Surgical Technique

Procedural Technique for Wide Awake Local Anesthesia No Tourniquet Injection for Endoscopic Carpal Tunnel Release

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Carpal tunnel syndrome is the most common upper extremity peripheral neuropathy syndrome. Treatment ranges from nonsurgical methods, including night-orthosis fabrication and corticosteroid injections to surgical management via a carpal tunnel release (CTR). Carpal tunnel release alleviates nerve compression by releasing the transverse carpal ligament, and performed as either an open CTR (OCTR) or endoscopic CTR (ECTR) procedure. However, there is no consensus on the superiority of the 2 approaches. Practitioners may be limited to 1 technique because of surgeons’ comfort, access to an operating room versus a procedure room, and cost. The purpose of this article was to describe the surgical technique for wide awake, local anesthesia, no tourniquet ECTR performed in an office-based setting, which would decrease operating room demand and cost.

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Patient selection

Not all patients are suitable for wide awake procedures. Thoroughly discussing patient expectations before the procedure will help the surgeon identify patients who would be amendable to ECTR under local anesthetic. Patients should
understand that they must remain awake throughout the procedure. An anxious patient maybe put at ease by listening to music, talking with the surgeon and staff, or even taking a nap during the procedure. Because the procedure is performed in the office setting, there is no ability to administer a systemic anesthetic if the patient did not tolerate the WALANT approach. Therefore, patient selection is a crucial component to a successful, wide awake surgery and because the surgeon feels more confident, one’s criteria may widen. Contraindications for this specific technique may include patients on anticoagulation as a tourniquet is not applied and achieving hemostasis is imperative for endoscopic visualization.

**Patient Preparation and Positioning**

**Local anesthetic**

Before the procedure, 2 syringes of 10-mL solutions are prepared. Each 10-mL solution contains 9 mL of 1% lidocaine with epinephrine (1:100,000) and 1 mL of 8.4% sodium bicarbonate. First, draw up the lidocaine with epinephrine, then the sodium bicarbonate. The sodium bicarbonate neutralizes the lidocaine to reduce pain when the lidocaine is administered. A designated clinic room separate from the procedure room is used for local anesthetic administration to minimize turnover time and decrease patient waiting times. Alternatively, patients can be injected and then returned to the waiting room with their hand covered. Approximately 30 minutes before the planned surgical intervention, the patient will be brought back for the injection.

The patient’s volar wrist is disinfected in line with sterile technique approved at one’s institution. Identify the palmaris longus if present. Administer the first local injection at the wrist crease slightly ulnar to the palmaris longus. If the palmaris longus is not present, inject in line with the radial aspect of the ring finger (Fig. 1). The needle is first inserted superficially to create a skin wheal with 2 mL of the anesthetic solution. The needle is then advanced deep to the fascia and the remaining 8 mL of solution is inserted around the median nerve, but not intraneural. If the patient experiences hand paresthesia during the injection, withdraw the needle slightly as it may be traversing the nerve. The second injection of the 10 mL solution should enter the skin at the same location as the first injection. Slowly inject the anesthetic as the needle is advanced distally, remaining superficial. The medication will bath the nerve endings to the TCL and the surrounding musculature from the wrist crease to the Kaplan’s cardinal line. Palpate the palm as the 10 mL solution is injected. The palm should transition from soft to firm, from the wrist crease to Kaplan’s cardinal line. In total, 20 mL of the anesthetic solution is administered after completion of the 2 injections.

**Procedure room setup**

Place a pillow under the patient’s head and legs. With the arm extended and resting on the operative table, adjust the surgical lights to be 180° from each other and in line with the operative arm. See Video 1 (available on the Journal’s website at www.jhsgo.org), Figure 2, and the Table for specific instruments and supplies used during the procedure and for closure. The endoscopic tower is placed along the contralateral side from the operative limb. On a separate sterile Mayo stand, assemble the endoscope. Drape a sterile gown over the patient’s body on which the endoscope cords can rest without being contaminated when crossing the patient’s body to be connected to the endoscopic tower power source. See Figure 3 for an overview of the procedure room setup.

**Surgical Procedure**

Identify the palmaris longus if present. Make a 1-cm transverse incision over the palmaris longus at the wrist crease. If the palmaris longus is not present, the incision will be centered in line with the radial border of the ring finger. See Figure 4 for the location of the incision. Using the bipolar forceps, obtain strict hemostasis of the subcutaneous soft tissue to ensure visualization with the endoscope. Spread it longitudinally down to the antebrachial fascia using dissecting scissors. Transversely incise the fascia using a
beaver blade. Clear the antebrachial fascia both dorsally and volarly, then incise the fascia in a retrograde fashion. With gentle pressure, push the open scissors along the fascia creating a sharp dissection of the antebrachial fascia. Now direct the attention distally. Prepare the carpal tunnel for endoscopic release based on the system being used. In this instance, 2 sequential dilators are introduced into the carpal tunnel. These dilators help to confirm the correct location along with dilating the tunnel for the endoscope. If the hook of hamate is palpated radial to the dilator, the dilator is most likely located in Guyon canal and should be redirected. The next step is to clear off the TCL of the synovium so that direct visualization of the ligament is noted. Next, a depth gauge is introduced into the carpal tunnel. The depth gauge should be inserted into the canal until the distal end is palpated just distal to the TCL. This measurement is the length of the TCL and will guide the safe release. Place the hook retractor deep to the fascia and apply upward force to direct the skin out of the dissection plane. Insert the endoscope into the carpal tunnel, watching the monitor as the blade enters, ensuring the median nerve is not in the blade’s path. If the tunnel is too tight or the nerve is getting into direct view, make sure the wrist is not being placed in hyperextension, abduct the thumb, and repeat the cleaning of the synovium off the ligament. The dissection will most likely require multiple passes with the blade activated to ensure that the TCL is fully incised (Figs. 5, 6). Make sure to cut only the TCL as muscle laceration will result in increased pillar pain. Irrigate the incision with a bolus of normal saline. Repair the incision with 4-0 Monocryl suture (Ethicon) and reinforce the closure with DERMABOND (Ethicon). See Video 2 (available on the Journal’s website at www.jhsgo.org) for an overview of the surgical technique.

Postoperative Instructions

Unless patients have underlying medical conditions that prevent them from taking the standard postoperative medications, patients are discharged home on acetaminophen 500 mg every 6 hours and ibuprofen 650 mg every 6 hours. The patients are instructed to remove the dressings and place a band-aid over the incision 3–5 days after surgery. They are to refrain from heavy lifting and getting their incision wet for 2 weeks after surgery. Patients are encouraged to perform gentle ranges of motion, apply ice, and elevate their extremity. No immobilization is required. Two weeks after surgery, they can progress to full weight-bearing and may return to normal activities.

Discussion

Patients who underwent unilateral CTR without other simultaneous procedures from May 2013 to October 2018 were evaluated. During this study period, 30 patients received WALANT ECTR, and 98 patients underwent open CTR under local anesthesia without tourniquet (WALANT OCTR). Of 30 patients, 1 (3.3%) patient in the WALANT ECTR group was converted to WALANT OCTR at the time of the index procedure because of poor visualization. There were no
nerve injuries in either cohort. Surgical times were not recorded for the office-based procedures, but surgical times were recorded when the procedure was performed in the ambulatory operating room. Wide awake, local anesthesia, no tourniquet OCTR was a consistently faster operation than WALANT ECTR with an average operating room time of 5.11 minutes less than WALANT ECTR (95% CI, 2.55–7.67 min, \( P < .01 \)). However, this was largely driven by the senior surgeon (M.C.M.). Comparing the other surgeons’ pooled WALANT OCTR times to WALANT ECTR showed no significant difference in operating room time, with WALANT ECTR being 0.18 minutes faster (95% CI, –4.51 to 4.87 min, \( P = .94 \)).

The lack of adequate visualization during WALANT ECTR is a common reason for conversion to an open procedure. Ly et al\(^8\) described their experience with WALANT ECTR. Of the 24 cases performed, 8 cases had impaired visualization of the TCL secondary to bleeding and edema. However, none of these cases were converted to open. In our cohort, excessive intraoperative bleeding was not a common occurrence. As described by McKee et al\(^9\), delaying the procedure by 25–30 minutes after epinephrine administration minimized bleeding and provided adequate hemostasis. Gauze may also be inserted into the canal to wick away bleeding and permits the surgeon to continue the operation safely with adequate visualization.

In summary, ECTR is an alternative method to open CTR and can be performed under WALANT in the clinic setting to potentially reduce costs. As both WALANT and endoscopic surgery become more popular, this option will continue to be more viable.

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