Regional Anesthesia Blocks for the Upper Extremities

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Disclaimer

• Within the past 12 months, I have had NO financial relationships with proprietary entities that produce health care goods and services.
Cases

• 68 yo presents for dialysis fistula revision. Extensive cardiac and pulmonary risk factors make GA undesirable. Fully anticoagulated.

• 57 yo morbidly obese patient presents for wrist and hand surgery after MVA. Long standing lung disease requires home O2.

• 12 yo presents for tumor debulking in the radius. Anxious and afraid of needles. Surgeon requests block due to allergy/intolerance to oral and IV pain meds.

Anatomy
Blocks above the Clavicle

- Interscalene block – root level block
- Supraclavicular block – trunk level block

Blocks below the Clavicle

- Infraclavicular block – cord level block
- Axillary block – branch level block

Interscalene Block

- Standard block for anesthesia and analgesia for shoulder surgery.
- Surface anatomical landmarks are the sternocleidomastoid muscle, the external jugular vein and clavicle.
- Insert the needle at the level of the cricoid cartilage (C6), aiming posteriorly.
- Depth 1-2 cm.
- Look for biceps, triceps or deltoïd responses.
Ultrasound Guidance-Interscalene

- Linear probe placed at level of C6.
- Needle entry is posterior, in plane.
- Good visualization of “stop light” with three roots.

Pitfalls with Interscalene Block

- Needle too anterior-diaphragmatic twitch from phrenic nerve.
- Needle too posterior-rhomboid twitch from dorsal scapular nerve.
- Careful attention to patient selection:
  - Lung function and capacity
  - Cooperation
Supraclavicular Block

- Sometimes referred to as the spinal of the upper extremity.
- Excellent for any upper extremity surgery except shoulder surgery.
- Fast onset, reliable anesthesia.
- Risk of pneumothorax is high.
- Bilateral block dangerous.
- US guidance helpful.

Ultrasound Guidance-Supraclavicular

- Probe placed above the clavicle.
- Needle can enter laterally or medially.
- Visualize “cluster of grapes” near subclavian artery.
Pitfalls with Supraclavicular Block

• Poor visualization of the needle tip.
• Not putting drug “behind” the pocket.

Infraclavicular Block

• Excellent cord-level block for lower arm, wrist or hand surgery.
• Many approaches
  – 2cm medial to the coracoid, 2 cm under the clavicle, needle remains parasagittal (coracoclavicular trough)
  – Small medial to lateral movements (less than 10°) are okay to find medial and lateral cords
• Posterior cord is most important-largest cord and provides most of the innervation in the lower arm.
  – Look for wrist extension, deltoid twitches to confirm

• Lateral and caudal placement will likely miss the musculocutaneous nerve.

Ultrasound Guidance-Infraclavicular

• Better technique when hand/wrist is fractured.
• Probe placed parasagittally under clavicle.
• Needle is in plane directed posteriorly.
• LA needs to surround artery.
**Intercostal Brachial Nerve**

- Intercostal brachial nerve block is necessary if the surgeon is using a tourniquet.
- Derives from T2, not part of brachial plexus.
- Innervates the medial aspect of upper arm.
- Block is a field block
  - 3 cm from axilla on medial side
  - Long skin wheel

**Pitfalls with Infraclavicular Block**

- Pneumothorax-less likely with parasagittal needle placement.
  

- Vascular puncture (0.4-2%)
  

- Not waiting for set up (usually 20-30 min depending on drug choice).

- Failing to block the posterior cord first when using landmark/nerve stimulation techniques.
Axillary Block

- Excellent and safe block for lower arm, wrist, hand surgery.
- Preferred method for bilateral block.
- Preferred method when lung dysfunction is severe-risk of PTX is zero.
- Classic, single injection high in axilla using arterial pulsation as guide.

Ultrasound Guidance-Axillary

- Ultrasound approach further from axilla, using ultrasound-guided nerve twitch responses.
  - Allows targeted delivery for dermatome sparing.
  - Preferred method when coagulation status is borderline-easy to avoid arteries and veins, possible to compress.
  - Requires nerve stimulation as location of nerve branches is highly variable.
  - Easier to teach this block using ultrasound to trainees.
Pitfalls with Axillary Block

- Risk of infection is theoretically higher.
- More painful than other blocks.
- Musculocutaneous nerve is outside the brachial plexus sheath and must be blocked separately, biceps twitch is helpful for ID.
- Intercostal brachial nerve block is necessary if using upper arm tourniquet.

What would you do?

- 68 yo presents for dialysis fistula revision. Extensive cardiac and pulmonary risk factors make GA undesirable. Fully anticoagulated.

- 57 yo morbidly obese patient (BMI 58) presents for wrist and hand surgery after MVA. Long standing lung disease requires home O2.

- 12 yo presents for tumor debulking in the radius. Anxious and afraid of needles. Angry and uncooperative. Surgeon requests block due to allergy/intolerance to oral and IV pain meds.
Summary

• There are 4 commonly-used approaches to block the brachial plexus. Choice of block depends on type of surgery, patient characteristics, equipment availability and practitioner skill.

• Choice of local anesthetic depends on purpose of the block, patient factors, and availability.

• All approaches can be modified for long term analgesia with catheter placement.