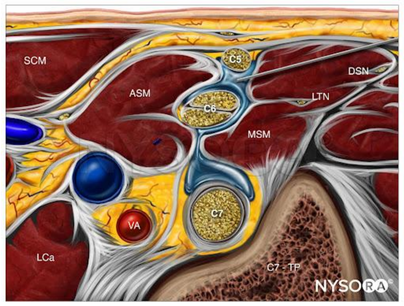
LARKIN® COMMUNITY HOSPITAL

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An unfortunate interscalene mishap

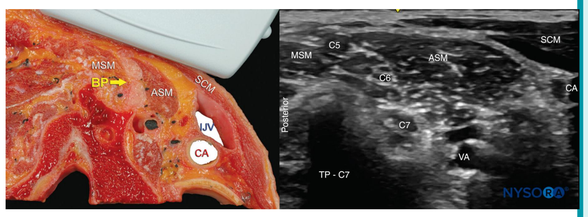
Department, Larkin Community Hospital, South Miami. Florida.

Background

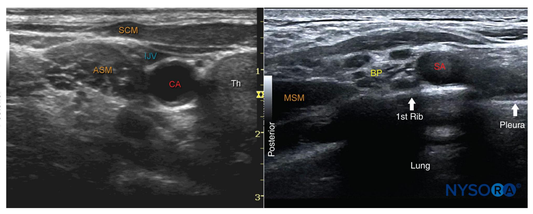


Regional Anatomy

Cross-section anatomy for interscalene brachial nerve block and transducer position to obtain the desired views. The plexus (BP) is seen between the middle scalene muscle (MSM) laterally and anterior scalene muscle (ASM) medially. The ultrasound image includes a partial view of the lateral border of the sternocleidomastoid muscle (SCM) the internal jugular vein (IJV), carotid artery (CA) and the transverse process of C7 (TP-C7).



Ultrasound image just below the level of the cricoid cartilage and medial to the sternocleidomastoid muscle (SCM). ASM, anterior scalene muscle; CA, carotid artery; IJV, internal jugular vein; SCM, sternocleidomastoid muscle; Th, thyroid gland. **(B)** View of the brachial plexus (BP) at the supraclavicular fossa. When identification of the brachial plexus at the interscalene level proves difficult, the transducer is positioned at the supraclavicular fossa to identify the BP superficial and posterior to the subclavian artery (SA). The transducer is then slowly moved cephalad while continuously visualizing the brachial plexus until the desired level is reached.



Case Report

Case Summary: Interscalene Block Complication
A 63-year-old female with right shoulder pain, weakness, and loss of function due to rotator cuff tear underwent right shoulder arthroscopic subacromial decompression, biceps tenodesis, and rotator cuff repair after failed conservative management.
Anesthetic Technique:
A preoperative single-shot lidocaine, ultrasound-guided right interscalene brachial plexus block was performed for postoperative analgesia. Standard monitoring was used. The procedure was uneventful, with negative aspiration, no paresthesia, and good patient tolerance.
Intraoperative Course:
Upon arrival in the OR, the patient was unable to lie flat and complained of dyspnea. Examination suggested right phrenic nerve involvement from the block. She was sedated, an LMA was placed, and surgery proceeded without complication.
Postoperative Course:
In recovery, the patient developed progressive respiratory distress with abdominal breathing, tachypnea, and wheezing. Initial management included inhaled bronchodilators, IV Decadron, and Versed, with minimal improvement. She was transferred to the ED for worsening respiratory status.
ED and ICU Course:
On ED arrival, the patient was minimally responsive with poor inspiratory effort and required intubation. Labs showed significant respiratory acidosis (pH 7.06, pCO_2 69). Imaging revealed low lung volumes and bibasilar atelectasis, without pneumothorax. She was admitted to the ICU, extubated the following day, transitioned to BiPAP, then nasal cannula, and discharged on room air.
Conclusion:
This case highlights a severe respiratory complication following interscalene block, likely due to phrenic nerve involvement, requiring ICU admission and ventilatory support.

Anatomy Continued



Discussion

This review evaluated whether diaphragm-sparing regional anesthesia techniques are more effective than conventional interscalene brachial plexus block (ISB) in preventing hemidiaphragmatic paralysis following shoulder surgery. The evidence demonstrates that certain modifications—specifically, the extrafascial approach (high-level evidence), the use of lower concentrations of local anesthetic (moderate-level evidence), and supraclavicular blockade (low-level evidence)—are associated with a reduced risk of hemidiaphragmatic paralysis compared to standard ISB. However, results for other techniques remain inconclusive.

A key strategy to minimize this complication involves reducing either the volume or concentration of the local anesthetic. This systematic review and meta-analysis aimed to identify which regional anesthetic technique most effectively prevents hemidiaphragmatic paralysis relative to conventional ISB in the context of shoulder surgery. The techniques assessed included modifications of ISB, such as low-volume injections (≤10 ml of local anesthetic), extrafascial injections (placement 4 mm lateral to the brachial plexus or at the muscular fascia of the middle scalene muscle), and the use of lower concentrations (<0.2%) of local anesthetic.

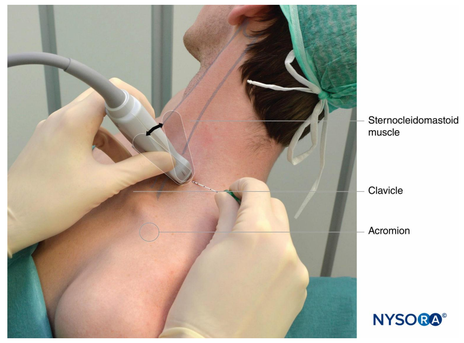
Among the various comparisons in the literature, the primary focus of this analysis was the difference between low-volume ISB and conventional ISB. Although there is no universal consensus, low-volume ISB is generally defined as using 5–10 ml of local anesthetic.

In the studies analyzed, hemidiaphragmatic paralysis occurred in 50.0% (80/160) of patients receiving low-volume ISB, compared to 79.5% (132/166) of those receiving conventional ISB. Meta-analysis confirmed a significantly lower incidence of hemidiaphragmatic paralysis with the low-volume technique, representing a 38% relative reduction compared to conventional ISB.

Furthermore, several studies have identified that the minimum effective analgesic volume for ISB can be as low as 0.9 ml of 0.5% ropivacaine or bupivacaine, which is sufficient to provide up to 6 hours of postoperative analgesia.

Discussion

Indications: Shoulder and upper arm surgery; clavicle surgery (with cervical plexus block)
Transducer position: Transverse on neck, 3–4 cm above clavicle, over external jugular vein
Goal: Local anesthetic spread around superior and middle trunks of brachial plexus, between anterior and middle scalene muscles
Local anesthetic: 7–15 mL
The needle is placed between the anterior and middle scalene muscles, and local anesthetic is injected until ultrasound confirms spread around the brachial plexus. Volume and needle insertions are adjusted based on observed anesthetic spread.



Conclusion

This case demonstrates that ultrasound-guided interscalene brachial plexus block may cause clinically significant phrenic nerve involvement and hemidiaphragmatic paralysis, resulting in severe respiratory failure requiring ventilatory support. Early recognition of dyspnea after block placement and prompt escalation of care are essential. Diaphragm-sparing approaches, including lower-volume or lower-concentration local anesthetic and extrafascial injection techniques, should be considered to reduce respiratory risk, particularly in patients with limited pulmonary reserve.

References

References:
Hemidiaphragmatic paralysis after ultrasound-guided brachial plexus blocks for shoulder surgery: A systematic review and meta-analysis of randomized clinical trials