Wide-Awake Extensor Indicis Proprius to Extensor Pollicis Longus Tendon Transfer

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This article provides video and narration to describe the technical details of how to inject local anesthesia and perform the extensor indicis proprius to extensor pollicis longus tendon transfer in patients with wide-awake local anesthesia and no tourniquet. Lidocaine for anesthesia and epinephrine for hemostasis are the only 2 medications given to the patient. Sedation and the tourniquet are not required. Wide-awake patients are comfortable, cooperative, and educable, and are able to help the surgeon set the correct tension for the transfer. They flex and extend the thumb before the skin is closed to make sure the transfer is not too tight or too loose. It helps that they remember seeing the thumb move nicely during the surgery when they are in postoperative hand therapy. (J Hand Surg Am. 2014;39(11):2297–2299. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Wide-awake local anesthesia no tourniquet, wide awake, epinephrine, adrenaline, transfer tension.

The advent of increasingly safe general anesthesia before 1950 generated the era of bloodless tourniquet hand surgery that dominated the field until the past 15 years. Although it was once taboo, the early 2000s brought good evidence that epinephrine hemostasis in the finger and hand is safe1–4 and that the tourniquet and its requirement for sedation are no longer essential to perform hand surgery.

Painful injection of local anesthesia is another factor that drives patients to sedation. However, new techniques of almost pain-free local anesthetic injection for operations such as carpal tunnel and simple tendon transfers can be reproducibly taught to medical students and residents in such a way that patients only feel the pain of the first poke of a 27-gauge needle.5,6 Almost pain-free local anesthetic injection technique will be demonstrated in the video and in the content of this article.

One challenge of tendon transfer is the correct setting of the transfer tension. The author remembers well his first case of general anesthetic extensor indicis proprius (EIP) to extensor pollicis longus tendon (EPL) transfer 30 years ago when he set it too tight in a young carpenter who subsequently had difficulty wielding his hammer. We were taught to “set it a little tighter than you think you should.” The comfortable, tourniquet-free, unsedated patient can test both flexion and extension of the thumb before the skin is closed, to help the surgeon adjust the tension so that it is not too tight and not too loose.

INDICATIONS

Rupture of EPL is most frequently seen after fracture of the radius. Transfer of EIP is simple, synergistic, almost always available, and close by anatomically. Patients do not have to learn this transfer and can cooperatively move the thumb immediately on the operating table when they are wide awake.7

CONTRAINDICATIONS

Patients who are not able to be cooperative with surgery under local anesthesia should not be considered
candidates. Patients who may be sensitive to epinephrine could have the epinephrine dosage lowered to the range of 1:400,000 to 1:1,000,000. Patients who “need” sedation cannot be taught during the operative procedure because they will not remember what they have learned during the surgery. In addition, sedation renders a number of patients uncooperative.

**TECHNIQUE**

**Injecting local anesthesia in a relatively pain-free manner**

Inject 30 mL of 1% lidocaine with 1:100,000 epinephrine (Video 1, available on the Journal’s Web site at www.jhandsurg.org) 2 cm beyond wherever dissection will occur. It is better to be too numb than not numb enough. Buffer the 30 mL of local with 3 mL of 8.4% bicarbonate to bring the pH up from 4.7 to 7.4.8

As described in more detail elsewhere, to minimize the pain of local anesthesia, begin by using a 27-gauge needle. It will hurt less than a 25-gauge needle and a smaller needle forces the injector to slow down.

To minimize feeling the needle wobbling in the skin before it is numb, have the injecting thumb ready on the plunger and the syringe stabilized with both hands before entering the skin. Apply pressure to the skin just adjacent to the entry site to provide sensory noise that decreases the sting of the needle. Enter the skin at 90° and inject under the dermis, not in the dermis. Inject at least 2 mL under the skin at the initial injection site before moving the needle at all. Inject slowly while advancing the needle gradually, not in jerks. The needle should always have at least 1 cm of palpable or visible local ahead of its sharp tip so that live unanesthetized nerves are never irritated.

The usual 2 causes of painful injection are infusing too rapidly or getting the sharp needle tip ahead of the local into unanesthetized nerve endings.

When reinserting the needle into a new area of skin, be sure to insert it into skin inside a clearly white 1-cm boundary that definitely shows evidence of epinephrine vasoconstriction and therefore is also numb with lidocaine.

**Intraoperative testing of transfer tension**

The EIP and EPL tendon stumps are overlapped so that the thumb position looks good with wrist flexion and wrist extension, as is done under motor block anesthesia. Two temporary mattress sutures are placed between the 2 tendons. One suture may not be enough to hold the tendons with active movement. The patient is then asked to extend the thumb as if hitchhiking, to test whether the tension is tight enough. The patient is then asked to touch the little finger with the thumb, to make sure the tension is not too tight. Tension is adjusted until it is just right and then a Pulvertaft weave is carried out.

**Rehabilitation and postoperative care**

Rehabilitation in patients who have already seen themselves perform a full range of motion on the operating table is greatly facilitated compared with those who have been sedated and told “Your transfer will probably work well” after surgery. We immobilize the transfer for 4 weeks and then begin gradual movement.

**CLINICAL CASE**


**PEARS AND PITFALLS**

Inject the local anesthesia in recovery before the patient comes into the operating room

It takes 26 minutes for maximum epinephrine vasoconstriction after injection. We therefore inject our patients in the recovery room before they are brought into the operating room to allow ample time for the lidocaine and epinephrine to work. Even if the surgery starts an hour after the injection, you will still easily have 2 to 3 hours to accomplish the procedure before the lidocaine with epinephrine wears off.

**INTRAOPERATIVE PATIENT EDUCATION**

Patients can be educated during the procedure with advice such as keeping the hand elevated for the first 2 or 3 days. They can be instructed on the proper use of pain medication. They can be told to not try to move the index finger while the tendon is healing. They will see with their own eyes and remember how lifting the index finger elevates the thumb. Unsedated patients will remember your instructions. You get a full hour of uninterrupted patient education time.

**Patients may need to look at thumb to move it during surgery**

You can simply cover the wound with a towel while patients look at the thumb if the sight of the wound bothers them.

**COMPLICATIONS**

Fainting during injection or during surgery

Any patient can faint during injection of local anesthesia or even lying down during the procedure. Vasovagal attacks (not enough blood going to the brain) are less likely if patients are lying down for the injection. If they become pale between the eyes or state that they feel nauseous or unwell, you can get more blood to their
brain by getting them to flex their hips and knees (blood from the thighs goes to the brain), taking the pillow away from under the head, and putting the injection stretcher or operating room table in Trendelenburg (head down, feet up) position. They usually feel much better within minutes. It may be wise to keep the head down for 10 to 15 minutes or the event may repeat itself.

The white thumb

The author has not seen a white thumb when performing this procedure. If it should occur and the surgeon is uncomfortable with it, he or she can dilute 1 mg of phentolamine in 5 to 10 mL of saline and inject it wherever epinephrine has been injected, to reverse vasoconstriction. Generally capillary refill returns within 1 hour.1

REFERENCES


