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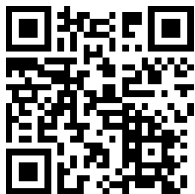
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Outcomes of Wide Awake Local Anaesthesia no Tourniquet (WALANT) In Soft Tissue Surgeries Of The Hand

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ABSTRACT

Introduction: Hemostasis in hand surgery can be achieved by use of an arm tourniquet but it has its own disadvantages like tourniquet-related pain, muscle and nerve injury, post-tourniquet thrombosis, and bleeding. Another method can be the use of epinephrine locally, but surgeons are concerned with digital ischemia and necrosis as seen with use of procaine in the 1970s. Recently Wide Awake Local Anesthesia No Tourniquet (WALANT) is being popular among hand surgeons in which a mixture of local anesthetic with adrenaline and sodium bicarbonate is used. Despite the absence of tourniquet related complications in WALANT technique, surgeons are reluctant to use lignocaine with epinephrine in hand surgery.

Objectives: The objective of this study is to observe the outcomes of WALANT technique in various surgical procedures of hand.

Methodology: This prospective study involved 103 patients undergoing soft tissue surgery of the hand at Birat Medical College Teaching Hospital. Patients meeting inclusion criteria and willing to participate in study were included. A proforma was filled by the operating surgeon and another proforma was to be filled by patient at home after discharge which was retrieved at follow-up visit. A mixture of 10 ml of 2% lignocaine with adrenaline diluted in equal volume of normal saline and 2ml of 8.4% sodium bicarbonate was used for local anesthesia.

None of our patients developed digital ischemia or necrosis, one patient developed surgical site infection which recovered with oral antibiotics. The mean VAS score at the time of administration of local anesthesia was 3.8+1.2, intraoperatively it was 1.8+1.1 and at 2 hours postoperatively it was 2.3+1.3. VAS score at 6 hours, 12 hours and 24 hours postoperatively was 3.2+1.2, 3.4+1.4 and 3.7+1.1 respectively. Hemostasis control was excellent in 33 cases, very good in 58 cases, good in 8 cases, and poor in 4 cases.

Conclusion: We conclude that WALANT technique is safe to use in various soft tissue surgeries of hand surgery in terms digital ischemia, necrosis or wound infection and effective in providing excellent control of hemostasis at surgical site.

INTRODUCTION

As with all surgeries, visibility of structures and control of bleeding is also critical in hand surgery, especially in the hand's small and delicate soft tissues. This can be achieved by using a tourniquet, but it has disadvantages like nerve injury, muscle injury, post-tourniquet thrombosis, and bleeding.^{1,2} The use of epinephrine locally for hemostasis is a way to avoid tourniquet-related complications³ However, surgeons are afraid of tissue ischemia and necrosis as described with the use of procaine in the 1970s. Later it was proven that tissue necrosis was a result of the acidic pH of procaine caused

by prolonged storage and not by epinephrine.⁴ Later, multiple studies demonstrated the safety and efficacy of epinephrine in hand surgery which encouraged its use on hands and fingers.^{5,6}

Recently the technique of Wide Awake Local Anaesthesia No Tourniquet (WALANT) is popular among hand surgeons. In this technique, the surgeon performs anesthesia on the patient using a mixture of lidocaine, epinephrine, and sodium bicarbonate. Epinephrine provides temporary hemostasis and prolongs the duration of action of lidocaine while Sodium Bicarbonate decreases the acidic pH of the local anesthetic solution thereby decreasing injection-related pain^{3,7,8}. Other advantages of the WALANT technique are the patient convenience of fewer hospital visits, no need for pre-procedural anesthetic clearance, and preoperative fasting as this procedure can be performed on a day care basis thus reducing the overall cost to the patient.⁵ Similarly, another advantage of the WALANT technique is the possibility to assess the repair or release of soft tissue as the patient is awake and can follow the command to move the finger thus helping the surgeon to judge the adequacy of the procedure.⁹ In spite of these advantages, the fear of tissue necrosis and ischemia is still present among many surgeons.¹⁰ There is a paucity of literature from Nepal regarding the outcome of this technique in hand surgery. We performed this study to observe the outcome of the WALANT technique in soft tissue surgeries of hand in our group of patients.

METHODOLOGY

This was a prospective study that enrolled 107 patients who underwent a variety of soft tissue surgery of the hand under WALANT in Birat Medical College Teaching Hospital from August 2022 to April 2023 after ethical approval from institutional review committee. Three patients did not come for follow up and one patient lost their proforma and hence 103 patients were included in the study of which 40 were males and 63 were females. Written informed consent was taken from all patients prior to the procedure. Patients with a diagnosis of trigger finger, carpal tunnel syndrome, ganglion cyst of wrist, de'Quervain tenosynovitis, laceration injury of hand, and tendon injury of hand were included in the study. Patients with age less than 18 years and more than 70 years, a history of peripheral vascular disease, a history of allergy to local anesthesia, and a history of previous surgical procedures at the site of surgery were excluded from the study. The questionnaire for surgeon included duration of surgical procedure, volume of local anesthetic mixture used, pain at the time of injection, pain during the surgical procedure, visibility of operative field in terms of hemostasis control (as judged by first assistant), VAS score at 2hrs post-op and postoperative complications if any. The proforma for patients included VAS score at 6hrs, 12 hrs, and 24 hrs of surgery and analgesic need within 6hrs and 24 hours of surgery. Data were summarized as mean and standard deviation for continuous variables, and percentage and frequency for categorical data.

Surgical procedure All procedures were done on a day care basis. Patients were thoroughly explained about the procedure.

Local anesthesia was prepared using a mixture of 10 ml of lignocaine (2%) with adrenaline(1:200000) diluted in 10 ml of Normal Saline (0.9%) in which 2ml of Sodium Bicarbonate (8.4%) was added forming a mixture of 22ml. The amount of local anesthesia was administered as per the need of surgery which never exceeded the recommended safety dose(7mg/kg).¹¹ Injection Phentolamine was kept ready for the reversal of digital ischemia if any happens during the procedure. Local anesthesia was administered at least 30 minutes before the surgery in a preoperative preparation room using sterile precautions following the Lalonde technique.⁹ Administration of local anesthetic mixture and surgical procedure was performed by the same surgeon. The pain related to injection was minimized by using techniques as described by Joukhadar et al.⁷ The proforma for the surgeon was filled by the same surgeon performing the surgical procedure. Patients were kept under observation for 4 hours to look for immediate complications and were discharged on the same day with advice to take oral analgesics as per the need. At the time of discharge, the patients were given a proforma to be filled at home which was retrieved during their next follow-up. All patients were called on 2nd postoperative day during which wound inspection and dressing were done and the proforma was retrieved on the same day. Suture removal was done after 14 days of surgery.

RESULTS

The surgical procedures performed using WALANT were A1 pulley release for trigger finger, carpal tunnel release, first dorsal compartment release for de'Quervain tenosynovitis, wound debridement and laceration repair of hand, primary repair of tendon injury of hand, and ganglion cyst excision of wrist. The mean age of our patients was 43.2 years. The mean volume of local anesthesia used was 12.44 ml and the mean surgical time was 28.74 mins. None of our patients developed digital ischemia or necrosis and phentolamine reversal, one patient developed surgical site infection which recovered with a course of oral antibiotics. Local anesthesia provided adequate intraoperative analgesia in all cases and there was no need of additional anesthetic requirements during the procedure. The visual analog scale (VAS) scale 0-10 was used to record pain at the time of administration of anesthesia, intraoperatively and postoperatively. The mean VAS score at the time of administration of local anesthesia was 3.8 ± 1.2 , intraoperatively it was 1.8 ± 1.1 and at 2 hours postoperatively it was 2.3 ± 1.3 . VAS score at 6 hours, 12 hours, and 24 hours postoperatively was 3.2 ± 1.2 , 3.4 ± 1.4 , and 3.7 ± 1.1 respectively. None of our patients required oral analgesics for up to 6 hours of surgery while only 44 out of 103 patients required a single dose of oral analgesic (NSAID) within 24 hours of surgery. Hemostasis control, graded on the Likert scale by the assistant (nursing staff) during the surgery, was excellent in 33 cases, very good in 58 cases, good in 8 cases, and poor in 4 cases.

Table 1: Surgical procedure, number of patients, surgical duration(mean) and volume of local anesthesia used (mean)

Surgical procedure	No of patients (n)	Mean surgical duration (mins)	Mean volume of Local anesthesia (ml)
A1 pulley release	28	9	6.5
Carpal tunnel release	12	22	12
First dorsal compartment release	9	16	9.5
Wound debridement and laceration repair	30	38	16.5
Primary repair of tendon injury	15	48	18.4
Ganglion cyst excision of wrist	9	21	11



Fig1: Carpal tunnel release showing excellent control of bleeding and median nerve (black arrow) visualized in the operative field

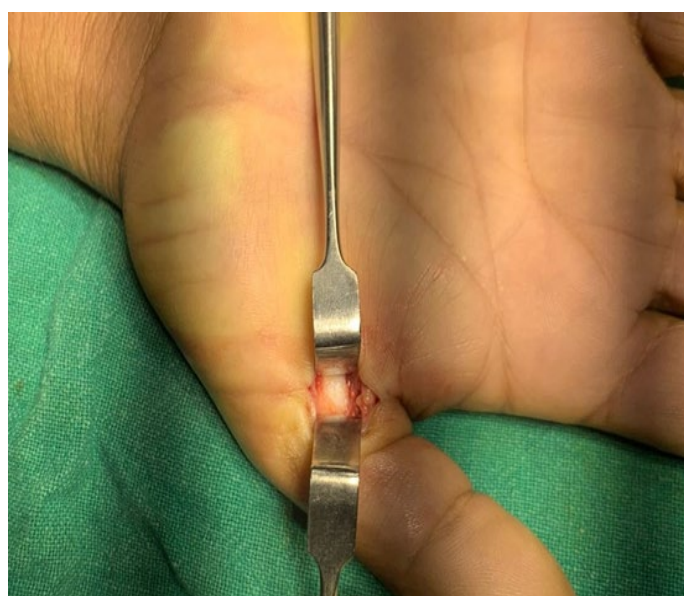


Fig 2: Thickened A1 pulley (white arrow) clearly visualized during trigger thumb release under WALANT

DISCUSSION

The advantages of the WALANT technique in hand surgery are avoidance of preoperative fasting and anesthetic clearance, no need for a tourniquet, day care procedure, and most importantly the ability of the surgeon to observe the adequacy of release, repair, or reconstruction of soft tissue structures like pulley release and tendon repair or reconstruction.¹² Along with these advantages, the present study also reinforces the additional advantages of WALANT like lower injection pain, prolonged duration of analgesia, decreased postoperative need for analgesics, and adequate hemostasis control during the surgery.

Injection pain, which is bothersome to patients receiving local anesthesia, is attributed to the acidic pH of lidocaine and adrenaline. The explanation for the pain is as follows: firstly, the acidic solution irritates the neutral tissue causing a burning sensation and secondly, at acidic pH, the anesthetic agent is in active, freely diffusible form thereby delaying the onset of action.^{13,14} We added sodium bicarbonate as a buffer to the

mixture which changed the pH of the solution to alkaline thereby decreasing the injection-related pain.

Our study showed that the anesthetic effect is prolonged with WALANT, which is beneficial for longer surgery like tendon repair and reconstruction. None of our cases required additional anesthesia during the surgery nor needed higher than the recommended dosage of local anesthesia which reinforces that WALANT can safely be used in surgeries requiring prolonged duration of anesthesia like tendon tendon transfer as well as fracture fixation.^{15,16} Similar to other studies our study also demonstrated that patients experienced little or no pain at the time of administration of local anesthesia. This is attributed to proper technique of administration of local anesthesia as described by Lalonde and Joukhdar⁷. We also observed that the mean VAS score during and after surgery was significantly less than that during the administration of local anesthesia.^{17,18} Like other studies, our study also showed that the analgesic

requirement in the immediate postoperative period is minimal with the use of the WALANT technique especially during the first 24 hours of surgery.^{18,19} This is beneficial for day care surgery as it decreases the post procedure anxiety of patient and increases perceived comfort.

To our knowledge, this is the first study to observe the effect of WALANT in terms of grade of hemostasis control in Likert scale as judged by first assistant. We observed that WALANT provides very good hemostasis control in terms of the visibility of structures during the surgery. The surgeon involved in grading the hemostasis control was not a part of the study thus eliminating bias during the study. We retrospectively reviewed the four cases where the hemostasis control was graded as poor, and we found that three out of those four cases had a higher BMI (29.4 to 34.1) probably requiring deeper infiltration of the local anesthetic agent and deeper soft tissue dissection during surgery.

Like other studies, we also found no complications like digital ischemia requiring phentolamine reversal nor any necrosis or increased incidence of infections while using the WALANT technique in hand surgeries.^{10,18,20}

A potential disadvantage of this technique is the prolonged preoperative preparation time of nearly 30 minutes which is required for the optimal onset of the vasoconstrictive effect of adrenaline. However, this administration of WALANT can be done in a preoperative procedure room or preparation room thereby not hampering the theater time. Despite this inevitable disadvantage of prolonged preoperative preparation time, the other advantages clearly outweigh the longer preparation time of the WALANT technique.

CONCLUSION

We conclude that the WALANT technique is safe to use in various soft tissue surgeries of hand surgery in terms of digital ischemia, necrosis, or wound infection. It provides excellent hemostasis in the operative field thereby negating the disadvantages of tourniquet application. There is minimal pain at the time of injection of local anesthesia and the pain control during the procedure and immediate post procedure is excellent. The only potential disadvantage of this technique is prolonged preoperative preparation time for optimal onset of hemostatic effect of adrenaline which is around 30 minutes.

LIMITATIONS OF STUDY

The strength of our study is: this prospective study eliminates recall bias, includes a variety of cases of hand surgery, the administration of local anesthesia, and surgical procedure was performed by the same surgeon thereby decreasing the bias. The weakness of our study is, this was a non-comparative study. And a variety of procedures were included in the study requiring different level of tissue dissection and hence the evaluation of bleeding and postoperative pain varies patient to patient. Pain

evaluation using VAS score is a subjective evaluation that also differs from patient to patient, hence the need of analgesics in the postoperative period is not the same in all patients.

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CONFLICT OF INTEREST

 None

FINANCIAL DISCLOSURES

 None

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