

Common Regional Nerve Blocks

Quick Guide developed by UWHC Acute Pain Service Jan 2011

A single-shot nerve block is the injection of local anesthetic to block a specific nerve distribution. It can be placed pre- or post-operatively to provide anesthesia and/or analgesia. The area affected will vary based on where the local anesthetic is injected. The onset and duration will vary based on the type of block, as well as the type of local anesthetic used. In addition, catheters with a continuous infusion may be placed to prolong analgesia.

Nursing Considerations

It is very important to protect the affected area from harm. Patients will have minimal or no sensation to the blocked area. If a catheter is placed, a more dilute medication will be used than the concentrated solution used for placement of the block. Some numbness/tingling as well as decreased motor function is still common. If a lower extremity block is performed, use extreme caution when ambulating the patient until the nerve block has worn off and/or the nerve catheter has been removed. **** If a femoral nerve catheter is placed, a knee immobilizer should be used during ambulation.** The only exception is if physical therapy is working with the patient and determines that the quadriceps strength is sufficient.

****It is very common for nerve catheters to leak.** In many cases this is just local anesthetic tracking back along the catheter. As long as the patient has good pain control, reinforce the dressing. If the patient has poor pain control, contact the Acute Pain Service, pager PAIN (#7246).

Rare, but possible complications from nerve blocks and/or nerve catheters include: infection, bleeding, vascular puncture, nerve injury, falls, shortness of breath, or horner's syndrome.

Horner's syndrome occurs when the nerve between the brain and the eye is affected. It can happen with any brachial plexus block, but is most common with the interscalene or supraclavicular. Symptoms include a drooping eyelid, decreased pupil size, and decreased sweating on the affected side of the face. This will resolve as the block wears off.

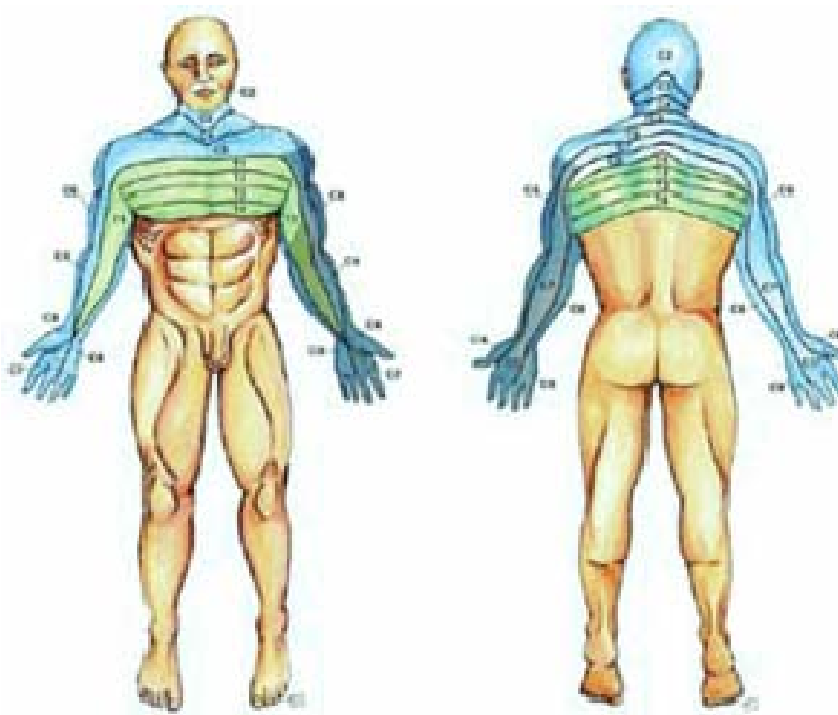
Medications

A variety of local anesthetics may be used for the nerve block. The most common include lidocaine, ropivacaine, bupivacaine, and mepivacaine. The type of medication used, the concentration, the volume administered, and the location of the block will affect the onset and duration. Included in this packet are the averages for each block type. Some patients may still experience shorter or longer durations than those listed. Occasionally epinephrine may be added to a nerve block. Epinephrine causes vasoconstriction of the blood vessels near the injection site. This causes decreased uptake of local anesthetic into the vasculature, allowing the block to work for a longer duration. Opioids are rarely used in a nerve block. ****Local anesthetic alone will not cause problems with nausea/vomiting, or pruritis. In addition, they are not centrally acting, which means that they will not affect the blood pressure. If your patient is experiencing any of these symptoms look for alternate causes.**

It is possible for a patient to develop **local anesthetic toxicity** from a nerve block or a nerve catheter. It may be caused by accidental injection directly into a blood vessel, or vascular reabsorption from around the injection site. Common symptoms of local anesthetic toxicity include numbness and tingling around the mouth, a metallic taste, or ringing in the ears. If it progresses, it may lead to seizures, arrhythmias, and even cardiac arrest. Contact the APS if your patient experiences any of these symptoms.

Upper Extremity Nerve Blocks

The interscalene, supraclavicular, infraclavicular, and axillary nerve blocks are used for surgeries of the upper extremity. They all block the brachial plexus (a bundle of nerves to the upper extremity), but at different locations. The area covered is shown in dark blue on the diagram below. Although coverage is similar among all 4 blocks, the type of surgery and patient characteristics influence which block is most likely to be performed. For example, a patient with a history of pulmonary disease would be less likely to receive an interscalene or supraclavicular nerve block (depending on the type of surgery) due to the risk of respiratory compromise. A patient with a thick neck, having wrist surgery, would be more likely to receive an infraclavicular or axillary nerve block.



Local Anesthetics

Due to the vasculature nature of the area, brachial plexus blocks (interscalene, supraclavicular, infraclavicular, or axillary) typically wear off fairly rapidly.

	Onset (min)	Anesthesia (hrs)	Analgesia (hrs)
1.5% Mepivacaine	10-20	2-3	2-4
1.5% Mepivacaine (+ epinephrine)	5-15	2.5-4	3-6
2% Lidocaine	10-20	2.5-3	2-5
2% Lidocaine (+ epinephrine)	5-15	3-6	5-8
0.5% Ropivacaine	15-20	6-8	8-12
0.5% Bupivacaine (+ epi)	20-30	8-10	16-18

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Interscalene

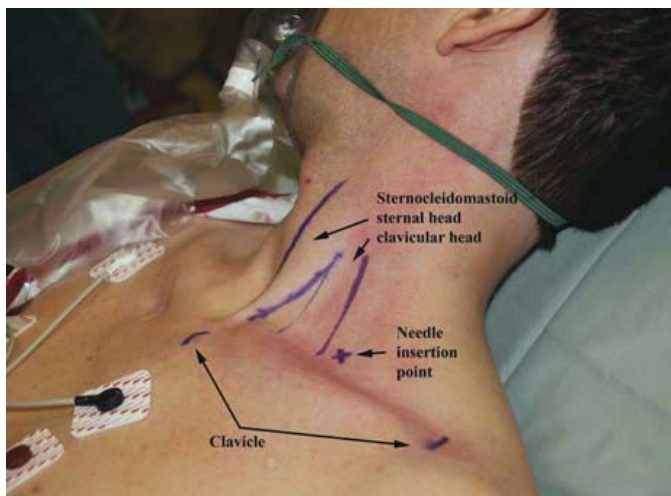
The interscalene nerve block is typically used for shoulder, clavicle, or upper arm surgeries because it covers higher up on the shoulder. The disadvantage is that patients will experience phrenic nerve blockade resulting in diaphragmatic paralysis. In most patients, this does not significantly compromise lung function. However, patients with underlying lung disease are at higher risk for respiratory compromise and should be monitored closely. The risk of pneumothorax is present, but minimal.



www.arapmi.org/maraa-book-project/Chapt7.pdf

Supraclavicular

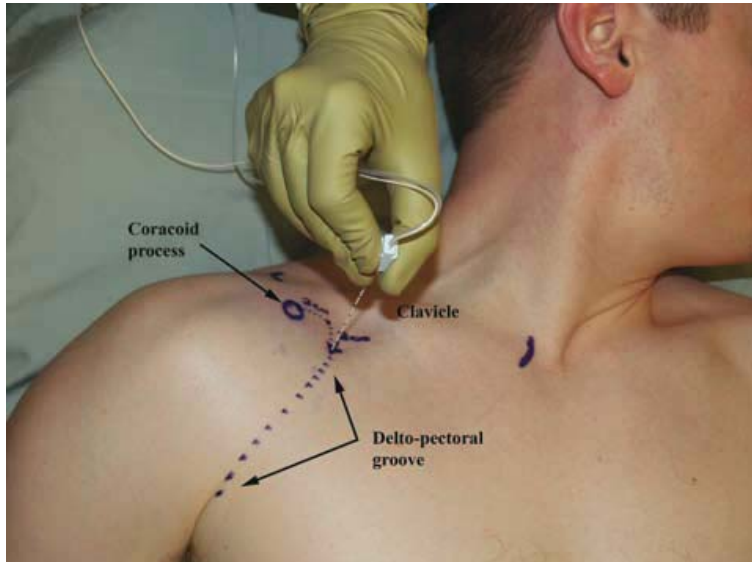
The supraclavicular nerve block is ideal for procedures of the upper arm, from the mid-humeral level down to the hand. The area covered is similar to the interscalene block, but does not cover the upper part of the shoulder as well. It has a rapid onset, with a dense and predictable level of pain control. There is a slightly higher risk of pneumothorax than the interscalene nerve block. Signs and symptoms of a large pneumothorax include sudden cough and shortness of breath. In addition, approximately 50% of patients will have diaphragmatic hemiparesis.



www.arapmi.org/maraa-book-project/Chapt8.pdf

Infraclavicular

The infraclavicular nerve block is ideal for operations to the elbow and below. It has a lower risk of pneumothorax than the supraclavicular, although higher than the interscalene. This block has minimal risk of blocking the phrenic nerve.



(www.arapmi.org/maraa-book-project/Chapt9.pdf)

Axillary

The axillary block is the most distal block performed on the brachial plexus. Because of the distal location, the axillary block has minimal risk of respiratory compromise from either pneumothorax or phrenic nerve blockade. However, the axillary nerve block does not cover the lateral aspect of the forearm from the elbow to the thumb as well as the other blocks. Usually a block of the musculocutaneous nerve is also performed with this block. This provides ulnar coverage.



Paravertebral

The paravertebral space is adjacent to the vertebral body. When a local anesthetic is injected into this space it blocks one or more nerve roots as they exit the spine. This leads to unilateral numbness of a specific area of the body. The most common indication is breast surgery, but it is used for chest and abdominal surgeries. The area that is blocked will depend on which level the local anesthetic is injected at. Potential complications include inadvertent vascular puncture, hypotension, hematoma, epidural spread or intrathecal spread, pleural puncture, and pneumothorax. Bilateral blocks may be performed.



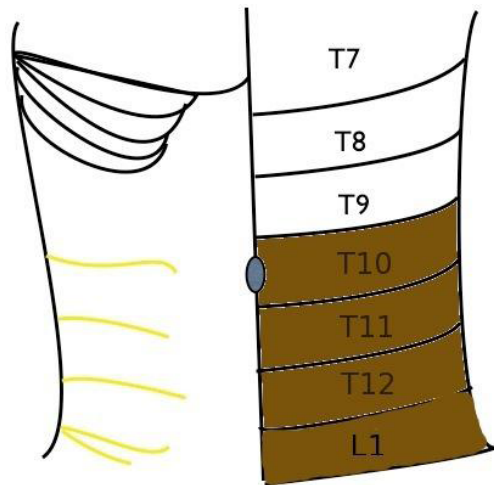
A paravertebral block does not typically result in motor block of the lower extremities. The exception is if L2-L5 are blocked (not commonly done). Most guidelines recommend using a longer-acting local anesthetic when possible.

	Onset (min)	Anesthesia (hrs)	Analgesia (hrs)
1.5% Mepivacaine (plus HCO ₃ + epinephrine)	10-20	2-3	3-4
2% Lidocaine (plus HCO ₃ + epinephrine)	10-15	2-3	3-4
0.5% Ropivacaine	15-25	3-5	8-12
0.5% Bupivacaine (plus epinephrine)	15-25	4-6	12-18
0.5% I-Bupivacaine (plus epinephrine)	15-25	4-6	12-18

Transversus Abdominis Plane

The Transversus Abdominis Plane (TAP) block is a technique where local anesthetic is injected into a potential space between the internal oblique and transversus abdominis muscles. This plane contains the nerves that provide sensation to the anterolateral abdominal wall, approximately T10-L1, although in some patients the block will spread further up and/or down. The TAP Block is typically used for pain control after lower abdominal surgery including bowel, prostate, obstetric, and gynecological surgery. Potential complications include intraperitoneal injection, bowel hematoma, transient femoral nerve palsy, liver laceration and local anesthetic toxicity. Theoretically these risks have greatly decreased now that most TAP blocks are placed under ultrasound guidance. More research is needed to prove this.

If surgery enters the peritoneal cavity, the dull visceral pain from spasm and/or inflammation may still be present. The TAP block primarily covers the incisional pain. Depending on the type of local anesthetic used, a TAP Block typically lasts 12-36 hours. The TAP block can produce relaxation of the abdominal wall muscles, which can result in a “flank bulge”, which may look like a hernia. This may be more pronounced in patients with low Body Mass Index (BMI). Any patient with significant abdominal distention following a TAP Block should be assessed for possible internal bleeding.



http://www.usra.ca/sb_tap



Flank “bulge” in a patient after bilateral TAP blocks

Lower Extremity Nerve Blocks

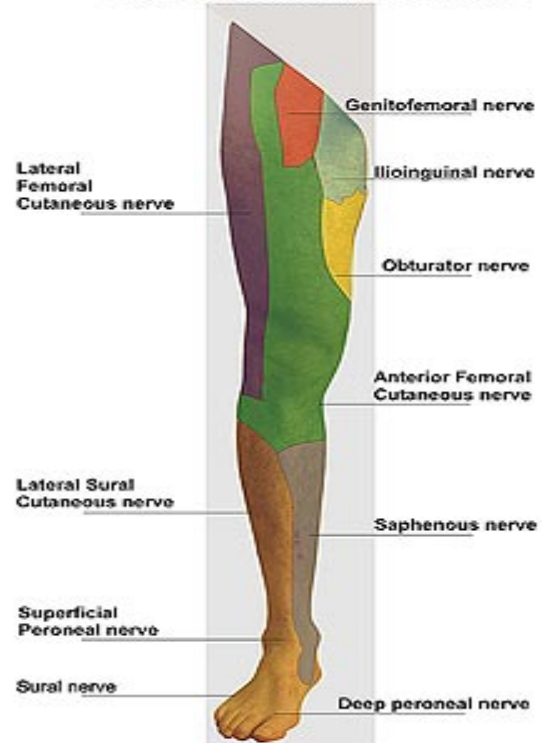
Lumbar Plexus

The lumbar plexus comprises 6 nerves that supply the lower extremity. When blocked at the level of the plexus, the majority of the front of the leg is covered including the anterolateral and medial thigh, knee, and the saphenous below the knee. Due to the placement of the needle in the deep muscle beds, the potential for systemic toxicity is greater than in many other blocks. In addition, the proximity of the lumbar nerve roots and epidural space carries a risk of epidural or spinal spread. The lumbar plexus block is most commonly used to hip arthroscopy, and other hip surgeries.



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LUMBAR PLEXUS
Cutaneous innervation



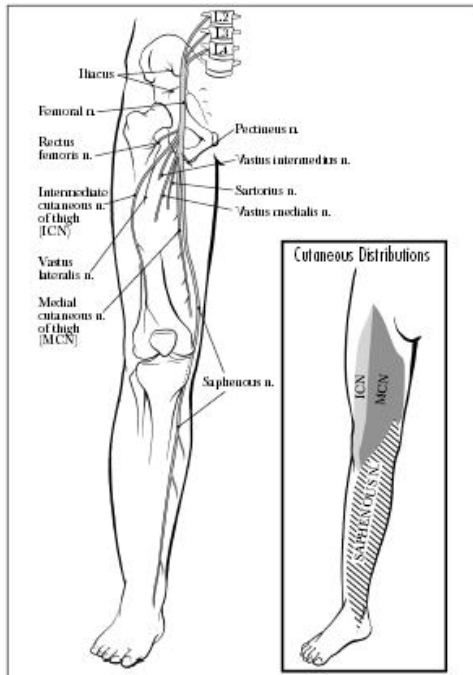
ANTERIOR © NYSORA.com

Due to the increased vascularity surrounding the lumbar plexus, the duration of action of local anesthetics tends to be slightly less than for other lower extremity nerve blocks.

	Onset (min)	Anesthesia (hrs)	Analgesia (hrs)
1.5% Mepivacaine (+ epi)	10-20	2-3	3-4
2% Lidocaine (+ epi)	10-15	2-3	3-4
0.5% Ropivacaine	15-25	3-5	8-12
0.5% Bupivacaine (+ epi)	15-25	4-6	12-18

Femoral

The femoral nerve is the largest branch of the lumbar plexus. A femoral block results in anesthesia of the entire anterior thigh and most of the femur and knee joint. It also blocks part of the hip joint. It is used for surgeries on the anterior thigh, knee, quadriceps tendon repair, and for postoperative pain management after femur and knee surgery, or hip fractures. ****A femoral nerve block will cover the front of the knee, but provides no coverage to the back of the knee.**



Femoral nerve blocks can last for a significant period of time; therefore it is very important to consider what medication is being used. The major side-effect noted is quadriceps weakness.

	Onset (min)	Anesthesia (hrs)	Analgesia (hrs)
1.5% Mepivacaine	15-20	2-3	3-5
1.5% Mepivacaine (+ epi)	15-20	2-5	3-8
2% lidocaine (+ epi)	10-20	2-5	3-8
0.5% ropivacaine	15-30	4-8	5-12
0.5 Bupivacaine	15-30	5-15	6-30

Sciatic

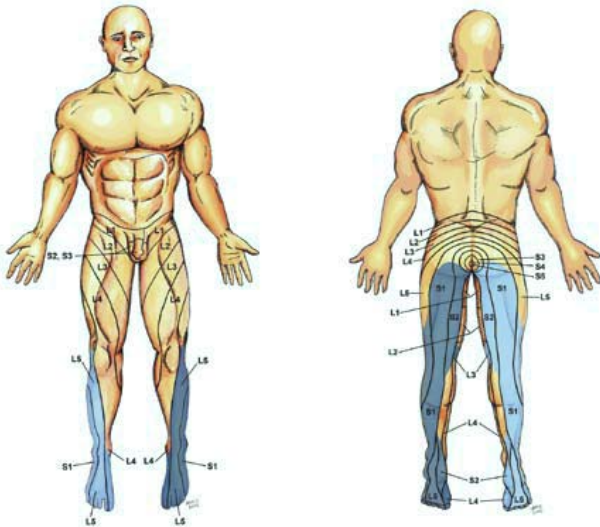
The sciatic nerve supplies motor and sensory innervation to the posterior aspect of the thigh as well as the entire lower leg, except for the medial leg, which is supplied by the saphenous nerve (see diagram below). The sciatic nerve is the largest nerve in the body. Because the sciatic nerve is so large, it can be blocked from several different locations along the lower extremity. The most common approaches are the popliteal and subgluteal.



Subgluteal approach



Popliteal approach



A fairly small amount of local anesthetic is needed for a sciatic nerve block. The duration of a sciatic blockade is longer than for any other nerve block.

	Onset (min)	Anesthesia (hrs)	Analgesia (hrs)
1.5% Mepivacaine (+ HCO ₃)	10-15	4-5	5-8
2% Lidocaine (+ HCO ₃)	10-20	5-6	5-8
0.5% Ropivacaine	15-20	6-12	6-24
0.5 Bupivacaine (or I-bupivacaine)	15-30	8-16	10-48

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