Step-by-Step Technique for Targeting Superficial Radial Nerve Pain

Description of the steps taken to treat radial nerve pain using injection of cross-lined hyaluronic acid (Restylane or Juvéderm).

By John A. Campa, III, MD [1]

Step-by-Step Description of Superficial Radial Nerve Technique

The types of injectate used in our clinic come prepackaged in 1 mL syringes and include Restylane and Juvéderm. The HA content is 20 mg/mL and 24 mg/mL, respectively. A typical procedure tray is shown in Figure 1. For peripheral sites, anticipate 0.15-0.25 mL per site, but more may be required depending on the volume of the virtual injection compartment surrounding the neural target. However, with increasing doses per site (0.5-1.0 mL), the risk of extra-arterial tamponade increases. In this circumstance, hyaluronidase (Hylenex or recombinant hyaluronidase) should be administered immediately to dissolve the injectate, along with other supportive measures to insure restoration and maintenance of arterial blood flow.

Figure 1. Procedure tray.

Click to enlarge

[2]

Step 1. Subserving Sensory Nerve Identification

First, clinically determine the principal sensory nerve or nerves subserving the affected painful area. In this case, it is the superficial radial nerve (SRN). But, remember, the sensory afferent pathway may be the innervated dermatome, sclerotome, or both.

Test block

If one or more nerves are involved, perform differential nerve blocks separately (test blocks of the various possible nerves with local anesthetic, 1-2 mL, 2% plain lidocaine). Wait 10 minutes after each nerve is blocked, and then assess the relief. The blocked nerve that provided the most relief will be the first target for XL-NMA. Avoid local anesthetic spread across various nerves by keeping volume low. Note, you must then wait for 3 to 7 days to allow forcomplete anesthetic washout before proceeding with XL-NMA.

XL-NMA

Once the correct nerve is isolated, identify and mark the target sensory nerve points for the SRN and the infrared thermometry (IRT) ranging points “T” (Figure 2). SRN target points “XX” are at the base of the anatomical snuffbox, bordered by extensor pollicis brevis (EPB) laterally and the extensor *pollicis longus* (EPL) medially (Figure 3). Aim and inject laterally to and above the EPB, and medially to and above the EPL to treat both branches of the medial SRN, respectively, after IRT. Note, the radial artery courses along the floor of the anatomical snuffbox.

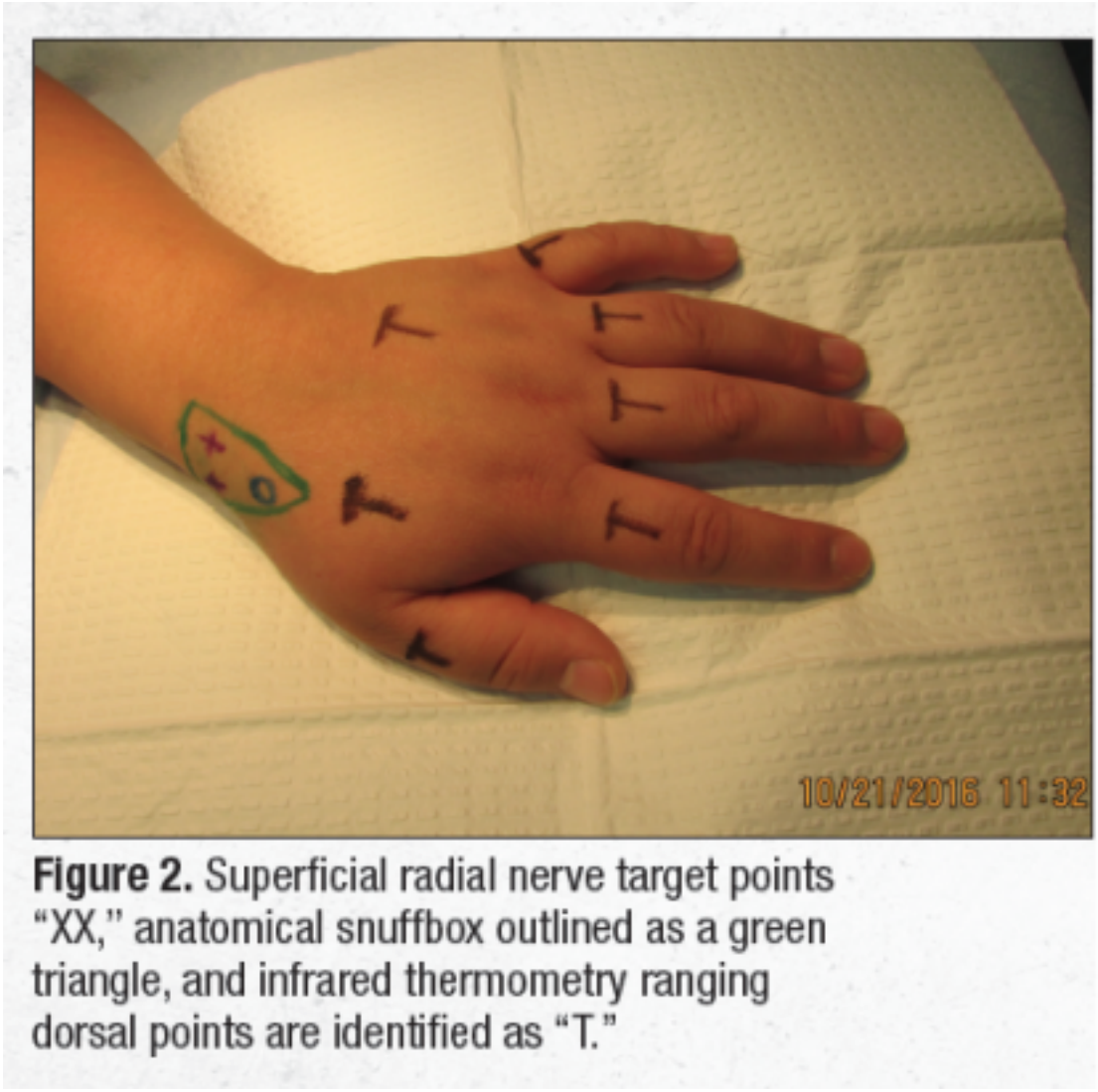
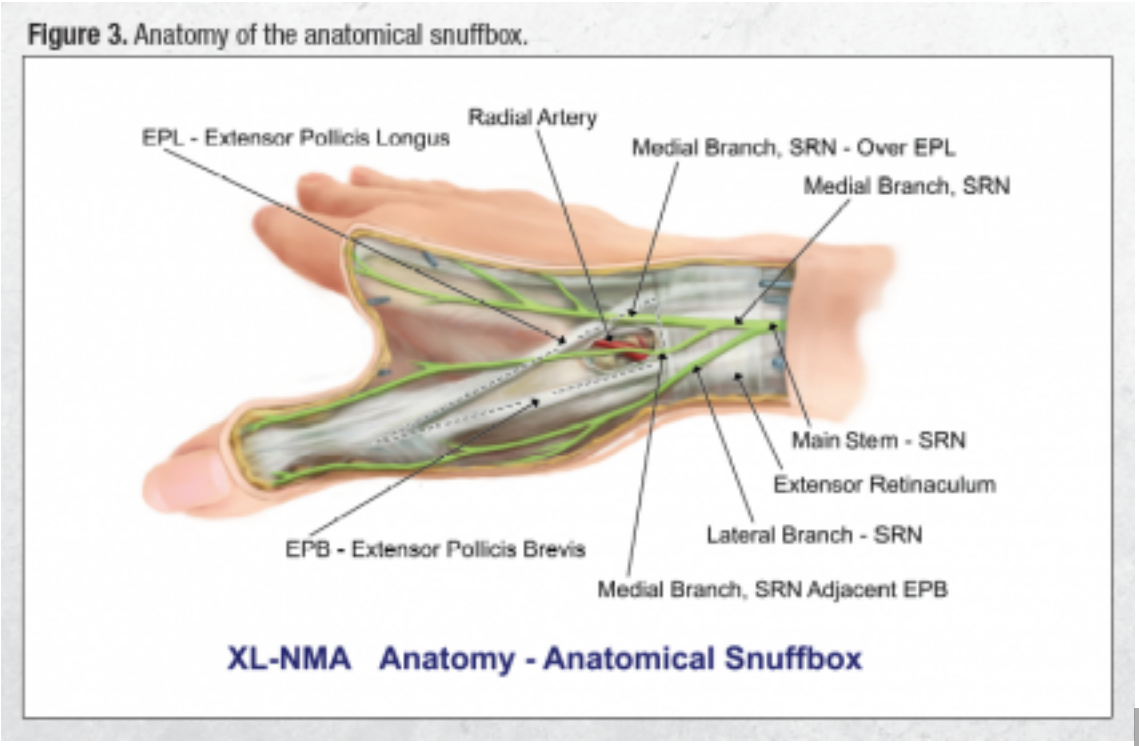


Figure 2. Superficial radial nerve target points "XX," anatomical snuffbox outlined as a green triangle, and infrared thermometry ranging dorsal points are identified as "T."

Click to enlarge

[3]



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[4]
Step 2. Pre-Procedure Infrared Thermometry (IRT)

Using a laser-guided, infrared thermometer as pictured in Figure 4, perform pre-procedure IRT of the innervated area just prior to injection (as needed) and document these temperatures. The ranging points “T” will vary depending on the distribution of pain and the subserving sensory nerve.

Figure 4. Infrared thermometry (IRT) being conducted at dorsum point "T" over digit #1.

Click to enlarge

[5]

Step 3. Pre-Procedure Doppler Arterial Patency Confirmation

Using a handheld 8 MHz vascular doppler device, verify arterial patency of any arteries in the immediate vicinity of the injection sites that may be compromised (Figure 5). For the SRN, place over the center of the anatomical snuffbox.

Figure 5. Arterial patency is confirmed using a handheld 8 MHz vascular doppler device.

Click to enlarge

[6]

Step 4. Skin Wheal Preparation

Cleanse treatment area with alcohol, and raise a skin wheal with a mixture of 0.5 mL 2% plain lidocaine and 1 mL
plain bupivacaine using a 30-gauge, ½-inch needle (Figure 6).

Figure 6. Skin wheal raised in small green circle at apex of the anatomical snuffbox.

Click to enlarge

[7]

Step 5. Injection Port Preparation

Avoiding any surface vessels, prepare injection ports with a 23-gauge-16-gauge, 1-inch cutting sharp bevel needle. For the SRN, a 20-gauge needle is sufficient. To facilitate insertion, carefully bend the needle to about 10° using a small sterile gauze, as is done for the microcannula in Figure 9. With the needle initially held at a 45° angle, gently thrust through the dermis wherein a palpable “give” will be felt, then reduce the angle and advance just past needle bevel a few times, back and forth, to prepare the port and tract for microcannula insertion (Figures 7 and 8). Remember, a sharp bevel needle is a cutting or knife-like instrument—by decreasing the angle, one can take full advantage of this and make port preparation smooth with easy entry. However, too deep insertion may pierce the radial artery, resulting in hematoma.

Figure 7. A 20-gauge port needle is inserted through dermis.

Click to enlarge

[8]

Figure 8. The surgeon reduces the angle of the port needle and advances past bevel.

Click to enlarge

[9]

Step 6. Microcannula Port Insertion

Using a 1-inch, 27-gauge, lateral port, blunt, flexible microcannula (DermaSculpt), carefully bend the needle to about 10° (Figure 9). Then, approach the site with the cannula at a 45° angle (Figure 10), inserting it through the port, just past the dermis. Then lower the microcannula horizontally, and advance to the neural target for a distance of 20-25 mm, allowing the cannula to dissect the tissues with only gentle pressure, until appropriate placement and/or paresthesia is obtained paraneurally. The depth of insertion is subcutaneous but at the same level of the targeted nerve (eg, level with the surrounding fascial plane).

Figure 9. The surgeon gently bends the microcannula 10°.

Click to enlarge

[10]

Step 7. Injection of Cross-Linked Hyaluronic Acid (CL-HA)

Slowly introduce the injectate at each site above and around the neural target, injecting small aliquots along the nerve as the microcannula is withdrawn. Inject, then retract, inject, then retract until the full dose (0.25 mL) has been administered (Figures 11 and 12). It is believed this provides a protective compartmental scaffolding around the neural matrix. Due to the viscoelastic nature of the hydrogel and the 27-gauge bore of the microcannula, firm pressure will be required.

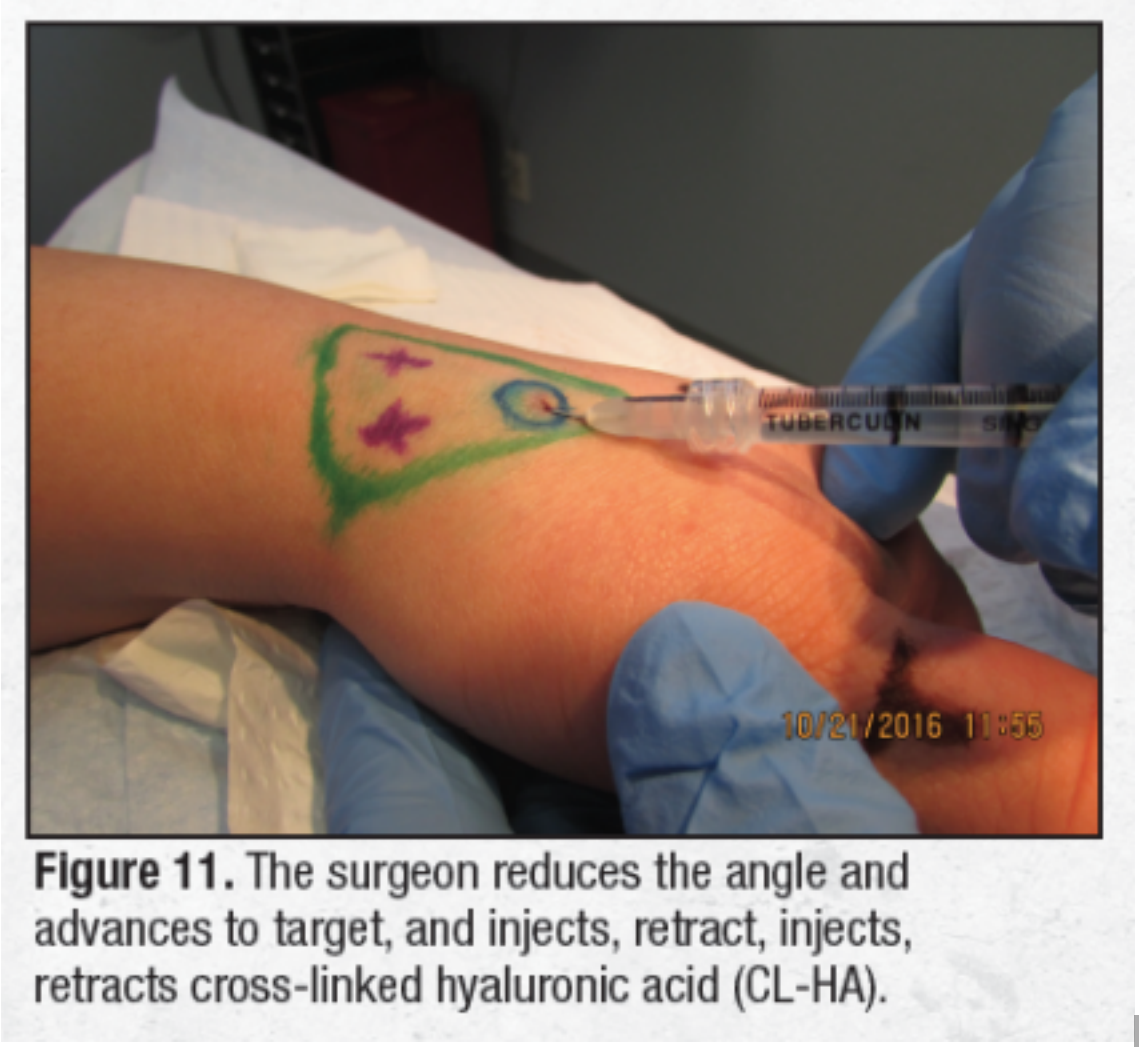

Figure 11. The surgeon reduces the angle and advances to target, and injects, retract, injects, retracts cross-linked hyaluronic acid (CL-HA).

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[11]

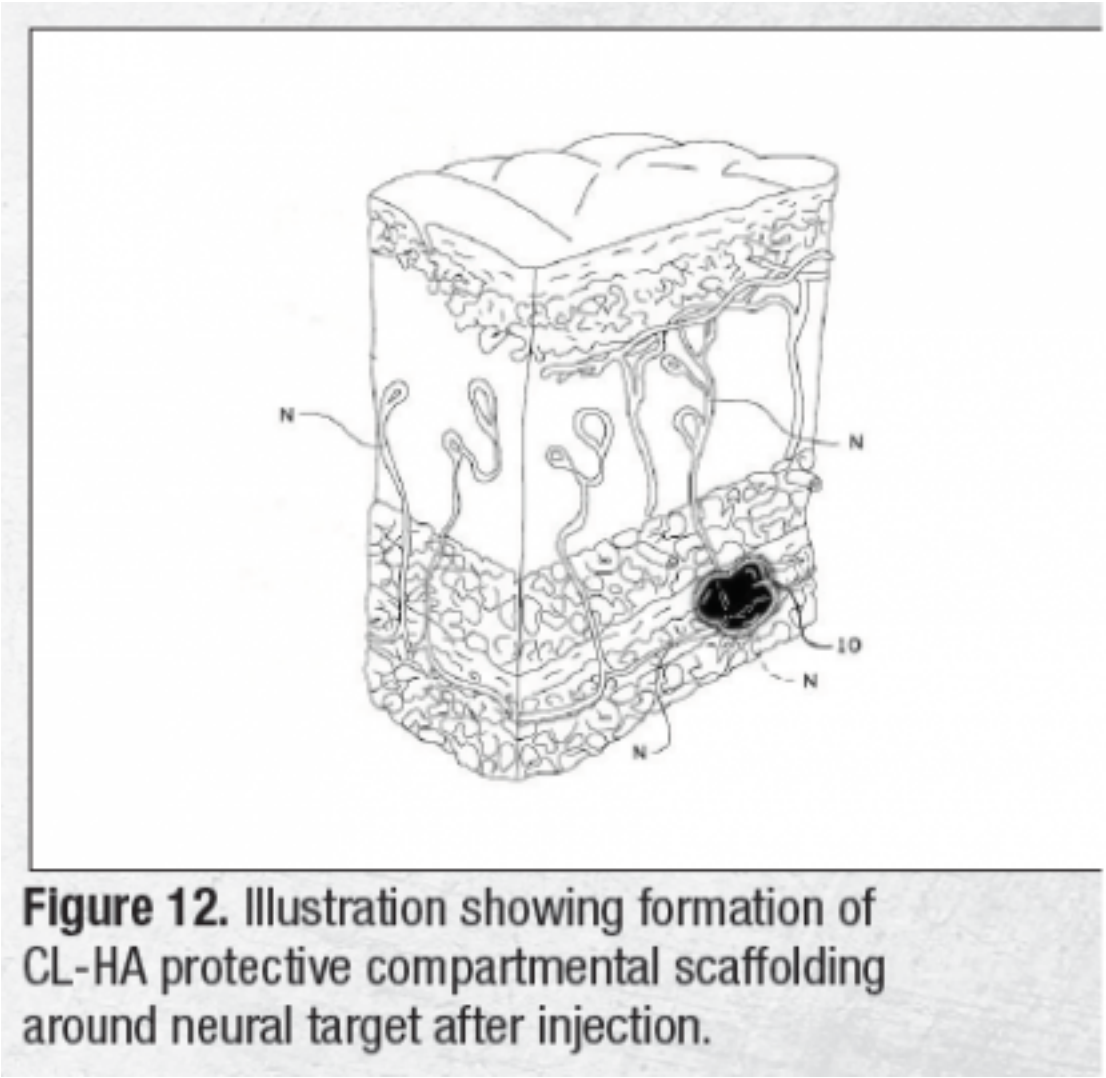

Figure 12. Illustration showing formation of CL-HA protective compartmental scaffolding around neural target after injection.

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[12]Step 8. Compression and Extension of CL-HA

Due to its viscous nature, firmly compress the injectate to increase its extension and coverage along the long axis of the target nerve using a small applicator and the operator's digit (Figures 13, 14, and 15). Dress the wound with a sterile adhesive bandage.

Figures 13, 14, and 15. The surgeon compresses injectate along nerve's long axis to extend coverage of injectate (proximal to distal).

Click to enlarge

[13]

Step 9. Post-Procedure IRT

Twenty minutes after the procedure, perform IRT again and compare to initial temperatures (Figure 16). After the initial XL-NMA, assuming the proper neural network and matrix have been targeted, a drop of 2-9°C amongst the ranging points is expected after the first procedure and portends an excellent and enduring response. Note: The degree of drop in temperature may vary or actually rise in future sessions, which may be a function of the underlying pathology.

Figure 16. Post-procedure infrared thermometry is performed.

Click to enlarge

[14]

Step 10. Post-Procedure Doppler Arterial Patency Confirmation

At the end of the procedure, again confirm that arterial patency is maintained to exclude inadvertent intra- or extra-arterial tamponade (Figure 5). Sudden onset of pain distally suggests this may have occurred. Remember that with increasing doses per site (0.5-1.0 mL), the risk of extra-arterial tamponade increases. In this circumstance, hyaluronidase should be administered immediately (eg, Hylenex or recombinant hyaluronidase) to dissolve the injectate, along with other supportive measures to ensure restoration and maintenance of arterial blood flow.

Step 11. Patient Follow-up and Expected Pain Relief

After the procedure, the patient should be contacted at 24 hours and 1 week to assess pain relief and the need for additional treatment. Expected pain relief should result in a VAS pain score of 0-4 out of 10,

with a duration from 8 weeks to 4 months—and, in some cases, permanently—depending on the underlying pathology.

To read the full article, click here [15].

All images are courtesy of John A. Campa III, MD.
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