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Original Research

Wide-Awake Hand Surgery Has Its Benefits: A Study of 1,011 Patients

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Purpose: Wide-awake local anesthesia with no tourniquet has dramatically changed hand surgery practice. Using lidocaine with epinephrine and no tourniquet has allowed many procedures to be moved from the main operating room to an in-office procedure room. Previous studies have shown that using local anesthesia is safe and cost effective, with high patient satisfaction. This study evaluated patient satisfaction and complications for the first 1,011 elective hand surgeries performed using wide-awake anesthesia in an in-office procedure room.

Methods: The first 1,011 patients who underwent elective hand surgery in an in-office procedure room were surveyed regarding their satisfaction. The patients were monitored for postoperative complications. Patient survey results and complications were logged in a database and analyzed.

Results: Single-digit trigger finger release was the most common procedure performed (n = 582), followed by mass excision (n = 158), multiple-digit trigger finger releases (n = 109), and carpal tunnel release (n = 41). There were 43 (4.3%) superficial skin infections, with the majority seen in single-digit trigger finger releases (n = 27). There were no deep wound infections. All infections were managed nonsurgically with oral antibiotics and local wound care. Ninety-nine percent of the patients rated the in-office procedure room experience as the same as or better than a dental visit, would recommend wide-awake anesthesia to a friend or family member, and would undergo the procedure again. Using “lean and green” hand packs saved our institution more than \$65,000 and saved 18.4 tons of waste during this study period.

Conclusions: Surgical procedures performed with wide-awake local anesthesia with no tourniquet in an in-office procedure room can be performed safely with a low infection rate, are cost effective, and have high patient satisfaction.

Clinical relevance: Minor hand surgery done in an in-office procedure room is safe, is cost effective, and has high patient satisfaction.

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Wide-awake local anesthesia with no tourniquet (WALANT) procedures have allowed hand surgery to move out of the operating room and into minor procedure rooms, revolutionizing the practice of hand surgery.^{1–7} This is beneficial for both hospitals and patients.

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It offloads demand for operating rooms and decreases cost by eliminating the need for anesthesia monitoring, an operating room, and postanesthesia care.⁶ It saves the patient time and money by eliminating the need for a preoperative evaluation and time off work.⁸ Additionally, there are cost savings associated with the decreased need for surgical drapes, equipment, and hospital staffing.^{2–29} There is also a decrease in the waste generated by these procedures, as they are typically done under minor field sterility, which consists of sterile prep, a single drape, a minor instrument tray, sterile gloves and a mask (no gown or antibiotics), and local anesthesia.^{16,29}



Figure 1. Our in-office procedure room.

Previous studies regarding WALANT have been conducted at military hospitals, large academic institutions, or in foreign countries. Those studies have shown the technique is safe, with high patient satisfaction. The purpose of this study in a United States' community-based in-office procedure room was 2-fold: (1) to evaluate patient satisfaction with surgery done in a procedure room; and (2) to evaluate postoperative complications after procedures done in procedure rooms. To measure patient satisfaction and infection rates, all patients who underwent a procedure in our in-office procedure room from its inception in 2015 through 2020 were surveyed, and their charts were reviewed for infection. The hypothesis of our study was that patients would be highly satisfied and have an infection rate comparable to those of previous studies done in in-office procedure rooms.

Materials and Methods

Sanford Health Institutional Review Board approval was not obtained, as it was deemed unnecessary by our institution because of the deidentified data already stored in the RedCap database. Using Current Procedural Terminology codes (64721, 26055, 20670, 26951, 11760, 25000, 10120, 26121, 26115, 26111, 26160, and 26011) and a premade database, a retrospective review was performed on the first 1,011 patients who underwent WALANT surgery in our in-office procedure room. All patients, regardless of age or medical comorbidities, who were seen in our practice and indicated for minor hand or wrist surgery, were offered the option of having their outpatient hand surgery performed in an in-office procedure room. There were only 2 contraindications to wide-awake surgery using lidocaine with epinephrine: a history of vasospastic disease (Raynaud) or fixed-vessel disease, such as calciphylaxis (calcific uremic arteriopathy).³⁰ We had no patients who fit these criteria, so none were excluded. No preoperative laboratory or medical examinations were performed. Procedures were performed using minor field sterility, by 1 of 3 fellowship-trained orthopedic hand surgeons (R.E.V., M.C.A., H.A.B.) between February 2015 and December 2020. Preoperative sedation was not ordered for patients having in-office procedures. If patients were too anxious or nervous to have an in-office procedure, they could choose to have surgery at the hospital under sedation.

Using the local injection technique described by Lalonde and Wong,¹ 1% lidocaine with 1:100,000 epinephrine was injected in a clinic room approximately 25 minutes prior to moving the patient into our 23.2 square meters, in-office procedure room (Fig. 1). Patients remained in their street clothes, could eat before surgery, and



Figure 2. The in-office procedure room back table set-up. The instruments include 2 mosquito forceps, 2 towel forceps, 1 needle holder, 1 Mayo scissor, 1 bandage scissor, 2 Adson forceps, 4 Ragnell retractors, 1 scalpel knife handle, and 1 freer. Senn retractors are also available.

could continue taking their medications, including oral anticoagulants. All procedures were performed under minor field sterility with minimal instrumentation (Fig 2). The extremities were prepped and draped using 1 drape that had a hole for the hand. No antibiotics were administered, and no cardiovascular monitoring was done. The surgical team consisted of a hand surgeon, surgical assistant, and nurse or medical assistant. Phentolamine was available if needed for digit ischemia.

Following surgery, patients were asked survey questions regarding their experience, using a questionnaire (Fig 3) modified from Rhee et al² and Davison et al.³ If the questions were not asked at the time of surgery, the patients were called after surgery. The patients were called once and, if there was no reply, they were encouraged to call the clinic to participate.

Charts were reviewed for survey responses, and clinic notes from the patient's first postoperative visit to their last follow-up were reviewed for any complications, including erythema, drainage, swelling, or other signs of infection after surgery. For most patients, the follow-up was about 6 weeks long. If patients had any of these signs or symptoms, they were counted as having an infection, and management of the infection was recorded. These were classified as either deep or superficial infections. Deep infections included flexor tenosynovitis, deep abscess, or wound dehiscence. Superficial infections included erythema around the incision or suture abscess. The primary outcome of our study was looking at all infections, both superficial and deep.

Statistical methods

Demographic information, including age and gender, along with the procedure type, number of procedures, survey responses, and infections were found in the RedCap database and pulled for the use of this study.

Results

Over the study period, 1,011 patients (337 men; 674 women; average age, 60.7 years; range, 15–93 years) underwent an in-office hand procedure. Most of the procedures were single-digit trigger finger releases (582 procedures), followed by mass removal (158

Procedure:**How would you compare your experience today to going to the dentist office?**

Better

Same

Worse

Would you recommend a procedure done in this room under wide-awake anesthesia to a friend or family member?

Yes

No

Would you do another procedure in this room under wide-awake anesthesia if you needed it?

Yes

No

Figure 3. Patient satisfaction survey, modified from Rhee et al.² and Davison et al.³

procedures), multiple-digit trigger finger releases (109 procedures), and carpal tunnel release (41 procedures; Table 1). One hundred and eighteen patients returned during the study period for a separate procedure.

There were no major complications in this group, as assessed from their first postoperative visit to their last recorded follow-up, which for most patients was 6 weeks. There were no hospital admissions noted. Superficial skin infections were the most common complication. There were 43 superficial infections (4.3%) in our study group, as assessed from the first postoperative visit through the last recorded follow-up. All infections were superficial, and were managed with oral antibiotics and local wound care. No secondary procedures for infections were done. There were no deep infections. There were 27 infections in the single-digit trigger finger group, 8 in the 2-digit trigger finger release group, and 3 in the mass removal group (Table 1). No patients required phentolamine rescue.

The survey response rate was 91% (922 patients). Ninety-nine percent of patients said the experience was better than or the same as going to the dentist, they would recommend the procedure to a friend or family member, and they would do surgery with WALANT again (Table 2).

Around the time of the inception of this project, “lean and green” hand packs were created at our institution to decrease surgical waste in minor field sterility procedures (Fig 2).¹⁶ The cost of one of our “lean and green” hand packs is \$37.46, compared with our traditional pack of \$46.68. Only 1.80 kg of waste are created from the “lean and green” hand pack, compared with 4.09 kg of waste created from our traditional pack.¹⁶ Our institution saved an estimated \$64,542 and an estimated 16,692.2 kg in waste during this project.

Discussion

The overall goals of this study were to evaluate the safety of and patient satisfaction with WALANT surgery in an in-office procedure room in a community-based hospital. Sanford USD Medical Center serves a state with a population of <1,000,000 people. We are based

Table 1

Patient Demographics, Procedure Types, and Infections for In-office Procedures From 2015–2020*

Procedure	Overall	Infections
2 × de Quervain	1	0
2 × Dupuytren	1	0
2 × mass	3	0
2 × trigger finger	109	8
2 × trigger finger, mass	1	0
3 × trigger finger	20	1
4 × trigger finger	2	0
Revision amputation	3	0
Carpal tunnel	41	0
Carpal tunnel, 2 × trigger finger	1	0
Carpal tunnel, 3 × trigger finger	1	0
Carpal tunnel, trigger	10	0
De Quervain	18	1
De Quervain, trigger	1	0
Dupuytren	6	0
Foreign body removal	10	0
Hardware removal	5	0
Incision & drainage	8	1
Mass	158	3
Nailbed	14	1
Nailbed, foreign body removal	1	0
Nailbed, mass	1	0
Scar revision	4	0
Tendon repair	1	0
Trigger finger	582	27
Trigger finger, Dupuytren	2	0
Trigger finger, mass	7	1
Total	1,011	43
Male	337	
Female	674	
Average age, y	60.7	

* A mass was defined as any soft tissue tumor, mucous cyst, or ganglion cyst removal. Hardware removal was Kirschner wire removal. All carpal tunnel releases were done open.

in the largest city in the state and frequently have patients who drive from hours away to be seen. We were motivated to create an in-office procedure room to help these patients have easier access

Table 2
Survey Responses

Procedure Year		2015	2016	2017	2018	2019	2020	Final
Response %		92%	99%	99%	99%	89%	74%	91%
Survey responses:								
Better than the dentist	n	43	106	162	185	114	133	743
	%	62%	90%	82%	85%	75%	80%	81%
Same as the dentist	n	23	11	35	31	39	31	170
	%	33%	9%	18%	14%	25%	19%	18%
Worse than the dentist	n	3	1	1	2	0	2	9
	%	4%	1%	1%	1%	0%	1%	1%
Would recommend to friend/family member	n	68	118	198	216	151	166	917
	%	99%	100%	100%	99%	99%	100%	99%
Would not recommend to friend/family member	n	1	0	0	2	2	0	5
	%	1%	0%	0%	1%	1%	0%	1%
Would do another procedure under WALANT	n	68	118	198	217	152	166	919
	%	99%	100%	100%	100%	99%	100%	100%
Would not do another procedure under WALANT	n	1	0	0	1	1	0	3
	%	1%	0%	0%	0%	1%	0%	0%

to medical care and to offload demand for our main operating rooms. Patients can drive themselves home, eat breakfast, take their medications, and minimize long travel days and time off work. It is more cost effective for the patient on a multitude of levels. Getting our hospital management on board was challenging but, with persistence and by showing the data, we were able to establish an in-office procedure room.

In this patient cohort, we found a low infection rate and high patient satisfaction with WALANT. The ability to do hand surgery in procedure rooms is related to 2 factors: (1) the use of epinephrine in the hand; and (2) the concept of minor field sterility. Historically, surgeons were taught that local anesthesia with epinephrine should not be injected into fingers for fear of necrosis. This dogma has been disproven, as multiple studies have shown the safety of epinephrine in the hand and fingers.^{31–36}

Another breakthrough in hand surgery is the concept of field sterility.²⁹ Field sterility has allowed procedures to be done outside of a formal operating room, with a minimal amount of equipment needed and with similar infection rates to those of procedures performed in operating rooms. After the advent of WALANT, there were concerns about potential increases in infection rates in procedures done outside of the traditional operating room. This concern is unfounded. Procedures done in minor procedure rooms using field sterility have been shown to have similar infection rates as compared to those performed in operating rooms.^{2,10,29,36–39} A systematic review by Jagodzinski et al⁴⁰ reviewed articles dealing with hand surgery done in a variety of locations, such as procedure rooms and minor operative suites, instead of the main hospital operating room. In 3 studies, there were no infections, and in 2 studies with a combined 1,962 carpal tunnel releases, the infection rate was 0.4%.⁴⁰

Our findings confirm a low infection rate in our in-office procedure room; overall, we had an infection rate of 4.3%. It is interesting that many of our infections came from the trigger finger groups, with the single-digit trigger finger group having an infection rate of 4.6% and the 2-digit trigger finger group having an infection rate of 7.3%. This is perhaps due to the association of diabetes and trigger fingers, as well as the relatively small numbers (582 and 109 hands, respectively) in these groups. We did not exclude patients with comorbidities or recent steroid injections and did not collect these data, so it is difficult to say definitively whether these variables played a role or not.

Recently, Stephens et al¹⁴ evaluated the safety of WALANT anesthesia in a procedure room. A group of 1,401 patients with 1,796 procedures were reviewed to look at the safety of a hand surgery procedure room. No patients were excluded based on

American Society of Anesthesiologists' scores or comorbidities. No patients were admitted to the hospital, and no procedures were stopped owing to patient intolerance or surgeon inability to complete the procedure. Minor complications included flexion contractures, infection, persistent symptoms, recurrence, numbness, or stiffness. There were 7 infections (0.6%) noted, and only 2 patients required operative debridement.

In a recent review article of field sterility, Yu et al¹⁵ advocated for field sterility for all skin and hand procedures. They found no evidence to support the use of main operating room sterility guidelines (head covers, gowns, full patient draping, and laminar airflow) for minor procedures. They argued that the waste and the costs generated by main operating rooms are not justified for minor skin and hand procedures. When superficial infections occur, they can be easily treated, with minimal patient morbidity.¹⁵ The ability to minimize surgical waste with minor hand procedures has also been documented by other authors.^{6,26,29,41,42}

Patients have been pleased with WALANT surgery done in procedure rooms. High patient satisfaction rates have been reported both in the United States and abroad.^{2,3,6,7,10,12,14,25,43–46} Our study found similar results, with 99% of patients rating their experience as better than or the same as going to the dentist. Ninety-nine percent of our patients would recommend wide-awake hand surgery to a friend or family member and would also do surgery while wide awake again if needed. One hundred and eighteen patients returned for another procedure in the procedure room during the study period. Although the survey used is not a validated outcome measure, patient satisfaction was high, and there was an overall positive perception of WALANT hand surgery.

Moving minor hand surgery cases from the main operating rooms to procedure rooms results in dramatic cost savings. Procedure rooms are less expensive and more efficient.^{2–29} The savings begin before the patient steps foot in the procedure room, with no need for preoperative laboratory testing and medical evaluations. In a study of preoperative carpal tunnel patients, Greenfield et al⁸ found a per-patient average cost of \$858.74 was spent on preoperative work-ups and nonsurgical management of patients who underwent carpal tunnel release.

Chatterjee et al²² compared the costs and profit margins for carpal tunnel surgeries done in a clinic procedure room versus the hospital operating room. They found the profit margin for an office-based open carpal tunnel release was \$1,186. In contrast, an open carpal tunnel release done in the main operating room had a net loss of \$650 per case. When factoring in the lost opportunity cost, the actual real loss for a main operating room open carpal tunnel release was \$3,349 per case.²²

There are some limitations to our study. This study is a retrospective chart review, so there is a risk for self-selection bias. At our institution, all patients seen in our practice are given the option of having their procedure done in office, regardless of medical comorbidities. The patients were free to choose the location for their procedure, in either the in-office procedure room or the hospital operating room. There was no control group, and no patient outcome measurements were collected. Potential for recall bias exists in the 110 patients who were called for survey responses after their surgeries, instead of being asked at the conclusion of their surgery.

Since information about infections was gathered from patient chart data that were imported into RedCap, it is possible that the patient medical records do not accurately reflect their infections or that they received treatment for infections elsewhere. Any patient who received an antibiotic for a postoperative wound problem was counted as having an infection. All patients were treated with oral antibiotics and local wound care.

We found that in-office hand procedures performed under WALANT and minor field sterility are safe, with high patient satisfaction. Our study was conducted at a single, community-based hospital in the United States. In addition, minor hand surgery done in a procedure room has been shown to be efficient, to be cost effective, and to decrease surgical waste.

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