



Wide-awake Hand and Wrist Surgery: A New Horizon in Outpatient Surgery

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Abstract

There has been increased interest in and experience with performing several surgical procedures on the hand and the wrist utilizing local anesthesia in an unsedated patient. These surgical procedures can be safely performed on an outpatient basis. Experience has shown that the strategic use of local anesthesia with epinephrine is safe and, in procedures such as tendon repair or transfer, permits intraoperative control of overall motion and function.

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This chapter discusses the correct dosages of local anesthesia for specific hand and wrist procedures, including flexor and extensor tendon repair, tendon transfer, Dupuytren contracture release, trigger finger and carpal tunnel release, and the surgical treatment of

metacarpal and phalangeal fractures. In addition, wide-awake techniques permit percutaneous Dupuytren contracture release to be performed as an office procedure. Step-by-step techniques for wide-awake anesthesia are described.

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Hemostasis Instead of a Tourniquet for Hand Surgery

Many hand surgeons are moving away from traditional surgery using a tourniquet and sedation to an approach that utilizes wide-awake local anesthesia and no tourniquet (WALANT). Lidocaine and epinephrine are the only medications injected for anesthesia and hemostasis at the locations of dissection and where Kirschner wires will be inserted.

The benefits of the WALANT approach include the following: (1) No sedation and no tourniquet increases patient comfort and convenience. Patients can have hand surgery in much the same way as a minor procedure at the dentist. (2) Eliminating the anesthesiology/sedation component decreases treatment time for minor procedures such as carpal tunnel and trigger finger releases. (3) During a procedure, the ability to see and alter sutured tendons and fixated bones and joints undergoing a full range of active movement initiated by a comfortable and cooperative

patient has improved results in tendon repair, transfer, and finger fracture fixation.¹

The WALANT approach is not appropriate for all patients, but most who can have dental procedures without sedation will do well with this approach.

Epinephrine Is Safe in the Finger

It was once widely believed that injected epinephrine frequently caused finger ischemia and necrosis. That belief was widespread before 1948 when procaine was the only injectable local anesthetic. Before expiration dates were mandated by the FDA in 1972, procaine (pH 3.6) that had become increasingly acidic during storage was used in surgical procedures.² Batches of procaine with a pH of 1 were used for injections as late as 1948.³ More finger necrosis occurred with procaine without epinephrine than occurred with procaine combined with epinephrine, but epinephrine was blamed because of its vasoconstrictive effect.⁴

Level I evidence has shown that phentolamine, an alpha blocker that became available in 1957, reliably reverses epinephrine vasoconstriction in the human finger.⁵ However, its use is seldom required in clinical practice.⁶ The literature has reports from large studies that clinical epinephrine has been used without inducing infarction.^{6,7} In addition, no cases of digital infarction have been reported with high-dose (1:1000) accidental epinephrine finger injections,^{8,9} so it is unlikely that epinephrine would infarct fingers at a concentration of 1:100,000. More cases of digital infarction have been reported with improperly used digital tourniquets than with lidocaine and epinephrine use, although both are rare.^{10,11}

Method of Injection

The commonly used dosages of lidocaine with epinephrine for typical procedures have been reported in the literature.^{1,12} This chapter's authors prefer to stay in the very safe zone of 7 mg/kg of lidocaine with epinephrine, even though much higher doses have resulted in nontoxic blood levels.¹³ If a 70-kg (154.3 lb) patient requires an injection of less than 50 mL to achieve slight firmness in the whole surgical area with local anesthesia (tumescence), then 1% lidocaine is used with 1:100,000 epinephrine. If 50 to 100 mL are required (for example, spaghetti wrist), then the solution is diluted with saline to 0.5% lidocaine with 1:200,000 epinephrine. If 100 to 200 mL are required, such as for tendon transfers, then the solution is diluted to 0.25% lidocaine with 1:400,000 epinephrine. If a surgical procedure is expected to take longer than 2.5 hours, up to 20 mL of 0.5% bupivacaine with 1:200,000 epinephrine is added to the total volume. **Table 1** lists the typical volumes of local anesthetic for common procedures. The location of the injection site is dependent on the type of procedure performed (**Figures 1, 2, 3, 4, 5, and 6**).

Injecting Local Anesthesia to Produce Minimal Pain

Local anesthesia injections can produce minimal pain for certain surgical procedures of the hand and wrist, and the technique can be reliably taught to medical students and residents. Most patients feel only the first poke of a 27-gauge needle.^{14,15} The details of the technique with drawings and movies have been published elsewhere.¹⁵ The essence of the technique is as follows: (1) Lidocaine and epinephrine 10:1 are buffered with 8.4% bicarbonate; (2) the

local anesthetic is warmed; (3) the area of injection is distracted with touch, pinch, or pressure; (4) a 27-gauge needle is used; (5) the syringe is stabilized to avoid needle wobble with the initial injection until the needle site is numb; (6) 0.5 mL of the solution are injected subdermally and perpendicularly; the surgeon then pauses until the patient says that needle pain is gone; (7) an additional 2 mL is injected before the needle is moved; then the needle is moved antegrade very slowly and gradually, with 1 cm of local anesthetic always palpable or visibly ahead of the needle; (8) needles are reinserted within 1 cm of blanched areas; and (9) the patient is asked for feedback on how many times he or she feels pain during the injection process; this will improve the surgeon's knowledge and ability to perform the procedure.¹⁶

Simplifying the Process for Carpal Tunnel and Minor Hand Surgery

With the WALANT approach, twice as many carpal tunnel releases can be performed in the same amount of time at 25% of the cost, even when performed in a main operating room with full sterility.¹⁷ The WALANT approach also permits moving surgical procedures from the operating room to the clinic, which produces even more cost savings.¹⁸ Field sterility can save additional costs and achieve low rates of infection.¹⁹ Patients who are offered this approach are as satisfied as those offered sedation.²⁰ Patient convenience with the WALANT approach is increased because there is no need to take time off from work or for preoperative testing visits. Patients can go home after the tourniquet-free procedure, just as they would after a minor dental procedure.

Table 1
Typical Volumes of Local Anesthetic Used for Common Procedures About the Hand and Wrist

Procedure	Typical Volume of 1% Lidocaine With 1:100,000 Epinephrine and 8.4% Bicarbonate (Mixed in 10:1 Ratio)	Location of Injection
Carpal tunnel release	20 mL	Inject 10 mL between ulnar and median nerves (5 mm proximal to wrist crease and 5 mm ulnar to median nerve); inject another 10 mL under incision.
Trigger finger release	4 mL	Inject subcutaneously beneath the center of the incision.
Finger sensory block (SIMPLE block)	2 mL	Inject the volar middle of proximal phalanx just past the palmar/finger crease.
Finger soft-tissue lesions or other surgery when finger base tourniquet is not desirable and finger epinephrine is used for hemostasis	5 mL volar distributed among three phalanges; 4 mL dorsal split between two phalanges	Inject 2 mL volar and 2 mL dorsal subcutaneous midline fat, in both proximal and middle phalanges. The distal phalanx gets only 1 mL midline volar just past the distal interphalangeal crease.
PIP fusion	8 mL total: 4 mL volar (2 mL in each phalanx) and 4 mL dorsal (2 mL in each phalanx)	Inject 2 mL midvolar and another 2 mL middorsal of both proximal and middle phalanges.
Thumb MCP fusion and collateral ligament tears of the MCP joint	15 mL	Inject 2 mL on each of volar and dorsal aspects of proximal phalanx and the remainder all around the metacarpal head.
Dupuytren contracture or zone II flexor tendon repair	15 mL/ray	Inject 10 mL (or more) in the palm and then 2 mL in proximal and middle phalanges and 1 mL in the distal phalanx (if required).
Trapeziectomy or Bennett fracture	40 mL	Inject the radial side of the hand under the skin and all around the joint, including the median nerve. If LRTI is performed, decrease the concentration to 0.5% lidocaine with 1:200,000 epinephrine and also inject all around where the FCR or the APL muscle will be dissected.
Metacarpal fractures	40 mL	Inject all around the metacarpal where dissection or Kirschner wires will occur.

APL = abductor pollicis longus, DIP = distal interphalangeal, FCR = flexor carpi radialis, LRTI = ligament reconstruction with tendon interposition, MCP = metacarpophalangeal, PIP = proximal interphalangeal, SIMPLE = single subcutaneous injection in the middle of the proximal phalanx with lidocaine and epinephrine.

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Improved Results With Tendon Repair and Transfer

The ability to detect and repair gapping that can be seen during a WALANT flexor tendon repair has decreased the rupture rate.²¹ In addition, full flexion and extension by a comfortable, cooperative, tourniquet-free patient allows the surgeon to vent pulleys and trim the repair so that full range of flexion and extension of the finger can be obtained intraoperatively before the skin

is closed; this decreases the need for subsequent tenolysis.^{22,23}

Obtaining an optimal tendon transfer is challenging because transfers can be either too tight or too loose. With this approach, the extensor indicis to extensor pollicis longus transfer can be adjusted during the procedure to achieve optimal results.²⁴

Local Anesthesia for Wrist Surgery

Hagert and Lalonde²⁵ have described the method for injecting local anesthesia for wrist arthroscopy and triangular fibrocartilage complex repair. They inject a total of 25 mL of lidocaine with epinephrine in the whole wrist area and joint. Active movement by the patient is helpful during these procedures to confirm that the triangular fibrocartilage complex repair remains

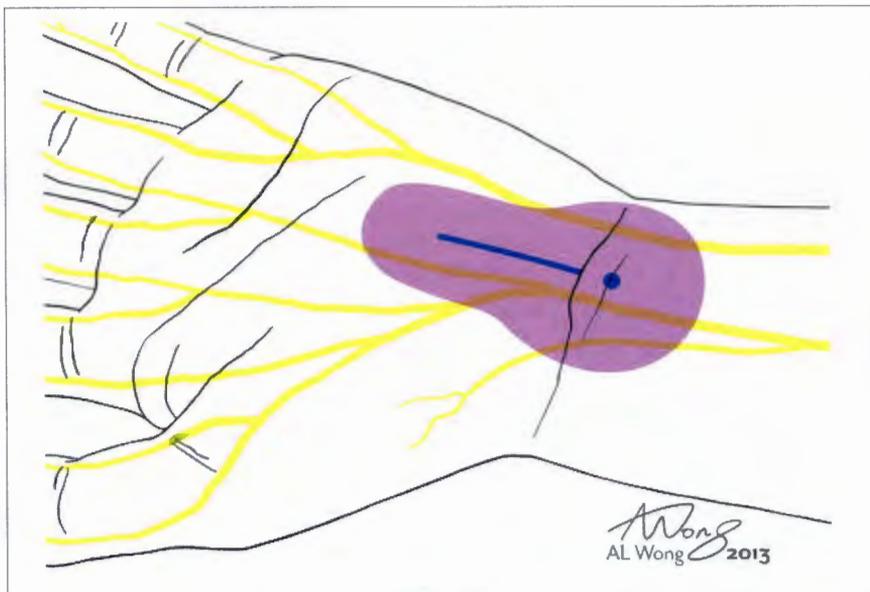


Figure 1 Illustration of the location of the injection for a carpal tunnel release. The surgeon injects 10 mL of local anesthetic into the subcutaneous fat (purple area) without moving the needle (blue dot). Eliciting paresthesias should be avoided, which may mean fascicle laceration by the sharp needle bevel. A second 10 mL of local anesthetic is injected under the incision (blue line) in the subcutaneous fat. (Reproduced with permission from Lalonde DH, Wong A: Dosage of local anesthesia in wide awake hand surgery. *J Hand Surg Am* 2013;38[10]:2025-2028.)

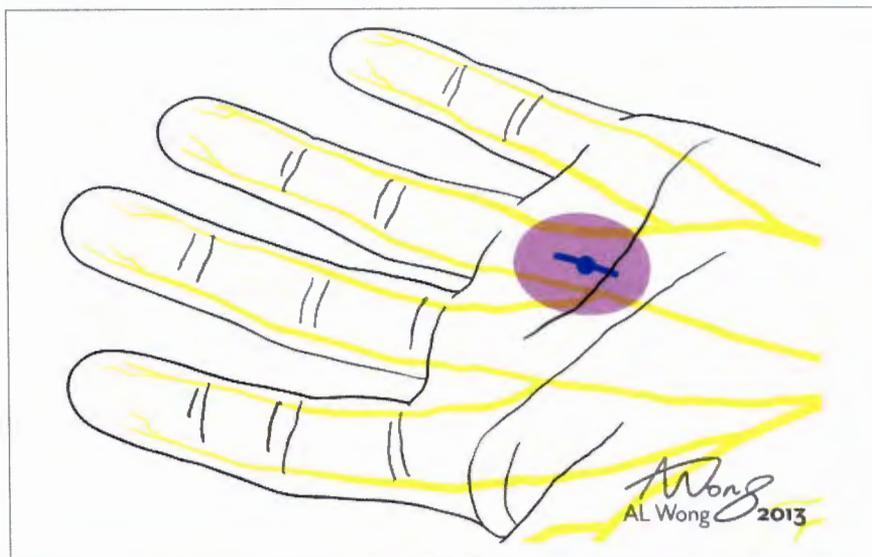


Figure 2 Illustration of the location of the injection for a trigger finger release. The surgeon injects 4 mL of local anesthetic in the subcutaneous fat (purple area) without moving the needle (blue dot). There is no need to inject into the sheath. The blue line represents the incision. (Reproduced with permission from Lalonde DH, Wong A: Dosage of local anesthesia in wide awake hand surgery. *J Hand Surg Am* 2013;38[10]:2025-2028.)

intact with active pronation and supination during surgery. Hagert²⁶ also has described how to inject local anesthesia for lacertus fibrosus and proximal pronator release in proximal forearm compression of the median nerve.

Needle Aponeurotomy Indications

Minimally invasive treatment of Dupuytren contracture should be considered as the first intervention for Dupuytren disease in patients with a low diathesis score for whom a shorter recovery is more important than early recurrence. Candidates must be able to tolerate awake surgery, have an extension deficit resulting from a tensionable cord, and have adequate skin reserve.

Needle aponeurotomy can be performed as an office procedure and does not require changes in the patient's medication or diet. With proper planning, it may be performed at the time of a patient's first office visit and does not require scheduled follow-up.

Patient Screening and Instructions

Before the Procedure

When setting a procedure date, patients should be instructed that when they arrive, the hand to be treated must be free of recent or healing injuries, and they should plan to avoid strenuous gripping for 1 week after the procedure. Prior to the office visit, rings should be removed from the affected fingers. If a patient normally takes an anxiolytic medication for routine dental work, he or she should plan to do the same for this procedure.

During the Procedure

Needle aponeurotomy is awake surgery that requires patient cooperation. A

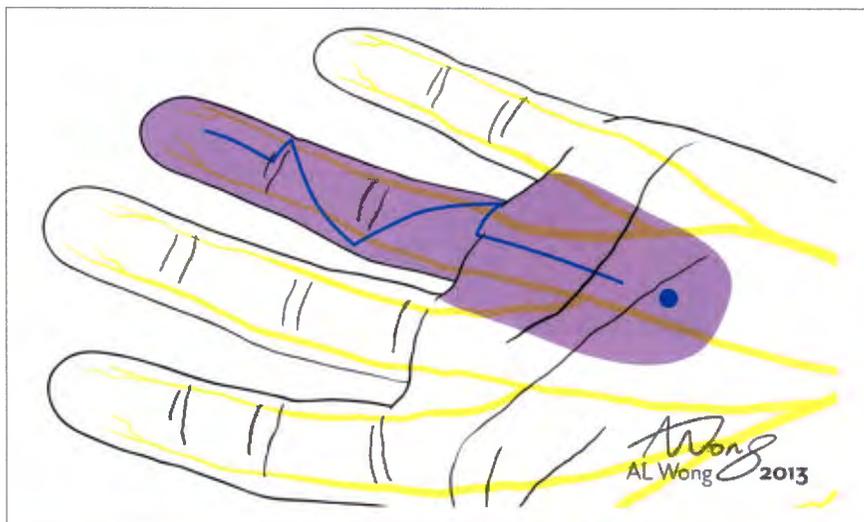


Figure 3 Illustration of the location of the injection (blue dot) for a zone II flexor tendon or a Dupuytren palmar fasciectomy. The surgeon injects 15 mL of local anesthetic or more per ray. The surgeon starts with 10 mL in the palm 1 cm proximal to the most proximal place that an incision (blue line) is most likely to be made. Next, the surgeon injects 2 mL per proximal and middle phalanx and 1 mL in the distal phalanx base volar midline. The purple area represents the entire region of zone II that will be anesthetized. (Reproduced with permission from Lalonde DH, Wong A: Dosage of local anesthesia in wide awake hand surgery. *J Hand Surg Am* 2013;38[10]:2025-2028.)

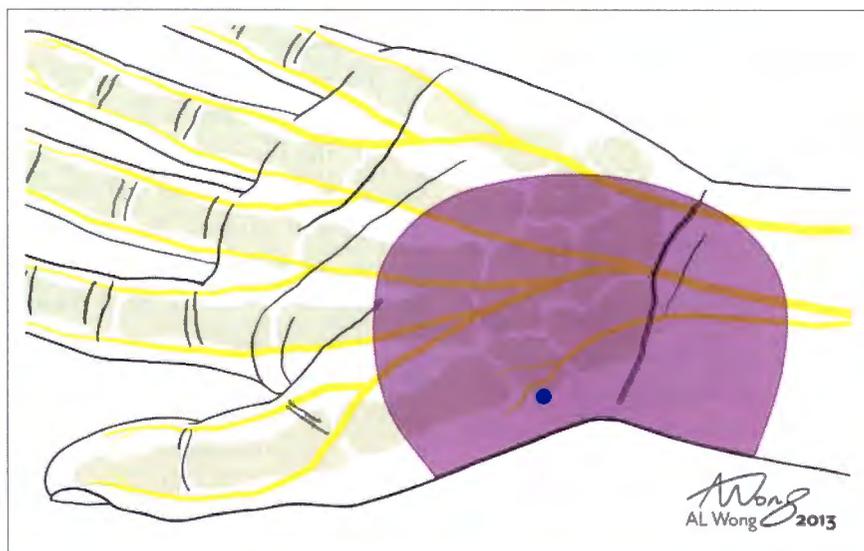


Figure 4 Illustration showing location of the injection (blue dot) for a trapeziectomy or a Bennett fracture. The surgeon injects 40 mL all around the trapezium, the metacarpal base, and the surrounding bones and joints where dissection or Kirschner wires are likely to generate pain (purple area). (Reproduced with permission from Lalonde DH, Wong A: Dosage of local anesthesia in wide awake hand surgery. *J Hand Surg Am* 2013;38[10]:2025-2028.)

preoperative discussion should include the following four points that the patient should follow during the actual procedure. (1) Patients should be instructed to consciously relax their fingers while the surgeon is working. This aids in the surgeon's ability to palpate tethering cords and avoids bowstringing the flexor tendons in areas where work is being done. (2) Patients should be instructed to report any uncomfortable sensations. If such sensations occur, they should be described in terms of both location (whether it is where the needle is or out at the fingertip) and quality (sharp versus electrical). This will help the surgeon assess whether the sensation represents digital nerve stimulation from needle proximity. (3) Active finger flexion should be checked preoperatively. Any lack of preoperative flexor tendon motion may be lost in the evaluation of severe contractures or boutonniere deformity. Patients should be instructed and asked to demonstrate short arc, active finger flexion, and extension "scratching" movement that the surgeon may ask them to perform during the procedure if there is a question of proximity of the needle to the flexor tendons. (4) Patients should be asked to alert the surgeon if at any point they feel any numbness or tingling during the procedure.

After the Procedure

The expectations that should be discussed with the patient before the procedure should include the following: (1) The patient should remove bandages the same day to prevent maceration. (2) Skin tears occur in a minority of patients, but they can occasionally be dramatic. Skin tears are managed with bandages that are changed frequently enough to avoid maceration and can be

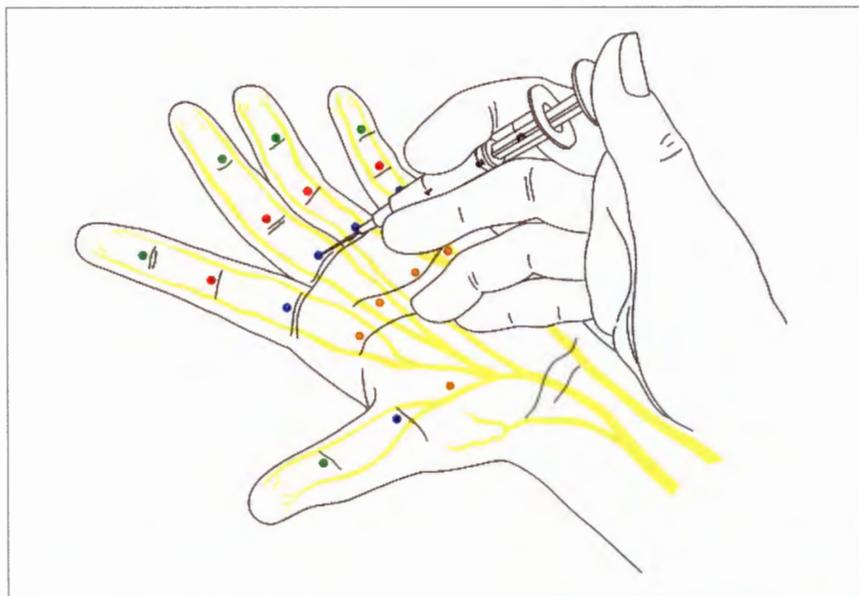


Figure 5 A 2-mL SIMPLE (single subcutaneous injection in the middle of the proximal phalanx with lidocaine and epinephrine) block is injected in the blue dot areas when only sensory blocks of the finger are required. For hemostasis and local anesthesia for palmar finger surgery, 1% lidocaine with 1:100,000 epinephrine is injected in the midline subcutaneous fat between the digital nerves in each area shown by a dot. Blue and red dots are injected with 2 mL, green dots with 1 mL, and orange dots with 5 mL. (Reproduced from Lalonde D, Martin A: Epinephrine in local anesthesia in finger and hand surgery: The case for wide-awake anesthesia. *J Am Acad Orthop Surg* 2013;21[8]:443-447.)

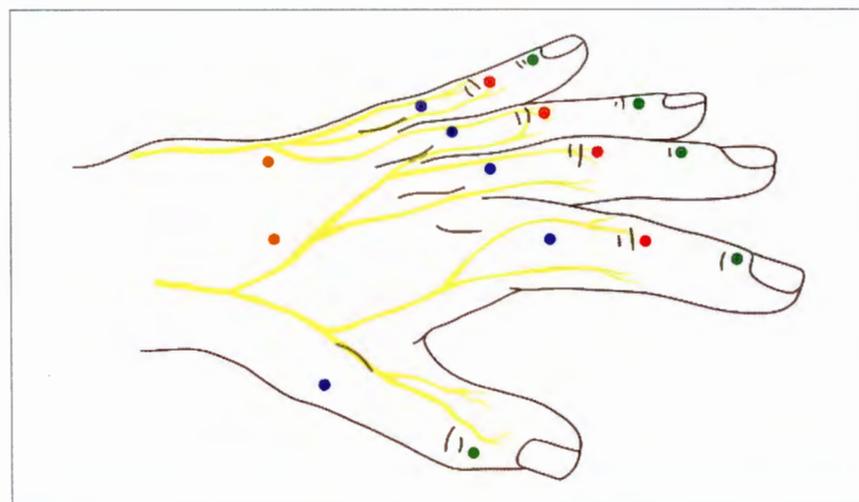


Figure 6 Illustration showing injection sites for hemostasis and local anesthesia for dorsal finger surgery. One percent lidocaine with 1:100,000 epinephrine is injected in the midline subcutaneous fat in each area shown by a dot. Blue and red dots are injected with 2 mL, green dots with 1 mL, and orange dots with 5 mL. (Reproduced from Lalonde D, Martin A: Epinephrine in local anesthesia in finger and hand surgery: The case for wide-awake anesthesia. *J Am Acad Orthop Surg* 2013;21[8]:443-447.)

expected to heal within 1 to 2 weeks. (3) Strenuous or sports-related gripping should be avoided for 1 week, including golf, tennis, biking, rowing, gripping during weight training, push-ups, pull-ups, shoveling, and so forth. It is important to be very specific about this instruction because there is often little or no pain with these activities; however, they may provoke a delayed inflammatory reaction that can mimic infection and may last for days. (4) Typical immediate outcomes are up to 90° improvement of composite (metacarpophalangeal [MCP] plus proximal interphalangeal [PIP]) extension and an average of 50% improvement of PIP extension. It is common for partial corrections to improve for several months after release, with or without splinting. (5) Recurrence significant enough to require a repeat procedure is likely within a few years. Repeat procedures are usually possible and reasonable if the initial release worked well, the release lasted at least 1 year, the recurrent contracture is caused by a palpable cord, and adequate skin reserve remains. Repeat release can be expected to result in similar improvements as with the prior release, with some diminishing returns and less predictability. There are no clear data to either support or discourage splinting after needle aponeurotomy. Soft indications for splinting include preoperative isolated PIP with MCP hyperextension, preoperative composite contracture of 90° or greater, postoperative extensor lag, and patient request.

Planning

Planning Portals

Ideal needle entry areas are over discrete, tensionable cords that are palpable beneath mobile skin. Portals may

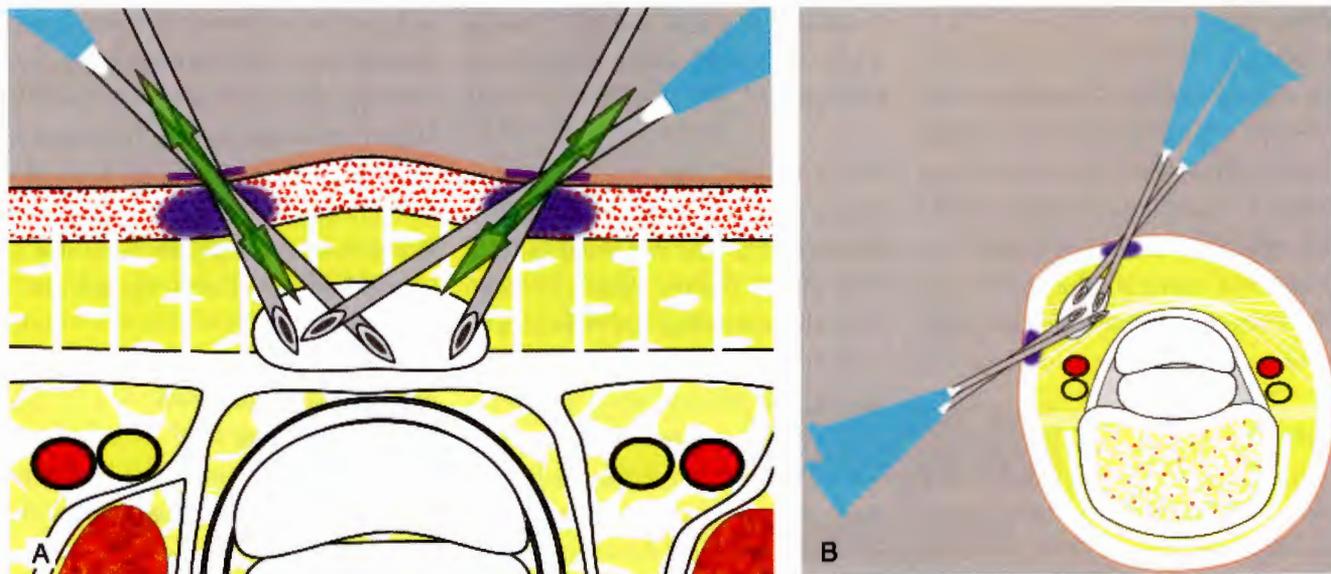


Figure 7 Illustrations of portals used in needle aponeurotomy. Dual portals (purple areas) are helpful in the palm (A) and the digit (B). The tangential approach path to the cord improves access to the cord (white oval area), improves efficiency by presenting the needle blade rather than just the tip, and reduces the depth of the cuts needed to divide the cord. (Courtesy of Charles Eaton, MD, Palm Springs, FL.)

be marked preoperatively or intraoperatively. Single portals are best planned directly over the most prominent area of the cord. Dual portals on each side of the cord are used for broad cords in the palm, for bowstringing lateral digital cords to improve safe access (Figure 7), and in areas where skin tethering is thought to pose an increased risk for a skin tear. The surgeon should avoid planning portals in areas of poor skin reserve, including areas in which the skin blanches on stretch. Some nodules resemble cords but can be distinguished by a lack of softening when a finger is flexed. Cords may have nodular involvement, and it may not be possible to completely avoid nodules. Portals proximal to the Kaplan line should be avoided if possible because this area may remain sensitive for weeks, similar to “pillar pain” after open carpal tunnel release. Distal interphalangeal or PIP portals are planned a few millimeters offset from flexion creases, and oblique needle paths may be used to detach the crease

dermis from the underlying cord, which improves release gains and reduces the chance of a crease tear.

Dimples

Skin dimples result from traction from septal fibers attached to the contracted cords. The depth of dimples should be confirmed by direct inspection or by using a probe.

Digital Cords

Based on a series of dissections, McFarlane²⁷ concluded that, away from the PIP joint, the neurovascular bundle in most cases lies central to lateral and spiral cords and lateral to central cords. At the PIP joint, however, the bundle usually lies deep to the cords.

Spiral Cords

Spiral cords should be suspected and searched for with a Doppler probe if there are areas in which a subdermal cord is in continuity with a cord segment lying beneath bulky subcutaneous

tissue. Spiral cords are most common in the zone between the distal palmar crease and the PIP flexion creases. The vascular pulse of a spiral cord is occasionally palpable, and the displaced digital nerve is occasionally tender to firm direct pressure while tensioning the cord with passive extension. A Doppler probe is a more definitive examination tool of these fleshy areas and should be pointed to areas where the neurovascular bundle should not normally lie. For example, the Doppler probe tip may be angled tangential to the skin to listen to areas more superficial than the normal course of the neurovascular bundle. Portals should not be used at the direct level of an identified spiral cord but, taking advantage of the spiral anatomy, may be planned 8 to 10 mm proximal or distal to the area in which the bundle has been identified as most superficial. Ultrasound imaging, if available, also is a useful technique.

Procedure

Positioning

During the procedure, the patient may rest in a supine or a semirecumbent position. If the patient is seated, there should be a simple mechanism to either have the chair recline or transfer the patient to a supine position in the event of a vasovagal reaction. An assistant is recommended but not mandatory.

Antisepsis

Immediately before the procedure, the patient washes his or her hands to clean and degrease the skin. The procedure may be performed using field sterility, similar to starting an intravenous line. The area of interest is prepped with povidone-iodine or another topical antiseptic solution. Sterile drapes and sterile gloves are not needed. Needles are handled in a manner to preserve sterility of the metal portion of the needle. Oral antibiotic prophylaxis is indicated as for any clean procedure. The surgeon should wear a mask and an eye cover to protect against backspray during anesthetic injection or joint manipulation.

Needle Size

Any needle gauge can be used. An 18-gauge needle has a terminal blade length of 2.6 mm; a 25-gauge needle has a diameter of 0.5 mm and a terminal blade length of 0.8 mm. Luck fasciotomy blades have an average blade length of 1 cm. Smaller gauge needles require more passes to divide the cords, but they have the advantage of greater control and less likelihood of completely severing a digital nerve with a single pass. Smaller needles are more flexible, and using the shortest possible needle gives the best control of the tip. Some surgeons hold a hypodermic needle directly with their fingertips, but

mounting the needle on a 3-mL syringe is recommended for better control and sterility.

Flexor Tendon Issues

Flexor tendons are at risk for injury. Patients should be reminded to relax their fingers (let the fingers go limp) to avoid tensioning the flexors. The cord, not the flexors, should be bow-stringed. In addition, active posturing by a patient—either flexion or extension—makes it more difficult to palpate cords and contractures. If there is any question regarding flexor proximity, this is checked by having a patient gently perform short arc, scratching motion finger flexion and extension with the needle in place, cautioning the patient to not make a fist. Needle contact with a moving tendon will either produce a scratching feel of the needle or visibly move the needle, depending on whether the needle tip is on or in the tendon. If there is a confirmed breach of the flexor tendon sheath, the use of that portal should be discontinued and the surgeon should check the tendon for continuity, triggering, and pain with flexion against resistance. If there is evidence or strong suspicion of a mechanically significant tendon injury, that issue assumes management priority. If not, the procedure may be continued at a different level, and the patient should be cautioned to avoid strenuous gripping for 1 month to reduce the chance of provoking tendinitis.

Nerve Issues

Distal to proximal portal sequences should be followed, including finishing the fingers before starting in the palm. Fingertip sensitivity should be checked before each anesthetic injection, before starting each new portal, and at regular

intervals in between. Even with careful technique, a digital nerve block may develop from anesthetic diffusion or digital nerve contusion and may appear without any precedent event or patient awareness of it developing. If digital nerve block develops, the safest step is to continue proximal to the last anesthetized portal.

Pain or Paresthesia With Needle Movement

If a patient experiences pain with needle maneuvers, it should always be evaluated. Cords are insensate and do not require anesthesia. The capsuloligamentous structures and associated cruciate pulleys of the PIP and distal interphalangeal joints have at least proprioceptive sensory innervation that may confer sensitivity to needle contact.^{28,29} It is not known if there is sensory innervation of other zones of the flexor tendon sheath or the annular pulleys. Following intradermal injection, needle maneuvering is usually painless. Pain during the procedure may result from contact of the needle tip with unanesthetized adjacent deep dermis, the joint capsule, cruciate pulley areas, the neurovascular bundle or adjacent pacinian corpuscles, or pressure on any of these structures from the needle shaft with lateral motion. If the patient has unexpected pain with needle maneuvering, the evaluation protocol shown in **Figure 8** should be followed. Traction on deep dermis from septal fiber involvement may result in subdermal tenderness deep to or adjacent to skin creases or dimples. If so, anesthetic injection into the dermis at the level of the crease or the dimple usually relieves this tenderness (**Figure 9**). Uncommonly, a cord may remain tender to needle penetration despite these steps. If there is no

possibility of dimple-related tenderness, this may represent nerve end organ or digital nerve tethering from the cord. An option in this situation is to inject the cord itself with 0.1 to 0.2 mL of local anesthetic directly in the area of sensitivity. Following this, the fingertip should be checked for sensibility; if the fingertip is not numb, the surgeon can return to cord division at the current portal. If a conduction block develops, work should be discontinued at this level and the surgeon should proceed to the next most proximal level.

Needling the Proximal Interphalangeal Joint

It is helpful to approach PIP release in a stepwise sequential fashion, releasing the most obvious palpable cord and then reassessing to identify additional constraints that were not initially palpable. Cords producing PIP contractures traverse the PIP flexion creases but may be palpable only proximal to the crease. Portals placed distal to PIP flexion creases may be used to allow an oblique needle path from distal to proximal deep to the PIP flexion creases

(**Figure 10, A**). During PIP release, it is important to continue checking for fingertip sensibility and the possibility of flexor tendon contact.

Joint Anesthetic Injection

Intra-articular anesthetic joint injection improves comfort and the effectiveness of interphalangeal joint manipulation.

A predictable technique for interphalangeal joint injection is to use a 30-gauge needle directly through the flexor tendon and the volar plate via a midline approach with the joint flexed³⁰ (**Figure 10, B**). Anesthetic placement can be confirmed by palpating the dorsal joint capsule distention during injection. The advantages of this approach

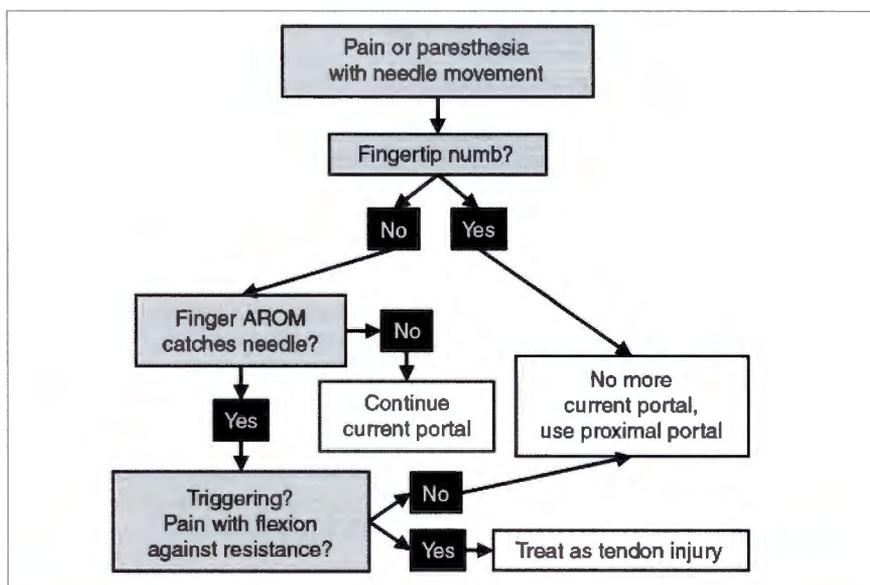


Figure 8 Decision algorithm for pain or paresthesia that develops during a procedure. AROM = active range of motion.

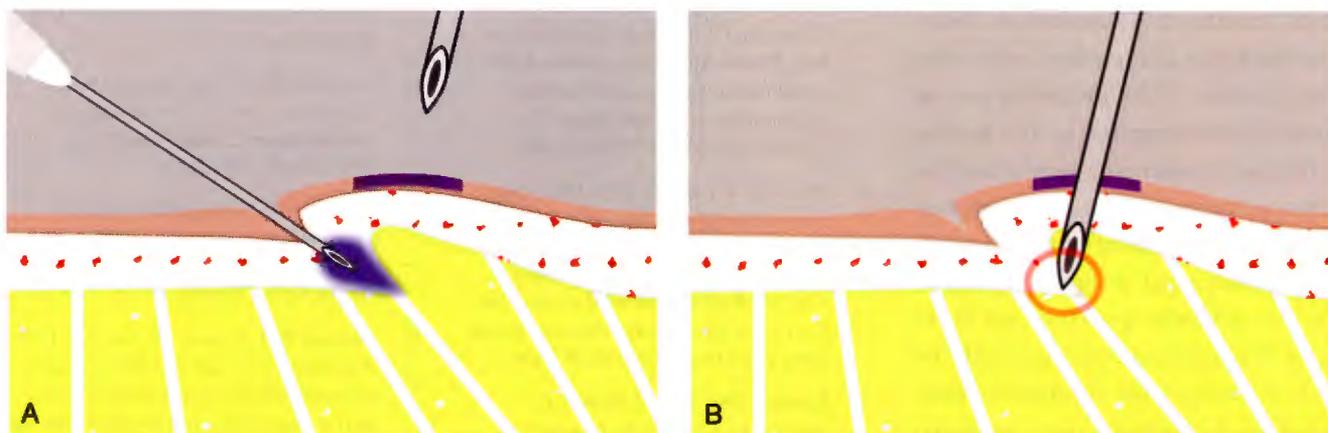


Figure 9 Illustrations of a technique to avoid needle tenderness. **A**, Pain may result from dimples dragging the sensitive deep dermis into the path of the needle adjacent to the dimple. **B**, If the location of the base of the dimple can be determined to pose no risk for inadvertent entry of a dimple sinus, intradermal anesthetic may be given at the base of the dimple (red circle) to resolve this sensitivity. (Courtesy of Charles Eaton, MD, Palm Springs, FL.)

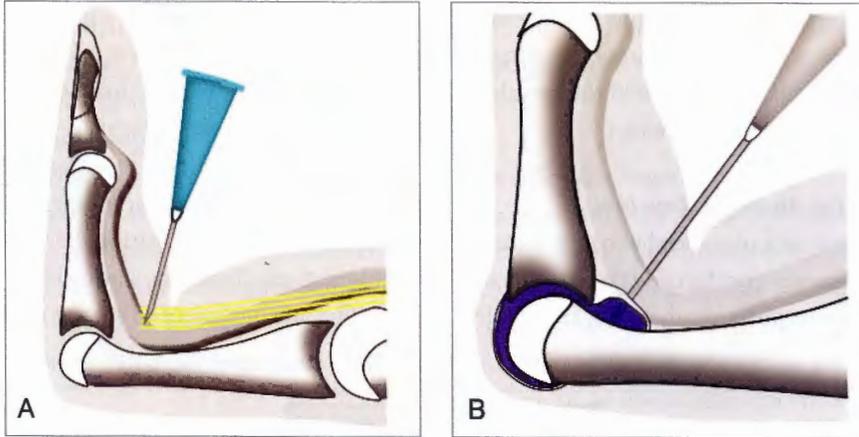


Figure 10 Illustrations of proximal interphalangeal (PIP) flexion creases. **A**, Proximal phalanx cords often traverse the PIP flexion crease and may be approached retrograde distal to the PIP flexion crease. Yellow lines represent the flexor tendon. **B**, Intra-articular anesthetic may be given via a midline palmar approach proximal or distal to the PIP flexion crease. The purple area represents the joint capsule. (Courtesy of Charles Eaton, MD, Palm Springs, FL.)

are greater predictability of achieving intra-articular infiltration and less likelihood of inadvertent digital nerve or sheath block. Joint anesthesia usually develops within 2 minutes of injection.

Summary

It has become evident that a number of surgical procedures about the hand and wrist can be safely performed using local anesthesia. These include flexor tendon repair and tenolysis, where the effectiveness of the procedure can be actively demonstrated by the patient while in the operating room; fracture fixation; nerve repair and decompression; and arthroplasty of the thumb carpometacarpal joint. In addition, the use of needle aponeurotomy to release Dupuytren contractures with the patient under local anesthesia offers substantial advantages over traditional palmar and digital fasciectomy and can be performed in the outpatient office setting.

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