

Brachial Plexus Approach

Transducer Placement



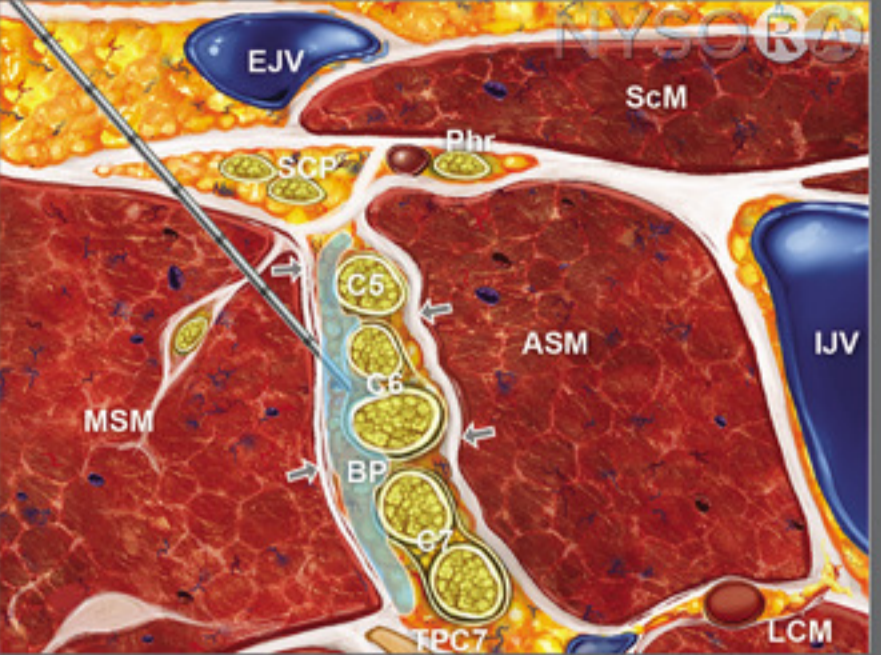
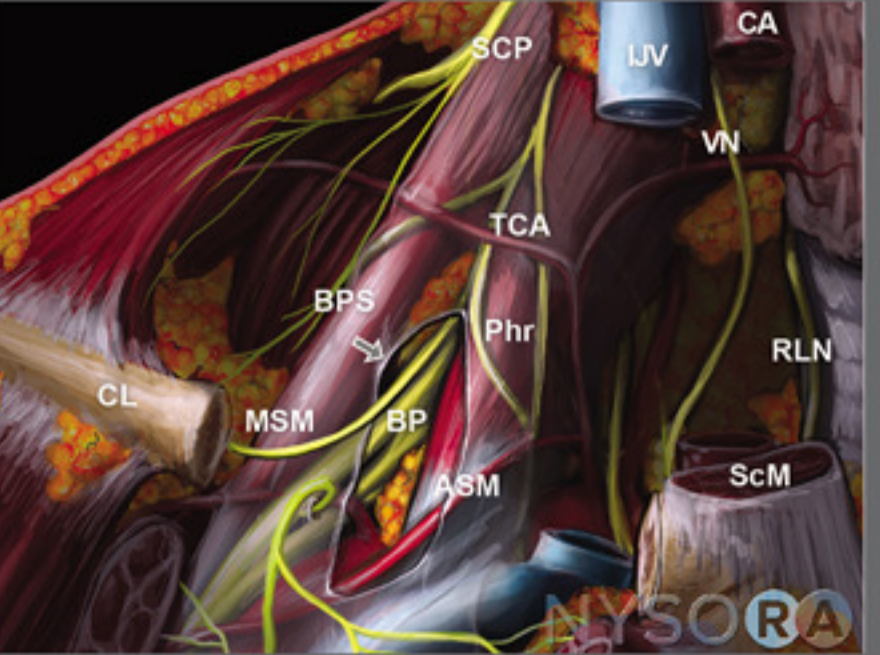
Ultrasound Image

Reverse Ultrasound Anatomy™

Anatomy

Interscalene

Indications: Anesthesia and analgesia for surgery on shoulder, distal clavicle and proximal humerus.
Patient position: Supine or semi-sitting, head facing to contralateral side.
Transducer: Linear.
Needle: 22G, 5 cm short bevel.
Common EMR obtained: Deltoid response.
LA: 10-15 ml.

Initial transducer placement: Over external jugular vein, approximately 3 cm above clavicle. Alternatively, start at supraclavicular fossa and scan proximally toward the plexus.
Initial depth setting: 3 cm.

Landmarks: ASM and MSM, 2 or 3 round hypoechoic structures (roots or trunks) between the ASM and MSM.
Ideal view: C5 C6 C7 nerve roots.

Technique: Needle insertion in plane (most common), lateral to medial; alternatively out of plane.
Ideal spread of LA: Within the interscalene space inside the sheath.
Number of injections: Based on spread; typically 1-2. BORE


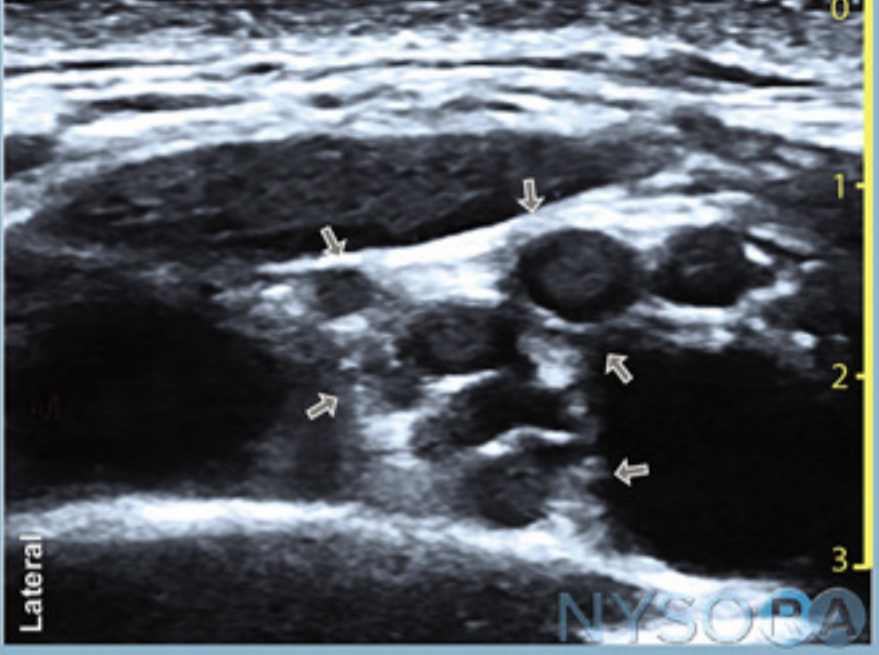
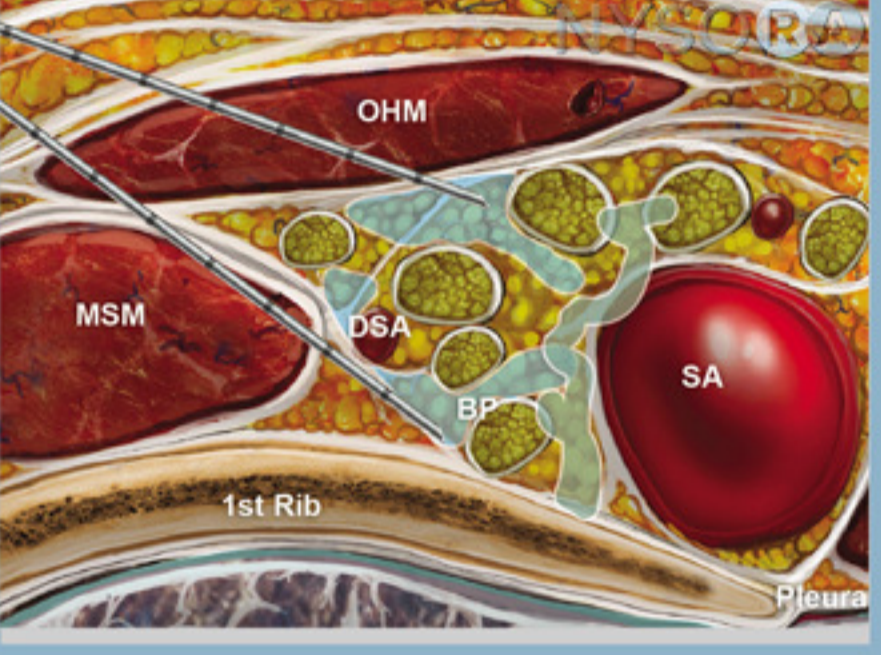
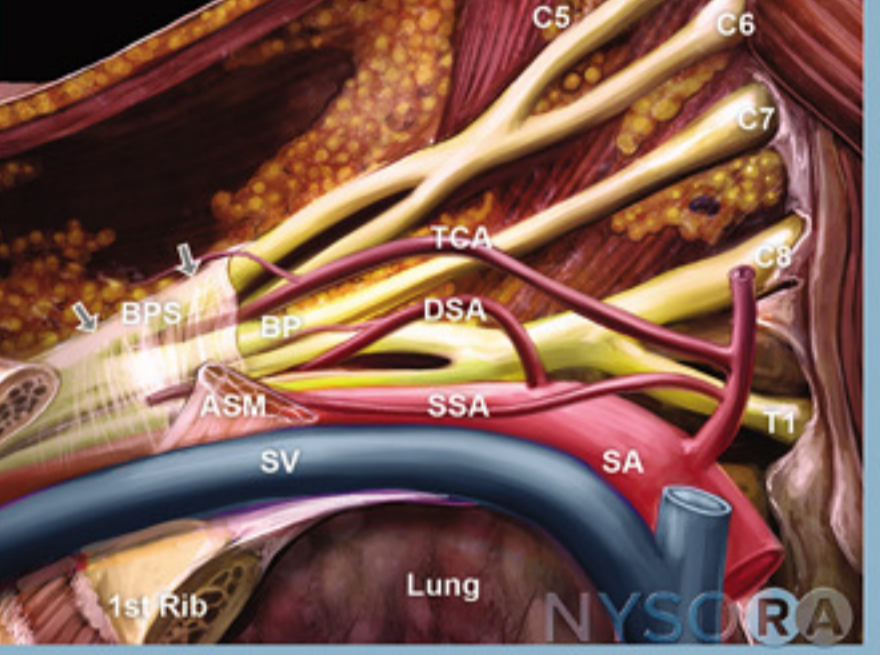
Tips: Use PD to detect and avoid blood vessels on the needle path. Reconsider in patients with history of significant respiratory disease. Use short acting LA through catheter in such patients; extend block through catheter if initial block tolerated well.

ABBREVIATIONS

ASM Anterior Scalene Muscle	LA Local Anesthetic
BP Brachial Plexus	MSM Middle Scalene Muscle
BPS Brachial Plexus Sheath	Phr Phrenic nerve
BORE Bolus Observe Reposition	RLN Recurrent Laryngeal Nerve
CA Carotid Artery	SCM Sternocleidomastoid Muscle
EMR Evoked Motor Response	SCF Superficial Cervical Fascia
EJV External Jugular Vein	TPC7 Transverse Process C7
IJV Internal Jugular Vein	VA Vertebral Artery
LCM Longus Coli Muscle	VN Vagus nerve

Supraclavicular

Indications: Anesthesia and analgesia for surgery on humerus, elbow, forearm and hand.
Patient position: Supine or semi-sitting, head facing to contralateral side.
Transducer: Linear.
Needle: 22G, 5 cm short bevel.
Common EMR obtained: Forearm, hand response.
LA: 20-25 ml.

Initial transducer placement: In supraclavicular fossa, lateral to clavicular head of SCM, tilted caudally.
Initial depth setting: 3 cm.

Landmarks: Subclavian artery, brachial plexus sheath (arrows), first rib and pleura.
Ideal view: Brachial plexus and subclavian artery above first rib (pleura should be visualized).

Technique: Needle insertion in plane, lateral to medial. Assess the depth of the BP, insert needle with shallow angle and adjust accordingly.
Ideal spread of LA: Within BP fascial sheath lateral to the SA but superficial to the first rib.
Number of injections: 2-3. BORE

Tips: Visualize the pleura (if unable, consider other technique). Use PD to detect and avoid TCA, DSA. Consider an alternative technique when large vessels are present within the sheath. Injection of LA should fill BPS. Reduce transducer pressure before injection of LA to facilitate spread.

ABBREVIATIONS

BP Brachial Plexus	MSM Middle Scalene Muscle
BPS Brachial Plexus Sheath	OHM Omohyoid Muscle
BORE Bolus Observe Reposition	PD Power Doppler
CA Clavicle	SA Subclavian Artery
DSA Dorsal Scapular artery	SSA Suprascapular Artery
EMR Evoked Motor Response	SV Subclavian Vein
LA Local Anesthetic	TCA Transverse Cervical Artery

Infraclavicular

Indications: Anesthesia and analgesia for surgery on humerus, elbow, forearm and hand.
Patient position: Supine with arm abducted and flexed at elbow.
Transducer: Linear.
Needle: 22G, 8-10 cm short bevel.
Common EMR obtained: Forearm, Hand.
LA: 20-25 ml






Initial transducer placement: Parasagittal, below the clavicle, medial to coracoid process.
Initial depth setting: 5 cm.

Landmarks: Axillary artery and fascia of pectoralis minor muscle (arrows).
Ideal view: Axillary artery and vein below the fascia of pectoralis minor muscle, lateral, medial, posterior cords periarterially.

Technique: Needle insertion in plane, cephalad to caudad. Release transducer pressure before injection to detect AV and CV and decrease the risk of intravenous injection. Use PD to identify vascular structures.
Ideal spread of LA: periarterially (U-shaped).
Number of injections: 1-2. BORE



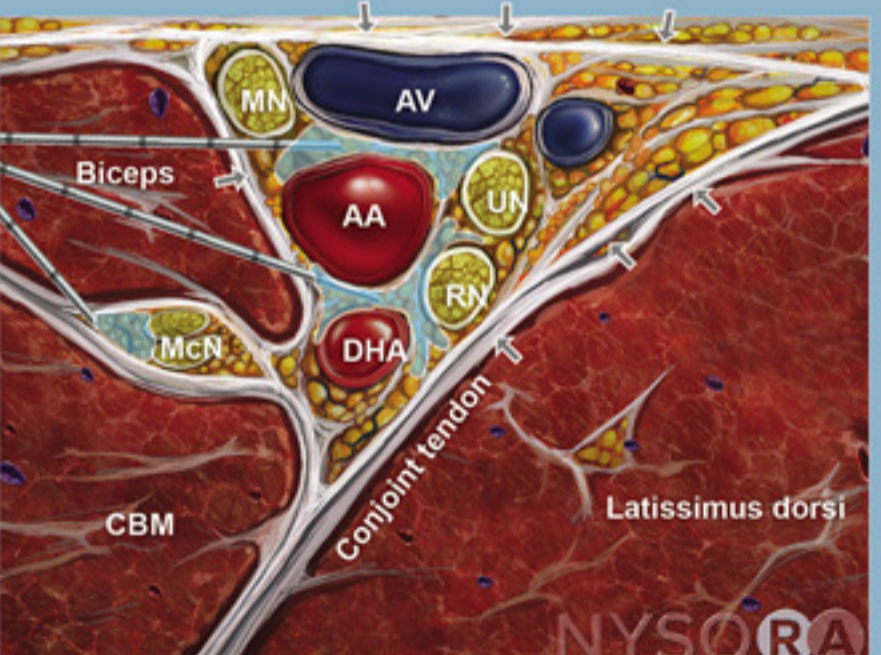
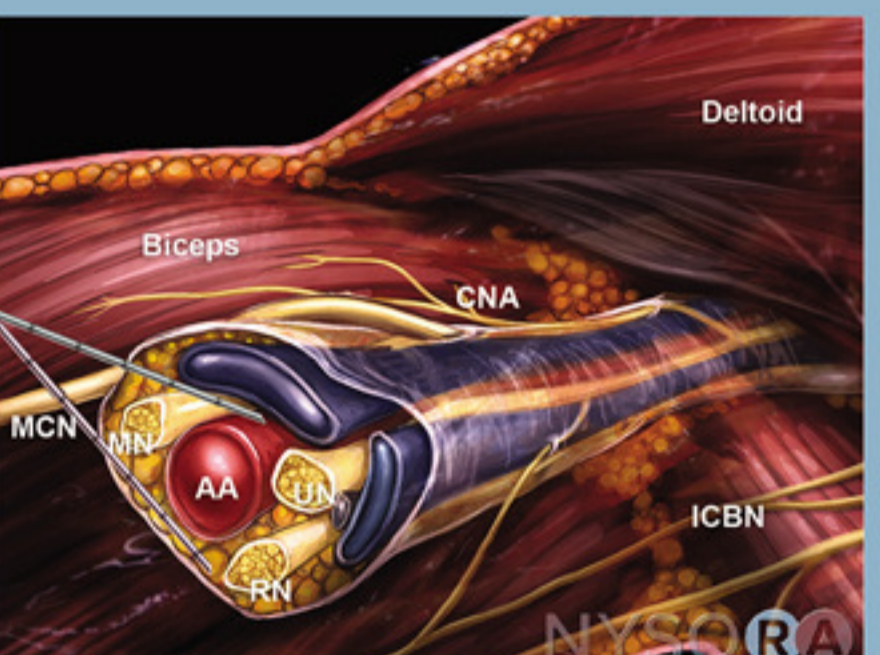
Tips: Ensure sufficient lateral placement of the transducer to avoid chest cavity. A single injection of LA is made where all cords are visible lateral to the artery, or posterior to the artery.

ABBREVIATIONS

AA Axillary Artery	MC Medial Cord
AV Axillary Vein	PC Posterior Cord
BORE Bolus Observe Reposition	PMaM Pectoralis Major Muscle
PD Power Doppler	PMIM Pectoralis Minor Muscle
CV Cephalic Vein	PN Pectoral Nerve
EMR Evoked Motor Response	SAM Serratus Anterior Muscle
LA Local Anesthetic	SsM Subscapular Muscle
LC Lateral Cord	
LPA Lateral Pectoral Artery	

Axillary

Indications: Anesthesia and analgesia for surgery on forearm and hand.
Patient Position: Supine with arm abducted and flexed at elbow.
Transducer: Linear.
Needle: 22G, 5 cm short bevel.
Common EMR obtained: Hand or fingers.
LA: 15-20 ml.

Initial transducer placement: Perpendicular to humerus in the axillary fossa, at intersection between pectoralis and biceps muscles.
Initial depth setting: 3 cm.

Landmarks: Axillary artery (AA) and Brachial Plexus fascial sheath (arrows).
Ideal view: MN, UN, RN scattered around AA, McN between the biceps and coracobrachialis muscles.

Technique: Needle Insertion in plane or out of plane. Injections: one above the artery, one between artery and conjoint tendon. McN is blocked separately.
LA deposit: 8ml posterior and 8ml anterior to the artery, 4ml for McN. **Ideal spread of LA:** around AA.
Number of injections: 2+McN. BORE

Tips: For extensive elbow surgery consider more proximal technique. Variations of McN are common. McN may be attached to the MN. Pre-scan to look for common anatomical variations. Reduce transducer pressure before injection of LA to facilitate spread and to decrease the risk of intravascular injection.

ABBREVIATIONS

AA Axillary Artery	ICBN Intercostobrachial nn
AV Axillary Vein	LA Local Anesthetic
BORE Bolus Observe Reposition	McN Musculocutaneous Nerve
CBM Coracobrachialis Muscle	MN Median Nerve
Cfx Circumflex Artery	RN Radial Nerve
CNA Cutaneous Nerve of Arm	UN Ulnar Nerve
DHA Deep Humeral Artery	
EMR Evoked Motor Response	

