

Infraclavicular Approach to Brachial Plexus Block

Least described approach to blocking the nerves of the arm and hand.

INDICATION:

- Block of the upper extremity for surgery distal to the shoulder

CONTRAINDICATIONS

- Relative contraindications:
 - Inability to palpate bony landmarks
 - Requirement for bilateral blocks
- Infection at the site, coagulopathy, local anesthetic allergy, uncooperative patients, patient refusal, inadequate technical skill, lack of resuscitative equipment, pre-existing neuropathy

POSITION:

- Patient supine with arms at sides in anatomical position
- Hand supported at wrist to facilitate seeing motor stimulation

TECHNIQUE (CORACOID):

- Ensure resuscitation equipment available, CAS monitors, IV access
- Identify the coracoid process, needle entry site is 2cm medial and 2cm caudad—the skin is cleansed and a skin wheel is raised at this point.
- A 22g 5cm insulated short bevel needle is inserted at 90° to the table top looking for motor response down to 0.5mA; Once nerve response is elicited the needle is fixed, and after careful aspiration, 20-30mL of 1% lidocaine or 0.25% bupivacaine are injected incrementally
- If a tourniquet is used, a ring of subcutaneous anesthesia should be infiltrated along the axilla to block the superficial intercostobrachial fibres.
- Ideal block for catheter placement as very low displacement rate due to immobile insertion site

SIDE EFFECTS AND COMPLICATIONS:

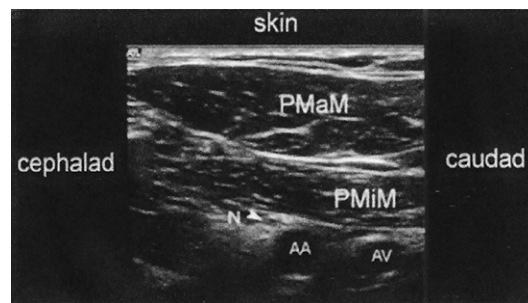
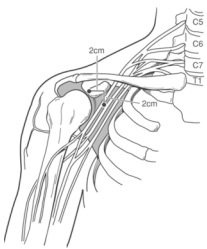
2. Pneumothorax
3. Intravascular injection resulting in convulsions
4. Intravascular puncture resulting in bleeding/hematoma
5. Phrenic nerve block (very rare)
6. Inadvertent stellate ganglion block

DISTRIBUTION OF ANESTHESIA

- Blocks the brachial plexus at the level of the cords as they wrap around the 2nd part of the axillary artery.
- Most approaches still block the musculocutaneous and axillary nerves (spared in axillary block)

ANATOMY

- As above for coracoid approach
- Also can have patient supine, head turned to contralateral side, arm abducted and elbow flexed with towel roll under wrist...also will require analgesia/sedation for needle traversing pectoral muscle
- Draw a line from the medial head of the clavicle to the coracoid process
- At midpoint of line mark a point 3cm caudad, clean and infiltrate with LA
- 10cm 22g insulated short bevel needle is inserted at this point 45 degrees to skin parallel to the line and directed laterally
- Initial stimulation at 1.5mA gives pectoral twitch, this should give way to hand twitches
- If pectoral twitch disappears but no brachial plexus twitch arises deviate 10 degrees cephalad, then 10 degrees caudad
- Subscapularis twitch (needle too deep), Axillary twitch/Deltoid (needle too cephalad), Musculocutaneous twitch/Biceps (needle too caudad)



Local Anesthetic

- **Bupivacaine 0.25% (without epinephrine)**
- **Lidocaine 1%**

ULTRASOUND GUIDED TECHNIQUE:

- low frequency (4-7 MHz) curvilinear probe
- Scanning is performed laterally to the coracoid process with the transducer held in sagittal orientation, at the lower edge of the clavicle
- Obtain a transverse view of the axillary artery and vein, as well as the pleura and chest wall
- Plexus is usually sitting 2-6cm below skin
- Cords of the plexus are located adjacent to the axillary artery in the medial, lateral and posterior positions.
- Insert 22g 5-10cm insulated stimulating needle perpendicular to the skin; directed caudally in the infraclavicular position with in-line visualization directing the needle between the axillary artery and vein
- Set nerve stimulation to 1.0mA

- Looking for pectoral twitch → hand twitches (adjust as above); decrease nerve stimulation to 0.4mA looking for persistent twitch
- Aspirate for blood/air
- Test injection of 5cc D5W
- Inject 20-30cc local anesthetic solution looking for adequate spread around the plexus



Figure 7 : Mark the footprint of the transducer. Outline of transducer is marked as T. A line through the middle of the footprint, with the cross marked N designates the needle insertion site. C, coracoid process, CL, clavicle. From Harmon D, Frizelle HP, NavParkash SS, et al (eds): Perioperative Diagnostic and Interventional Ultrasound. Philadelphia, Saunders Elsevier, 2008, pp 143.



Figure 8 : Advance the needle under "real-time" US guidance. From Harmon D, Frizelle HP, NavParkash SS, et al (eds): Perioperative Diagnostic and Interventional Ultrasound. Philadelphia, Saunders Elsevier, 2008, pp 143.

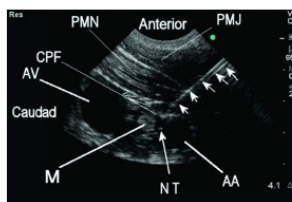


Figure 9 : Transverse view of the infraclavicular part of the brachial plexus at the median infraclavicular level. Needle (arrows) is directed between the axillary artery (AA) and the axillary vein (AV). DPF, clavipectoral fascia; L, lateral cord; M, medial cord; NT, needle tip; P, posterior cord; PMJ, pectoralis major muscle; PMN pectoralis minor muscle. From Harmon D, Frizelle HP, NavParkash SS, et al (eds): Perioperative Diagnostic and Interventional Ultrasound. Philadelphia, Saunders Elsevier, 2008, pp 144.

COMPLICATIONS

- **Partial block**—no radial (posterior cord) distribution, block should set up in 20min or less
- **Stellate ganglion block**
- **Neck hematoma**
- **Infection**
- **Pneumothorax (uncommon)**
- **Nerve Injury** – avoid injection if patient reports pain or a crampy feeling, or stimulus <0.3mA
- **Phrenic nerve paralysis** (less common than with supraclavicular and interscalene)
- **Local Anesthetic**
 - Intravascular injection – intermittent aspiration
 - Allergy / anaphylaxis

REFERENCES:

- Cousins—Neural Blockade
- Miller 7th ed
- Hadzic NYSORA atlas 2004