

## Part One

### Regional Anesthetic Blocks for the Care of Minor Upper Extremity Wounds

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This series originally were printed in *SWAT DIGEST*. Some of the material was edited to make it pertinent to the SOF medics for deployments. The author personally administered these blocks while working in austere environments, far away from medical support and can attest to their effectiveness. These procedures provide for the SOF medic and physician a review of techniques and procedures that are already in use especially with the transporting of casualties over long distances. For those unfamiliar with the techniques, it is simply another tool for the tool box.

Serving on an extended, remote operation such as a natural disaster such as Hurricane Katrina or the Haiti earthquake, a long patrol near the Afghanistan border, or even a deployment to a U.S. territory, often CASEVAC/MEDEVAC is not an option due to location, terrain, or an LZ not being secure for aircraft to land. Sometimes, during these operations, it is imperative to remain covert or, as with the Katrina disaster or Haiti earthquake, advanced medical care may not be an option. What are the medic's or physician's options for treating extremity wounds, that are minor in nature, but severe enough to possibly require a visit to the operating room (OR), when a MEDEVAC is not desirable, or available?

When the team leader's upper extremity abrasion gets infected and requires a wash out or the team's breacher uses too much plastic explosives and now looks like a porcupine with pieces of door sticking out of his arm, providing adequate anesthesia for the treatment of these minor wounds becomes a top priority. This article will relate different techniques for providing anesthetic blocks to the upper extremities that are already being taught to the SOF Medic (therefore, it is a review of techniques). All techniques should be attempted initially in a controlled environment (i.e., prior to the deployment and on as many team members as possible). The blocks discussed are easy to give and, the risks for the patient are minor and seldom encountered.

#### **BIER BLOCK**

This block will only anesthetize an extremity and is not a central block. It can be used on both upper and lower extremities, although the author had more success on upper extremities. This block can be used for wound care, minor amputations, and setting of minor fractures.

Begin by starting an IV (e.g., 20 gauge) as distal as possible in the hand and cap it off (no IV flow). Elevate the arm above the heart and exsanguinate it with a tightly wrapped Esmarch bandage. The Esmarch is a wide, rubber band that is wrapped around the extremity from distal to proximal. This effectively squeezes the blood out of the arm. While the Esmarch is in place, and with the arm elevated, apply and inflate a blood pressure (BP) cuff on the upper portion of the arm. Inflate the cuff to 150mmHg above the patient's systolic pressure and clamp the tube off to prevent air leakage of the cuff. Keep the cuff inflated for at least 25 minutes. (Unbearable cuff pain usually occurs after one hour after inflation. However, in the operating room the cuff may be left inflated for upwards of 1.5 hours due to the ability to administer pain meds and anxiolytics. The SOF medic may have the ability to perform a light sedation and this will help with any breakthrough pain). Remove the Esmarch bandage and confirm the absence of a distal pulse in the extremity. Uncap the IV and slowly inject 50ml of 0.5% plain lidocaine (without epinephrine) into the catheter. The arm will now be adequately anesthetized for a surgical procedure. Logic dictates that this block should be only be used when the lack of blood flow to the damaged area will not affect the retention of the appendage (i.e., finger or hand), as the cuff will block blood flow and oxygen to the area.

At the end of the procedure, slowly deflate the cuff to allow the lidocaine to be cleared out of the arm by the now functioning circulation in the extremity. If the cuff must be let down prior to 25 minutes, then the patient must be watched for lidocaine toxicity.

**EDITOR'S NOTE:** The symptoms of lidocaine toxicity tend to follow a predictable progression. The toxicity begins with numbness of the tongue, lightheadedness, and visual disturbances and progresses to muscle twitching, unconsciousness, and seizures, then coma, respiratory arrest, and cardiovascular depression.

This block works well and usually provides complete anesthesia of the arm distal to the BP cuff. It can be augmented with local anesthetic at the site of the surgery if there is still the sensation of pain. Remember, the maximum dose of plain lidocaine is 5mg/kg (It is actually slightly higher than that, but when in the field, overdosing on lidocaine is not recommended). Therefore, for a 70kg patient (154lbs) the max-

imum dose is 350mg (70 x 5mg). So, even with the 50ml or 250mg total dose needed for an effective block (0.5% lidocaine at 5mg/ml x 50ml= 250mg), it is still well below the toxic dose for a 154 pound. person.

### ULNAR NERVE BLOCK

The ulnar nerve is the nerve that reacts when you hit your elbow or your “funny bone” causing tingling or a loss of sensation from below the elbow and possibly up to the shoulder. It can be palpated easily as it runs in a groove on the medial posterior side of the elbow. Simply inject 5-10ml of local anesthetic (with or without epinephrine) approximately 3cm proximal to the elbow joint in a fan pattern. In other words, measure from the elbow (going towards the shoulder) approximately 3cm and give the injection. Refer to Figure 1 for the location of the block and Figure 2 for the area anesthetized.

### MEDIAN NERVE BLOCK

The median nerve is medial to the brachial artery. The artery/ pulse can be palpated on the medial side of the biceps approximately 2-3cm above the elbow crease. The nerve is anesthetized with 5-10ml of local anesthetic, with or without epinephrine and given in a fan pattern. Refer to Figure 1 for the location of the block and Figure 2 for the area anesthetized.

### RADIAL NERVE BLOCK

The radial nerve lies lateral to the biceps tendon at the level of the elbow joint. Insert the needle 1-2cm lateral to the tendon and 2cm towards the shoulder and advance it until it contacts the lateral epicondyle. Inject 3-5ml of local anesthetic with or without epinephrine. Refer to Figure 1 for the location of the block and Figure 2 for the area anesthetized.

Blocks for the arm below the elbow will need to be augmented with local anesthesia if the area to be operated on includes the forearm as the musculocutaneous nerve may not be anesthetized by the radial nerve block. Also, keep in mind that epinephrine in the anesthetic is a great vasoconstrictor. Therefore, a block given some distance away from the site of injury will not help with hemostasis as is the case when infiltrating into the wound itself. This brings up the question, “why not just infiltrate lidocaine into every wound to be treated?” Most wounds can be anesthetized by simply infiltrating lidocaine; however, due to the chemical structure of lidocaine, its duration is limited and is based on the volume injected. Marcaine, due to its chemical structure, does not work well with infiltration into a wound because of its long onset. But, it will give superb anesthesia for blocks that may last upwards of eight hours (especially for the three blocks mentioned above). This will give the medic more than enough time to treat the patient while also allowing the patient to have a longer period with some pain relief.

### WRIST BLOCKS

All three nerves mentioned above can be blocked at the level of the wrist as well. The ulnar and median nerves can be blocked by infiltrating anesthetic lateral to and between the two tendons that flex the palm towards the body. The needle should be inserted 90 degrees to the skin and approximately 2cm from the wrist crease (heading towards the elbow) and should pierce the fascia prior to depositing 3-6ml of anesthetic. Anesthetize the radial nerve by infiltrating the anesthetic subcutaneously 2cm from crease of the wrist just lateral to the radial artery. The subcutaneous infiltration should continue past the joint of the thumb and just onto the back of the wrist.

The use of the wrist block and the other blocks mentioned above will allow the medic or physician, while treating patients in austere environments, to use epinephrine with lidocaine or Marcaine while working on the hand or fingers. In addition, the blocks will also allow for extended anesthetic time so the team does not have to stop sewing to re-anesthetize. This will allow the team members to get back on the mission faster and possibly eliminate the need for an unwanted MEDEVAC.

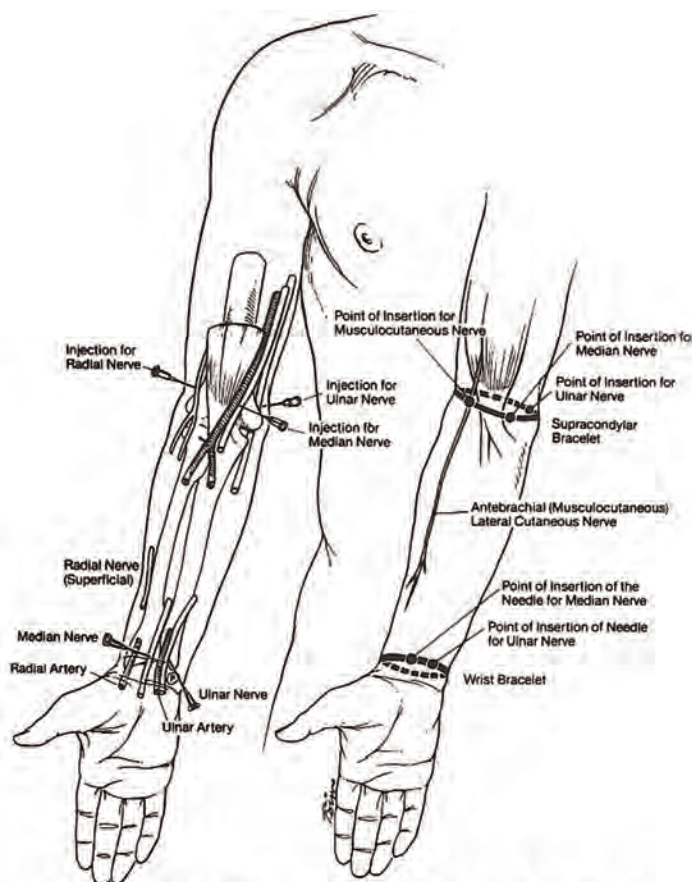


Fig. 1. Deep anatomy for elbow and wrist blocks of radial, ulnar and median nerves  
(From Raj, P.P. Clinical Practice of Regional Anesthesia. New York: Churchill Livingstone, 1991.)

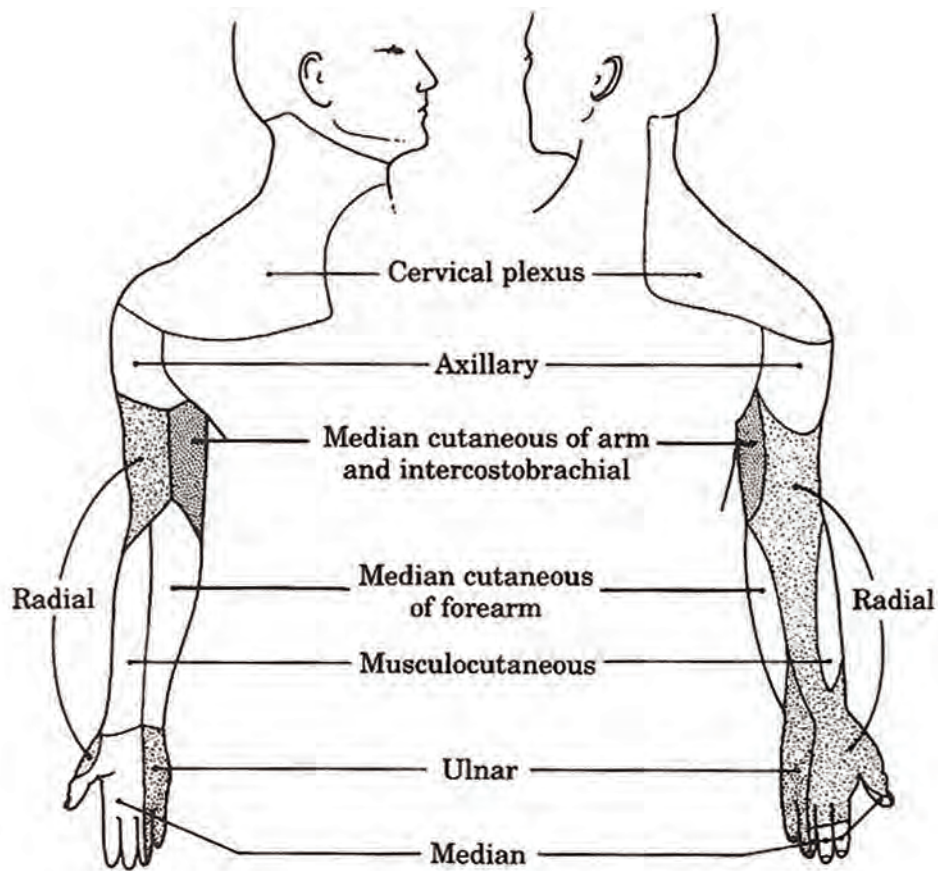


Fig. 2. Cutaneous peripheral nerve supply of the upper extremity  
 (From Clinical Anesthesia Procedures of the  
 Massachusetts General Hospital. Philadelphia: Lippencott- Raven. 1998.)