-based TFR was 993.79 United States dollars (USD), while a LAWT-based OR TFR cost 3,304.25 USD, a cost reduction of more than 70%.[4] Similarly, the cost of human resource per minute was 44.00 USD less in the PR setting.[4] Alter et al. demonstrated an absolute direct cost of 89.12 USD with WALANT versus 1409.28 USD for intravenous anesthesia.[11] More broadly, Levit et al. found a pooled 52.2% decrease in cost across various international cohorts using WALANT.[2] A summary of these economic factors is presented in Table 2 and illustrated in Figure 2.

**Table 2: Economic and resource comparison of surgical settings.**

| Economic Variable | Procedure Room (WALANT) | Main Operating Room (LAWT) | Difference |
|---|---|---|---|
| Instrument Tray Cost [4] | 993.79 USD | 3,304.25 USD | 70% Reduction |
| Total Procedure Direct Cost[11] | 89.12 USD | 1409.28 USD | 93% Reduction |
| Overall Procedural Cost[2] | -52.2% (Mean Difference) | Baseline | 52.2% Reduction |
| Anesthesia Provider Required[1] | No | Yes (Frequently) | Resource Optimization |

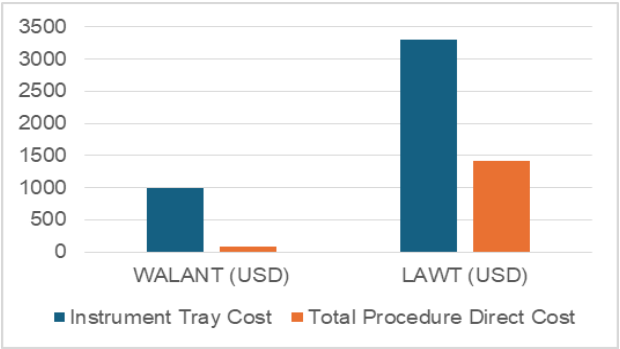


**Figure 2: Cost comparison: WALANT vs. LAWT (USD).**

**Safety Profile and adverse events**

Misgivings about potential epinephrine-induced digital ischemia have been a major obstacle to the widespread take-up of WALANT.[1,2] But there is now a large body of recent evidence, led by Lalonde's prospective, multi-institutional study of more than 3,000 cases, demonstrating the safety of local infiltration with low-concentration epinephrine for the digits.[5] In the very rare case of prolonged vasospasm, phentolamine is kept readily available as a rapid and virtually guaranteed reversal agent.[1]

In their retrospective study, Maliha et al. found no statistically significant differences in complications following PR-WALANT and OR-LAWT.[4] There were no statistically significant differences in persistent paresthesia (2.7% in both groups) and inadequate release (5.13% in WALANT and 2.7% in LAWT groups, p = 0.572).[4] Notably, while minor field sterility was used as

opposed to main-OR sterility, post-operative wound infection rates were minimal.[1,4] Rellán et al. also reported no infections in their comparative study of minor hand surgeries.[8] Gallucci et al. similarly observed no ischemic events or systemic toxicities in their prospective WALANT group, further demonstrating the safety of WALANT.[3] Table 3 and Figure 3 detail the complication rates and functional results.

**Table 3: Clinical outcomes and complication rates.**

| Complication / Outcome | WALANT Cohort | LAWT Cohort | P-Value | Study Source |
|---|---|---|---|---|
| **Persistent Paresthesia** | 0.027 | 0.027 | 0.985 | Maliha et al.[4] |
| **Recurrent Triggering** | 0.0513 | 0.027 | 0.572 | Maliha et al.[4] |
| **Surgical Site Infection** | 0 | 0 | N/A | Rellán et al.[8] |
| **Postoperative DASH Score** | 18.03 ± 9.39 | 23.93 ± 11.34 | 0.042 | Gallucci et al.[3] |

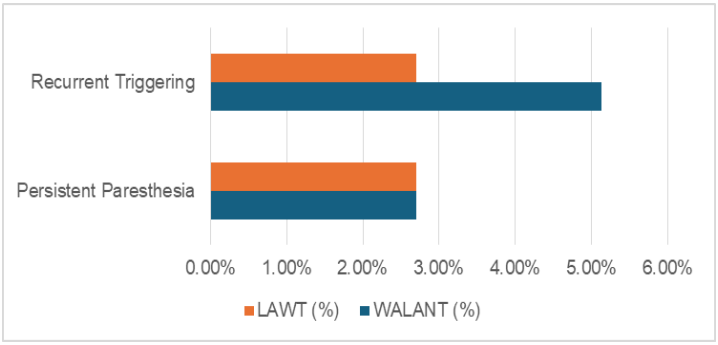


**Figure 3: Clinical outcomes and postoperative complication rates (%).**

## CONCLUSION

The advent of the Wide-Awake Local Anesthesia No Tourniquet (WALANT) technique is a landmark evolution in surgical treatment of carpal tunnel syndrome and trigger finger from the conventional local anesthesia with tourniquet (LAWT) technique. According to a broad review of the literature, there are no differences or even better results when WALANT is used over LAWT, mainly because tourniquet-induced ischemia pain is eliminated and the need for post-operative opioid medication is dramatically reduced. Additionally, the ability to actively test motor function intraoperatively under WALANT allows for complete anatomical release, thus eliminating the risk of incomplete surgery.

WALANT has tremendous financial and operational benefits. By safely shifting minor hand surgical procedures from resource-intensive main operating rooms to minor procedure rooms using field sterility, medical institutions can save 50% to 70% or more for each procedure. This better use of resources also dramatically reduces room downtime, thereby increasing institutional capacity and patient access. Future studies should focus on large, multicenter randomized controlled studies and uniform cost analyses to further establish the superiority of the WALANT technique and to definitively determine selection criteria.

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