Evaluation of the Upper Extremity and Augmentation of Upper Extremity Blocks

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Disclosures

• I do not have any relevant relationships with any commercial interests.

• I may be discussing off-label uses of local anesthetics and adjuncts depending upon participant questions.

Learner Outcomes

1. Describe the necessary steps to evaluate the results of a brachial plexus block.
2. Discuss procedures for augmenting a brachial plexus block using additional peripheral nerve blocks.
UPPER EXTREMITY OBJECTIVE:

Deposit a large volume of local anesthetic somewhere along the brachial plexus – depending upon where you need anesthesia.

UNDERSTAND YOUR ANATOMY:

Musculocutaneous takes off very high in the axilla, therefore in order to block it you have to go after it separately.


**Cutaneous Innervation**

[Diagram showing cutaneous innervation]

**Osseous Innervation**

[Diagram showing osseous innervation]

**Interscalene**

[Diagram showing interscalene region]

https://www.asra.com/
Interscalene

- Ideal for surgery of the shoulder and upper arm
- Provides anesthesia to:
  - C-5, C-6, C-7
  - Upper branches of brachial plexus
- Ulnar sparing
  - Do not use this block for procedures below elbow

Interscalene Contraindications

Absolute:
- Contralateral recurrent laryngeal nerve palsy
- Phrenic nerve palsy

Relative:
- Brachial plexus pathology
- Impaired pulmonary function
  - Can the patient tolerate hemi-diaphragm paralysis?

The phrenic nerve is often blocked too = hemidiaphragm paralysis
**Interscalene**

**Ultrasound technique**
- Scan and isolate hypoechoic nerve trunks aka “Stop Light” sign
- Needle inserted lateral, in plane
- Aim between superior and middle trunks as shown
- Aspirate and inject gently (20mL)

**Interscalene Approach**

**Interscalene Complications**

- **Horner’s Syndrome (most common)**
  - Horny PAM
  - Ptosis
  - Anhydrosis
  - Miosis
- Phrenic nerve block (common) – hemi-diaphragm
- Recurrent Laryngeal Nerve block (rare) - hoarseness
- Intravascular injection (rare)
- Subarachnoid/Epidural injection (rare)
- Pneumothorax (rare)

**Supraclavicular**

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**Supraclavicular**

- Effective block for all portions of the upper extremity: hand, forearm, and upper arm
- Carried out at the trunk/division level of the brachial plexus
- Increased success of blocking inferior trunk compared to interscalene blockade.

**Supraclavicular Contraindications**

- Brachial plexus pathology
- Pneumothorax
- Coagulopathy
  - Non-compressible vessel if punctured (subclavian artery)

**“Classic” Approach**
Supraclavicular Ultrasound

- Probe over clavicle (supraclavicular fossa)
- Visualize subclavian artery and brachial plexus lateral and superior
- Visualize first rib and pleura
- Probe: Linear, High Frequency (5 to 12 MHz)

Supraclavicular Ultrasound - Needles inserted lateral and in-plane - Note first rib and pleura locations - Keep needle shaft and tip in view - Goal is “Corner Pocket” between nerve bundle and S.A. - Aspirate and inject gently in 5 mL increments - Usual volume: 20 mL

1st Rib as a Backstop
**Supraclavicular Complications**

- Pneumothorax most associated with supraclavicular block.
  - Apex of lung is medial and posterior to brachial plexus.
  - Sudden cough and shortness of breath
- Vascular Puncture
- Hemiparesis of diaphragm (phrenic nerve block)
- Horner’s Syndrome (less so than interscalene)

**Expected Outcomes**

- Anesthesia from mid humerus down
- Many references will say from proximal humerus down?????
- Covers most of the hand well (See below!)
- Think of it as the SAB of the arm
- Ulnar sparing

**Pearls**

- DON’T infiltrate LA deep – the plexus is very superficial
- Phrenic nerve involvement is extremely rare
- Will cover from tourniquet down
- Only need 20ish mls of LA
- Very little risk of PTX if you stay shallow and can “see” the needle
- Great block for distal fractures because you don’t have to position arm
Don’t Panic

• Your first response is not necessarily to induce general anesthesia.

• Questions to ask yourself:
  – Is the block setting up or is it a total failure?
  – How much time do I have?
  – Do I need to supplement block or just buy time until it sets up?
Next...

- Gather supplies to supplement:
  - 2% Lidocaine
  - 10 ml syringe
  - "B" bevel needle
  - Alcohol pad

Midhumeral anatomy

Cadaver antecubital dissection
Posterior dissection at elbow

Radial nerve block

Median nerve block
References

- Personal Clinical Practice.