

Interscalene Brachial Plexus Block

Intraoperative teaching · CA-2

THE QUESTION

Where the evidence disagrees

This topic was selected because an evidence synthesis beats a textbook on it: the trials disagree, or the guidance has moved recently.

THE EVIDENCE

What each source contributes, and how strong it is

Study design first — a cohort and a randomised trial do not carry the same weight.

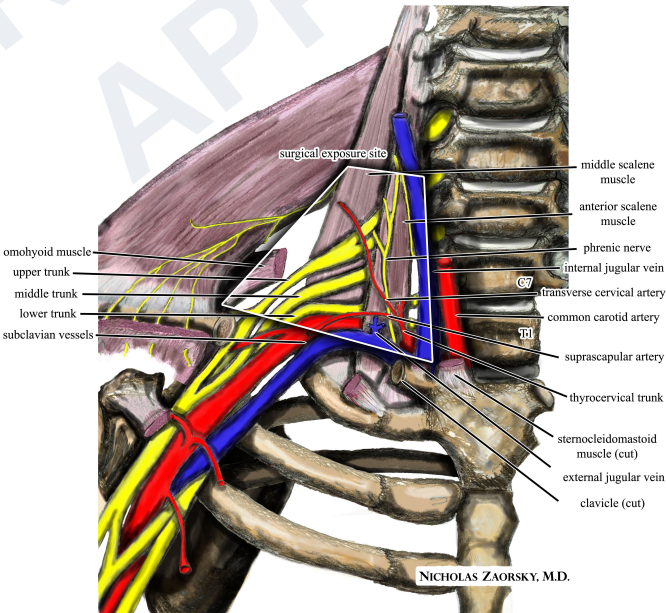
Design	Year	Journal	What it found
Meta-analysis	2025	BMC anesthesiology	This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine
Randomised trial	2025	development and therapy	This randomized trial found that for ASA I or II patients undergoing humeral surgery
Review	2024	Lithuania)	This review found that interscalene catheter position can be altered by neck or
Meta-analysis	2025	Brazilian journal of anesthesiolog	This meta-analysis of six randomized controlled trials found no statistically
Randomised trial	2025	The Clinical journal of pain	This randomized controlled trial found that adding 5 mg of perineural dexamethasone
Review	2023	Cureus	This review article highlights evidence that adding the alpha-2 adrenergic agonist

6 resolved citations behind this deck; every point above traces to one of them.

THE ANATOMY

The phrenic nerve sits millimetres from the target

An anterior view of the right scalene triangle with the clavicle and sternocleidomastoid cut, showing the upper, middle and lower trunks of the brachial plexus emerging between the anterior and middle scalene muscles, the phrenic nerve descending on the face of the anterior scalene, and the subclavian vessels crossing beneath — the white outline marks the surgical exposure window the illustration was drawn for, not a block target.



Nicholas Zaorsky, M.D. — An illustration of the relevant neurovascular anatomy in anterior supraclavicular neurosurgical approach to the brachial plexus and subclavian vessels for thoracic outlet syndrome. · <https://commons.wikimedia.org/wiki/>

File:Wikipedia_medical_illustration_thoracic_outlet_syndrome_brachial_plexus_anatomy_with_labels.jpg

Nicholas Zaorsky, M.D. · CC-BY-SA-3.0 · <https://commons.wikimedia.org/wiki/>

File:Wikipedia_medical_illustration_thoracic_outlet_syndrome_brachial_plexus_anatomy_with_labels.jpg

The trunks lie in the groove between anterior and middle scalene, with the phrenic nerve on the front of the anterior scalene — the same anatomy that makes the interscalene block work is what takes the hemidiaphragm with it.

WHERE THE GUIDANCE SITS

What the guidelines and pooled evidence say

2 findings, each on the slide that follows.

BMC ANESTHESIOLOGY 2025

This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine

This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine for interscalene blocks in shoulder surgery reduces opioid...

BRAZILIAN JOURNAL OF ANESTHESIOLOGY (ELSEVIER) 2025

This meta-analysis of six randomized controlled trials found no statistically

This meta-analysis of six randomized controlled trials found no statistically significant difference between anterior and posterior approaches in...

WHERE THE GUIDANCE SITS

This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine

Meta-analysis · BMC anesthesiology

This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine for interscalene blocks in shoulder surgery reduces opioid consumption on POD 3 and improves pain scores on POD 2, but increases the risk of hoarseness on POD 1 compared to bupivacaine alone or with other adjuvants.

Efficacy and safety of co-administered bupivacaine and liposomal bupivacaine in interscalene brachial plexus block for shoulder surgery: a systematic review and meta-analysis, BMC anesthesiology 2025 · PMID 41310439

WHERE THE GUIDANCE SITS

This meta-analysis of six randomized controlled trials found no statistically

Meta-analysis · Brazilian journal of anesthesiology

This meta-analysis of six randomized controlled trials found no statistically significant difference between anterior and posterior approaches in complete sensory block rates or time to block completion, so the choice should be based on provider comfort and proficiency rather than expected superiority of either technique.

Comparative effectiveness of anterior and posterior approaches for interscalene brachial plexus block: a systematic review and meta-analysis, Brazilian journal of anesthesiology (Elsevier) 2025 · PMID 39551468

WHAT THE TRIALS FOUND

Where randomised evidence moved the question

2 findings, each on the slide that follows.

DEVELOPMENT AND THERAPY 2025

This randomized trial found that for ASA I or II patients undergoing humeral surgery

This randomized trial found that for ASA I or II patients undergoing humeral surgery with an interscalene block, low-dose esketamine (0.2 mg/kg...

THE CLINICAL JOURNAL OF PAIN 2025

This randomized controlled trial found that adding 5 mg of perineural dexamethasone

This randomized controlled trial found that adding 5 mg of perineural dexamethasone to ropivacaine for interscalene brachial plexus block in shoulder...

WHAT THE TRIALS FOUND

This randomized trial found that for ASA I or II patients undergoing humeral surgery

Randomised trial · development and therapy

This randomized trial found that for ASA I or II patients undergoing humeral surgery with an interscalene block, low-dose esketamine (0.2 mg/kg bolus, 0.15 mg/kg/h infusion) improved postoperative day 1 recovery quality and caused less sedation and heart rate reduction than dexmedetomidine.

Comparison Between Low-Dose Esketamine and Dexmedetomidine on Postoperative Recovery Quality Among Patients Undergoing Humeral Trauma Surgery in Interscalene Brachial Plexus Block: A Randomized, Double-Blind, Controlled Trial, Drug design, development and therapy 2025 · PMID 40351348

WHAT THE TRIALS FOUND

This randomized controlled trial found that adding 5 mg of perineural dexamethasone

Randomised trial · The Clinical journal of pain

This randomized controlled trial found that adding 5 mg of perineural dexamethasone to ropivacaine for interscalene brachial plexus block in shoulder arthroscopy patients did not significantly prolong the duration of analgesia compared to

ropivacaine alone.

Postoperative Analgesia Effect Evaluation of Perineural Dexamethasone Plus Various Doses of Ropivacaine in Interscalene Brachial Plexus Block: A Randomized Controlled Trial, *The Clinical journal of pain* 2025 · PMID 40401460

IN PRACTICE

What the cohorts and reviews add

2 findings, each on the slide that follows.

LITHUANIA) 2024

This review found that interscalene catheter position can be altered by neck or

This review found that interscalene catheter position can be altered by neck or shoulder movement, such as during physiotherapy, leading to secondary...

CUREUS 2023

This review article highlights evidence that adding the alpha-2 adrenergic agonist

This review article highlights evidence that adding the alpha-2 adrenergic agonist dexmedetomidine as an adjunct to interscalene brachial plexus...

IN PRACTICE

This review found that interscalene catheter position can be altered by neck or

Review · Lithuania)

This review found that interscalene catheter position can be altered by neck or shoulder movement, such as during physiotherapy, leading to secondary dislocation that causes side effects or loss of effectiveness hours or days after initially correct placement.

Continuous Interscalene Brachial Plexus Blocks: An Anatomical Challenge between Scylla and Charybdis?, *Medicina (Kaunas, Lithuania)* 2024 · PMID 38399521

IN PRACTICE

This review article highlights evidence that adding the alpha-2 adrenergic agonist

Review · Cureus

This review article highlights evidence that adding the alpha-2 adrenergic agonist dexmedetomidine as an adjunct to interscalene brachial plexus blocks for shoulder surgery improves pain control and patient outcomes compared to traditional techniques.

Advances in Anesthesia for Shoulder Surgery: A Comprehensive Review of Dexmedetomidine-Enhanced Interscalene Brachial Plexus Block, *Cureus* 2023 · PMID 38106768

INDICATIONS

When this is the right block

SUPRASCAPULAR VERSUS INTERSCALENE BLOCK META-ANALYSIS, *ANESTHESIOLOGY* 2017

Shoulder surgery, where it remains the reference block

In a meta-analysis of 16 trials and 1152 patients, interscalene block reduced pain during recovery room stay by 1.5 cm compared with suprascapular block, and the 24-hour area-under-curve difference of 1.1 cm/h favoured it, although that difference was not clinically important.

REBOUND PAIN AFTER INTERSCALENE BLOCK RCT, *CAN J ANAESTH* 2024

Arthroscopic shoulder surgery, to carry the first half-day

In a two-centre randomised trial, mean time to first rescue analgesia after a single-injection interscalene block was 11.3 hours and mean time to worst pain was 14.6 hours. Plan the oral regimen around that window rather than around discharge time.

LOW-DOSE ULTRASOUND-GUIDED INTERSCALENE BLOCK RCT, *REG ANESTH PAIN MED* 2009

Low-volume ultrasound technique when respiratory reserve is tight

With 10 mL of ropivacaine 0.75% delivered under ultrasound at the C7 root, hemidiaphragmatic paresis occurred in 13% of patients versus 93% with nerve stimulation at the same dose, and forced expiratory volume, forced vital capacity and peak expiratory flow were all better preserved.

CONTRAINDICATIONS

When it is not

Severe respiratory disease or a contralateral diaphragm you cannot lose

In a prospective cohort of shoulder surgery patients, hemidiaphragmatic paralysis followed interscalene block in 95.3% of cases, and paradoxical diaphragm movement was twice as common as after supraclavicular block. Phrenic palsy is close to universal, so this is the wrong block for a patient whose other hemidiaphragm is already compromised.

SUPRASCAPULAR VERSUS INTERSCALENE BLOCK META-ANALYSIS, ANESTHESIOLOGY 2017

A patient for whom a suprascapular block would do

Suprascapular block matched interscalene on 24-hour morphine consumption and on pain at every time point except the recovery room, while reducing the odds of block-related and respiratory complications. When the analgesic gap is that small, the side-effect difference decides.

POSTOPERATIVE NEUROLOGICAL SYMPTOMS AFTER INTERSCALENE BLOCK, REG ANESTH PAIN MED 2023

Pre-existing brachial plexopathy or an unrecorded neurologic baseline

After single-injection ultrasound-guided interscalene block for arthroscopic shoulder surgery, postoperative neurological symptoms occurred in 83 of 477 patients (17.4%) at 14 days, and 12% of those still had symptoms at six months. No patient, surgical or anaesthetic factor reliably predicted who. Consent and baseline documentation carry the weight here.

ASRA ANTITHROMBOTIC GUIDELINES, 5TH EDITION, REG ANESTH PAIN MED 2025

Antithrombotic therapy still inside the ASRA interval

ASRA's fifth edition proposes conservative interruption times before neural blockade and now describes anticoagulant doses as low or high rather than prophylactic or therapeutic, because the same dose serves different indications. Check the interval against the agent before the patient is positioned.

PEARLS

What experience adds

REBOUND PAIN AFTER INTERSCALENE BLOCK RCT, CAN J ANAESTH 2024

Rebound pain is not fixed by an oral opioid on a timer

Oral hydromorphone 2 mg given six hours after the block did not reduce the worst 24-hour pain score compared with placebo (6.5 versus 5.9), nor change the pain trajectory or opioid use.

PROPHYLACTIC DEXAMETHASONE FOR REBOUND PAIN META-ANALYSIS, BR J ANAESTH 2024

Dexamethasone is what has moved rebound pain

Across seven randomised trials in 574 patients, prophylactic dexamethasone reduced the incidence of rebound pain with an odds ratio of 0.16, and trial sequential analysis confirmed an adequate information size. Both intravenous and perineural routes worked.

Trace the trunk in from the supraclavicular fossa

Start the probe low, find the plexus where it is unmistakable, and slide up counting what you follow rather than dropping straight onto the interscalene groove and naming what you hope you see. The structure you traced is the structure you can defend.

IN THE ROOM

What this changes about the next case

Colour is the strength of the evidence behind each step, not the urgency.

- 1**
This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine for interscalene blocks in shoulder surgery reduces opioid consumption on POD 3 and improves pain scores on POD 2, but increases the risk of hoarseness on POD 1 compared to bupivacaine alone or with other adjuvants.
- 2**
This meta-analysis of six randomized controlled trials found no statistically significant difference between anterior and posterior approaches in complete sensory block rates or time to block completion, so the choice should be based on provider comfort and proficiency rather than expected superiority of either technique.
- 3**
This randomized trial found that for ASA I or II patients undergoing humeral surgery with an interscalene block, low-dose esketamine (0.2 mg/kg bolus, 0.15 mg/kg/h infusion) improved postoperative day 1 recovery quality and caused less sedation and heart rate reduction than dexmedetomidine.

- 4 This randomized controlled trial found that adding 5 mg of perineural dexamethasone to ropivacaine for interscalene brachial plexus block in shoulder arthroscopy patients did not significantly prolong the duration of analgesia compared to ropivacaine alone.
- 5 This review found that interscalene catheter position can be altered by neck or shoulder movement, such as during physiotherapy, leading to secondary dislocation that causes side effects or loss of effectiveness hours or days after initially correct placement.

KEY TAKEAWAYS

What to carry into the next case

This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine
BMC anesthesiology 2025

This randomized trial found that for ASA I or II patients undergoing humeral surgery
development and therapy 2025

This review found that interscalene catheter position can be altered by neck or
Lithuania) 2024

This meta-analysis of six randomized controlled trials found no statistically
Brazilian journal of anesthesiology (Elsevier) 2025

This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine

QUESTIONS I'LL ASK YOU IN THE ROOM

1. How does your plan change if the patient is not optimised?
2. What is the physiology behind what we just did?
3. Talk me through the trade-off you made there.
4. What would make you abandon this plan and do something else?

BOARD QUESTIONS

1. In the ultrasonographic study that established how often the hemidiaphragm is affected by interscalene brachial plexus block, thirteen patients received a block sufficient for shoulder surgery. How many developed hemidiaphragmatic paresis, and how quickly?
 - A. All 13, with paradoxical hemidiaphragmatic motion within 5 minutes of injection
 - B. About three-quarters, with onset over 30 to 60 minutes
 - C. About half, within 30 minutes
 - D. About a quarter, and only after the first hour
2. In a randomised double-blind trial, patients having arthroscopic shoulder surgery received an ultrasound-guided interscalene block at the level of the cricoid cartilage with either 20 ml or 10 ml of ropivacaine 0.5%. What happened to hemidiaphragmatic paresis 15 minutes after the block?
 - A. It was unchanged — 14 of 15 patients in each group
 - B. It fell from 14 of 15 to 7 of 15 with the lower volume
 - C. It fell from 14 of 15 to 2 of 15 with the lower volume
 - D. It was unchanged, but the spirometric reduction was avoided in the 10 ml group
3. Seventy patients having major shoulder surgery were randomised to a continuous interscalene catheter placed with its tip either inside the brachial plexus sheath or immediately outside it, midway between C5 and C6, all receiving the same ropivacaine bolus and infusion. Give the rates of hemidiaphragmatic paresis on the first postoperative day and say what it cost analgesically.

ANSWER KEY

1. **A. All 13, with paradoxical hemidiaphragmatic motion within 5 minutes of injection**

Thirteen of thirteen, eleven of them within two minutes, and diaphragmatic motion did not return to normal until three to five hours after injection. The authors' conclusion is that diaphragmatic paresis appears to be an inevitable consequence of an interscalene block giving anaesthesia sufficient for shoulder surgery — a strong statement resting on 13 patients given 34-52 ml by a paresthesia technique, volumes far above what is injected today. Read at that width it is a reason to treat the block as a respiratory decision as much as an analgesic one, rather than a rule about which patients may never receive one.

Urmey WF et al., One hundred percent incidence of hemidiaphragmatic paresis associated with interscalene brachial plexus anesthesia as diagnosed by ultrasonography, Anesth Analg 1991 · PMID 2006740

2. A. It was unchanged — 14 of 15 patients in each group

Halving the volume at the cricoid level bought nothing: the same paresis rate, the same reduction in forced vital capacity, forced expiratory volume in 1 second and peak flow, and 13 of 15 in each group still paretic at recovery-room discharge. What the trial shows is that reducing volume alone, at the cricoid level, does not spare the phrenic nerve. It did not compare injection levels or planes, so it cannot tell you that a lower or more lateral injection would do better — only that the millilitres were not the lever here.

Sinha SK et al., Decreasing the local anesthetic volume from 20 to 10 mL for ultrasound-guided interscalene block at the cricoid level does not reduce the incidence of hemidiaphragmatic paresis, Reg Anesth Pain Med 2011 · PMID 21751435

3. Paresis on postoperative day 1 was 41% with the intrafascial tip and 15% with the extrafascial tip. No analgesic cost could be measured: the investigators were unable to detect a difference between the groups in forced vital capacity, forced expiratory volume in 1 second, or rest pain scores, which were a median of 3 on a 1-10 scale in both ($p = 0.93$). With 70 patients that is a failure to detect a difference rather than a demonstration that none exists. The authors' conclusion is that routine placement of the catheter tip inside the sheath is not supported.

Moving the tip outside the sheath more than halved the rate of paresis while the trial could detect no difference in rest pain — the trade the study was designed to look for. The familiar explanation, that the local anaesthetic still reaches the plexus and simply has further to travel towards the phrenic nerve, is an account offered for that result and not something the trial measured. Note also that the intrafascial rate here was 41%, not 100%: a low-volume continuous infusion is a different exposure from a large single-shot bolus.

Albrecht E et al., Reduced hemidiaphragmatic paresis with extrafascial compared with conventional intrafascial tip placement for continuous interscalene brachial plexus block: a randomized, controlled, double-blind trial, Br J Anaesth 2017 · PMID 28403412

This meta-analysis found that co-administering bupivacaine and liposomal bupivacaine

SOURCES

- [1] Efficacy and safety of co-administered bupivacaine and liposomal bupivacaine in interscalene brachial plexus block for shoulder surgery: a systematic review and meta-analysis, BMC anesthesiology 2025 · PMID 41310439
- [2] Comparison Between Low-Dose Esketamine and Dexmedetomidine on Postoperative Recovery Quality Among Patients Undergoing Humeral Trauma Surgery in Interscalene Brachial Plexus Block: A Randomized, Double-Blind, Controlled Trial, Drug design, development and therapy 2025 · PMID 40351348
- [3] Continuous Interscalene Brachial Plexus Blocks: An Anatomical Challenge between Scylla and Charybdis?, Medicina (Kaunas, Lithuania) 2024 · PMID 38399521
- [4] Comparative effectiveness of anterior and posterior approaches for interscalene brachial plexus block: a systematic review and meta-analysis, Brazilian journal of anesthesiology (Elsevier) 2025 · PMID 39551468
- [5] Postoperative Analgesia Effect Evaluation of Perineural Dexamethasone Plus Various Doses of Ropivacaine in Interscalene Brachial Plexus Block: A Randomized Controlled Trial, The Clinical journal of pain 2025 · PMID 40401460
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- [11] Postoperative neurological symptoms after interscalene block, Reg Anesth Pain Med 2023 · PMID 37295793
- [12] ASRA antithrombotic guidelines, 5th edition, Reg Anesth Pain Med 2025 · PMID 39880411
- [13] Prophylactic dexamethasone for rebound pain meta-analysis, Br J Anaesth 2024 · PMID 38501226