Regional Anaesthesia: Minimizing risk and complications

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Regional Anesthesia

Its Technic and Clinical Application

By

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With a Foreword by

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"Regional anesthesia is an art. Remembering that even experts may fail, we should try often and again, observing scrupulously its principles, until we succeed"

Labat, G: Regional anesthesia: Its Technique and Clinical Application: 1922


Safety First!
Lots of Practice!
Lots of Patience!

Complications of RA

- Nerve Injury
- Vascular Injury
- Collateral organ damage
- Local Anaesthetic Toxicity
- Psychological trauma

Nerve injury after peripheral nerve blockade (PNB) is a potentially devastating complication that can result in permanent disability.[1] Data from a recent review of published studies suggest that the incidence of neuropathy after PNB varies depending on the anatomical location, ranging from 0.03% for supraclavicular blocks to 0.3% for femoral blocks to up to 3% for interscalene blocks.[2] Fortunately, the vast majority of these neuropathies seem to be temporary and resolve over weeks to months. However, the etiology of neurologic injury related to

2. Brull R, McCartney CJL, Chan VWS, et al. Neurological complications after regional anesthesia: contemporary estimates of risk. *Anesth Analg*. 2007;104: 965–974.

U/S signs of intraneural injection

- Visualization of the needle inside the nerve (within outer epineurium) at the time of injection
- Increase in nerve diameter and cross-sectional area of the nerve by $\geq 15\%$
- Separation of the fascicles and/or fascicular bundles by the injectate
- Diffusion of the LA within epineurium in a proximal and distal direction

Complications of PNB

- Nerve Injury
- Vascular Injury
- Collateral organ damage
- Local Anaesthetic Toxicity
- Psychological trauma

Management of L.A. Toxicity

- ACLS
- ABC
- Call for help
- O_2
- CPR
- Intubation & hyperventilation
- Atropine/Adrenaline
- Abort seizure(eg: STP)
- Amiodarone for VT
- 20% Intralipid (1.5ml/kg over 2 min., follow by ivi 0.25-0.5ml/kg/min)
- Treat acidosis
- Defib.

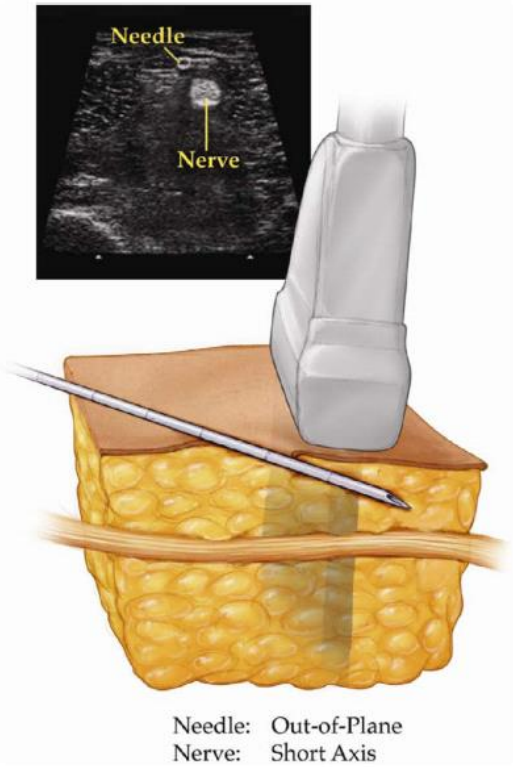
Insurance of practice

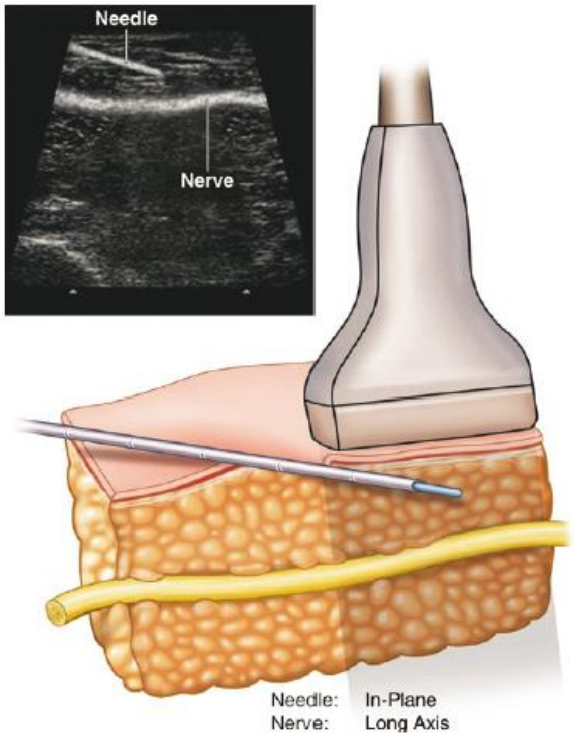
- Individual
- Group
- Institution

Tips on USGRA

- Always place the US machine in front of the operator
- Left hand hold the probe**
- Right hand hold the needle**
- Start with in-plane technique
- Larger nerve usually need multiple injection
- Use nerve stimulator whenever you are unsure

Needling technique





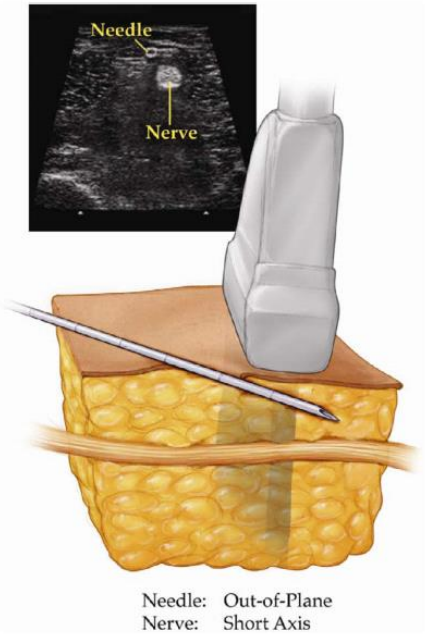
Nerve in Short Axis, Needle In-Plane Approach

needle orientation perpendicular to the path of the target nerve, which may result in catheters being inserted beyond the nerve and misplacement of the subsequent local anesthetic infusion

Dhir S, Ganapathy S. Comparative evaluation of ultrasound-guided continuous infraclavicular brachial plexus block with stimulating catheter and traditional technique: a prospective-randomized trial. *Acta Anaesthesiol Scand*. 2008;52:1158–1166

The use of a flexible epidural-type catheter may prevent catheter tip misplacement

Mariano ER Ultrasound guidance versus electrical stimulation for femoral perineural catheter insertion. *J Ultrasound Med*. 2009;28:1453–1460



Nerve in Short Axis, Needle Out-of--Plane Approach

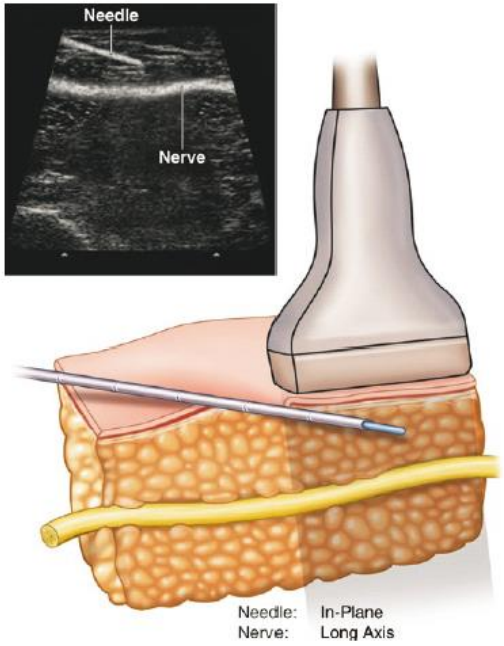
needle tip identification can be difficult or impossible

Fredrickson MJ A prospective randomized comparison of ultrasound and neurostimulation as needle end points for interscalene catheter placement. *Anesth Analg*. 2009;108:1695–1700

the use of local tissue movement and intermittent injection of fluid (hydro-location) to infer the position of the needle tip

Swenson JD Outpatient management of continuous peripheral nerve catheters placed using ultrasound guidance: an experience in 620 patients. *Anesth Analg*.2006;103:1436–1443

Fredrickson MJ. A prospective randomized comparison of ultrasound and neurostimulation as needle end points for interscalene catheter placement. *Anesth Analg*. 2009;108:1695–1700



Nerve in Long Axis, Needle In-Plane Approach

Scarcity of published reports

Koscielniak-Nielsen ZJ Long-axis ultrasound imaging of the nerves
and advancement of perineural catheters under direct vision: a preliminary report of four cases.
Reg Anesth Pain Med 2008;33:477–82. 26.
Tsui BC. Ultrasound-guided anterior sciatic nerve block using a longitudinal approach: “expanding the view”. Reg Anesth Pain Med 2008;33:275–6

Difficulty to advance the catheters with real-time ultrasonographic visualization

Wang AZ Ultrasound-guided continuous femoral nerve block
for analgesia after total knee arthroplasty--catheter perpendicular to the nerve versus catheter
parallel to the nerve. Reg Anesth Pain Med 2010

TIP LOCALIZATION WITH ULTRASOUND

identifying the tip is often challenging

location of fluid, agitated fluid/air mixture or air, injected through the catheter can infer the location

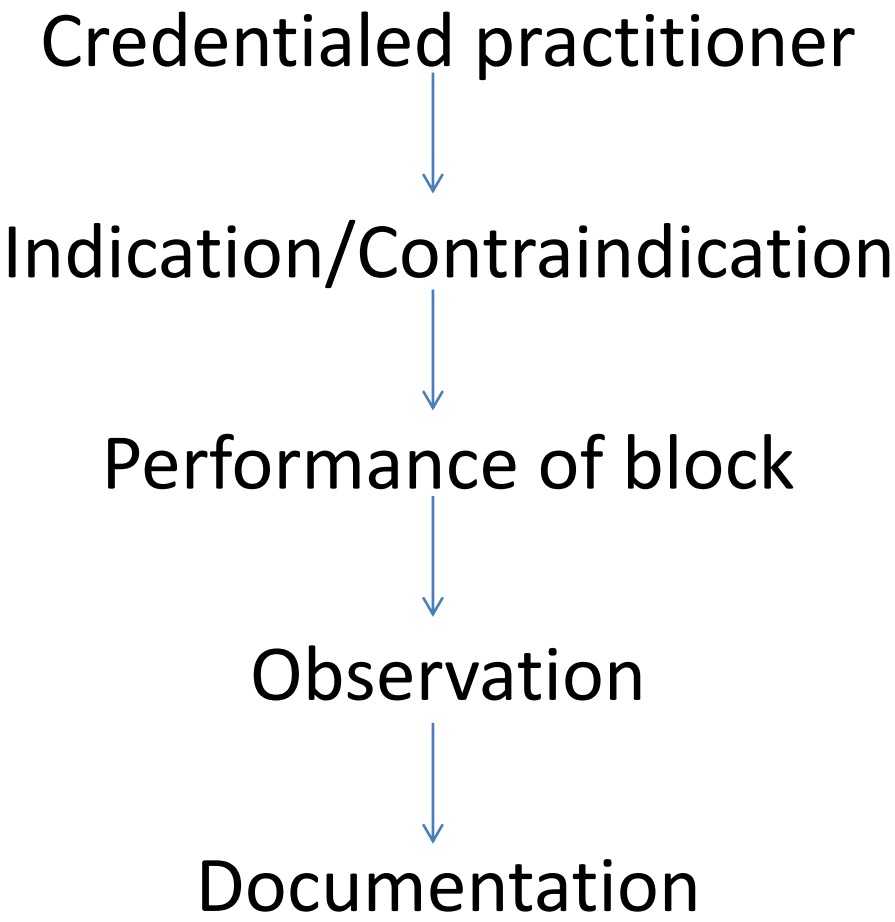
the positive and negative predictive value of each of these methods remains unknown

Antonakakis JG, Ultrasound-guided posterior approach for the placement of a continuous interscalene catheter. Reg Anesth Pain Med 2009;34:64–8
Dhir S Use of ultrasound guidance and contrast enhancement: a study of continuous infraclavicular brachial plexus approach. Acta Anaesthesiol Scand 2008;52:338–42
Swenson JD A novel approach for assessing catheter position after ultrasound-guided placement of continuous interscalene block. Anesth Analg 2008;106:1015–6

Protocol for R.A.

- Consent
- Indication
- Contraindication
- Emergency drug
- G.A machine & equ.
- IV drip
- Full monitoring
- Pt. Positioning
- Landmark
- Aseptic technique
- Light sedation
- L.A. to skin
- Needle
- Technique
- End point
- Dosage
- Complication
- Anesthesia assessment

ED model RA flow



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