OBSTETRIC ANESTHESIA

Erector Spinae Plane 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.

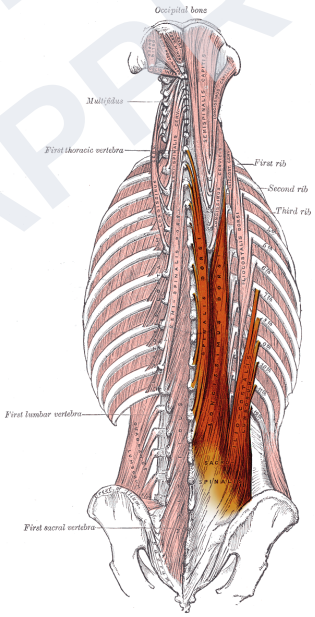
Design	Year	Journal	What it found
Meta-analysis	2024	BMC anesthesiology	This meta-analysis found that for laparoscopic surgeries, an erector spinae plane
Randomised trial	2025	Anesthesiology	This randomized trial found that for patients undergoing uniportal thoracoscopic
Review	2024	Canadian journal of anaesthesia =	This narrative review includes the erector spinae plane block among the regional
Randomised trial	2025	England)	This randomized controlled trial found that for patients undergoing thoracoscopic
Review	2023	Current oncology reports	This review identifies erector spinae nerve blocks as one of the commonly performed

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

THE ANATOMY

The block is named for this column, and the injection goes deep to it

Gray's plate of the deep muscles of the back seen from behind, with the erector spinae group — iliocostalis, longissimus and spinalis — highlighted as a continuous column running from the sacrum and iliac crest to the occiput over the transverse processes and ribs, with multifidus and semispinalis alongside.



Henry Vandyke Carter — Reproduction of a Gray's anatomy plate with the muscles of the erector spinae muscle group highlighted · https://commons.wikimedia.org/wiki/File:Gray389_-_Erector_spinae.png
Henry Vandyke Carter · public-domain · https://commons.wikimedia.org/wiki/File:Gray389_-_Erector_spinae.png

Erector spinae runs unbroken from sacrum to occiput over the transverse processes — a plane long enough that one level of injection can cover several segments.

WHERE THE GUIDANCE SITS

This meta-analysis found that for laparoscopic surgeries, an erector spinae plane

Meta-analysis · BMC anesthesiology

This meta-analysis found that for laparoscopic surgeries, an erector spinae plane block significantly reduces 24-hour postoperative pain scores and opioid consumption compared to a transversus abdominis plane block.

Erector spinae plane block for laparoscopic surgeries: a systematic review and meta-analysis, BMC anesthesiology 2024 · PMID 39472781

WHAT THE TRIALS FOUND

Where randomised evidence moved the question

2 findings, each on the slide that follows.

ANESTHESIOLOGY 2025

This randomized trial found that for patients undergoing uniportal thoracoscopic

This randomized trial found that for patients undergoing uniportal thoracoscopic surgery, surgical intercostal nerve blocks with 30 ml of 0.5%…

ENGLAND) 2025

This randomized controlled trial found that for patients undergoing thoracoscopic

This randomized controlled trial found that for patients undergoing thoracoscopic lung resection, intercostal nerve block can be used interchangeably…

WHAT THE TRIALS FOUND

This randomized trial found that for patients undergoing uniportal thoracoscopic

Randomised trial · Anesthesiology

This randomized trial found that for patients undergoing uniportal thoracoscopic surgery, surgical intercostal nerve blocks with 30 ml of 0.5% ropivacaine reduced 12-hour morphine consumption and systemic local anesthetic absorption compared to erector spinae plane blocks.

Erector Spinae Plane Block versus Intercostal Nerve Blocks in Uniportal Videoscopic-assisted Thoracic Surgery: A Multicenter, Double-blind, Prospective Randomized Placebo-controlled Trial, Anesthesiology 2025 · PMID 40537064

WHAT THE TRIALS FOUND

This randomized controlled trial found that for patients undergoing thoracoscopic

Randomised trial · England)

This randomized controlled trial found that for patients undergoing thoracoscopic lung resection, intercostal nerve block can be used interchangeably with erector spinae plane block for multimodal analgesia, as the 24-hour quality of recovery difference was not significant after Bonferroni correction.

Esketamine vs. placebo combined with erector spinae plane block vs. intercostal nerve block on quality of recovery following thoracoscopic lung resection: a randomized controlled factorial trial, International journal of surgery (London, England) 2025 · PMID 39172717

IN PRACTICE

What the cohorts and reviews add

2 findings, each on the slide that follows.

This narrative review includes the erector spinae plane block among the regional

This narrative review includes the erector spinae plane block among the regional analgesic techniques reviewed for rib fracture management as part of…

CURRENT ONCOLOGY REPORTS 2023

This review identifies erector spinae nerve blocks as one of the commonly performed

This review identifies erector spinae nerve blocks as one of the commonly performed interventional procedures that, when combined with physical…

IN PRACTICE

This narrative review includes the erector spinae plane block among the regional

Review · Canadian journal of anaesthesia =

This narrative review includes the erector spinae plane block among the regional analgesic techniques reviewed for rib fracture management as part of a broadly recommended multimodal analgesia approach aimed at reducing morbidity and mortality.

Analgesia for rib fractures: a narrative review, Canadian journal of anaesthesia = Journal canadien d'anesthesie 2024 · PMID 38459368

IN PRACTICE

This review identifies erector spinae nerve blocks as one of the commonly performed

Review · Current oncology reports

This review identifies erector spinae nerve blocks as one of the commonly performed interventional procedures that, when combined with physical therapy and pharmacologic interventions, can help manage post-mastectomy pain syndrome,

which affects 25-60% of breast surgery patients.

Interventional Treatment Options for Post-mastectomy Pain, Current oncology reports 2023 · PMID 37646901

INDICATIONS

When this is the right block

PROSPECT GUIDELINES FOR VIDEO-ASSISTED THORACOSCOPIC SURGERY, ANAESTHESIA 2022

Video-assisted thoracoscopic surgery

PROSPECT's VATS review of 69 randomised trials recommends paravertebral block or erector spinae plane block as a first-choice regional technique, with serratus anterior plane block as a second choice, on top of paracetamol and an NSAID or COX-2 inhibitor.

ESP BLOCK FOR SPINE SURGERY META-ANALYSIS, EUR SPINE J 2021

Spine surgery

Across 12 trials in 828 patients, pre-operative erector spinae plane block reduced pain at rest and on movement at nearly every interval to 48 hours, cut 24-hour opioid consumption, and reduced rescue analgesia (RR 0.33) and postoperative nausea and vomiting (RR 0.38).

ESP BLOCK IN CARDIAC SURGERY META-ANALYSIS, ANN CARD ANAESTH 2023

Cardiac surgery through a sternotomy

Across 16 trials in 1110 patients, erector spinae plane block reduced 48-hour opioid consumption and intra-operative opioid use, lowered pain scores at multiple intervals, and shortened ventilation time, time to first mobilisation and ICU and hospital stay — although 24-hour opioid consumption was not significantly different.

ESP BLOCK FOR RIB FRACTURES IN THE EMERGENCY DEPARTMENT, CJEM 2022

Rib fractures where opioids have already failed

In a nine-patient emergency department pilot, erector spinae plane block performed by emergency physicians reduced mean pain scores from 9.89 to 3.56 in patients who had failed traditional analgesia. That is a signal, not a result — the sample is tiny and uncontrolled.

CONTRAINDICATIONS

When it is not

LOCAL ANESTHETIC DOSING FOR FASCIAL PLANE BLOCKS, CAN J ANAESTH 2025

A total dose that crosses the weight-based maximum

This block buys its dermatomal reach with volume, and across the fascial plane block pharmacokinetic literature several patients crossed the toxic plasma threshold, with mild neurologic symptoms and seizures reported. Reduce concentration as volume rises and keep the total dose under the weight-based limit.

ESP VERSUS PARAVERTEBRAL BLOCK FOR BREAST SURGERY RCT, BR J ANAESTH 2025

Major breast surgery where paravertebral block is available

In a 292-patient multicentre randomised trial, 75.2% of the erector spinae group needed morphine within two hours versus 50.3% of the paravertebral group, the noninferiority criterion was not met, and the required dermatomal area was uncovered in 55.9% of erector spinae patients versus 20.4% with paravertebral block. Paravertebral block remained the preferred technique.

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

Antithrombotic therapy still inside the ASRA interval

ASRA's fifth edition reviews the evidence since 2018 and, where that evidence is thin, keeps an antihaemorrhagic position with conservative interruption times before neural blockade. Apply it here even though the plane is superficial to the transverse process.

PEARLS

What experience adds

ESP VERSUS PARAVERTEBRAL CATHETER AFTER VATS RCT, BR J ANAESTH 2023

The catheter outperformed a surgically placed paravertebral catheter on recovery, not on pain

In 74 analysed VATS patients, an ultrasound-guided erector spinae catheter gave higher Quality of Recovery-15 scores at 24 hours (118 versus 110) and 48 hours (131 versus 120) than a video-assisted paravertebral catheter, with no difference in pain, opioid consumption, complications, length of stay or chronic pain at three months.

PLASMA LEVOBUPIVACAINE AFTER ESP BLOCK RCT, BMC ANESTHESIOL 2022

Epinephrine halves the peak plasma concentration

With 2 mg/kg levobupivacaine, peak plasma concentration was 1.24 µg/mL at 6 minutes; adding epinephrine 5 µg/mL dropped it to 0.62 µg/mL and delayed the peak to 7.2 minutes, with no effect on postoperative analgesia. A fast, high peak is the pharmacokinetic signature of this block.

Watch the muscle lift off the bone

Hydrodissect first and look for the erector spinae belly rising cleanly off the transverse process as a single sheet. If the injectate blooms into muscle instead of lifting it, the needle is not where you are about to say it was.

IN THE ROOM

What this changes about the next case

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

1. **1**
   This meta-analysis found that for laparoscopic surgeries, an erector spinae plane block significantly reduces 24-hour postoperative pain scores and opioid consumption compared to a transversus abdominis plane block.
2. **2**
   This randomized trial found that for patients undergoing uniportal thoracoscopic surgery, surgical intercostal nerve blocks with 30 ml of 0.5% ropivacaine reduced 12-hour morphine consumption and systemic local anesthetic absorption compared to erector spinae plane blocks.
3. **3**
   This randomized controlled trial found that for patients undergoing thoracoscopic lung resection, intercostal nerve block can be used interchangeably with erector spinae plane block for multimodal analgesia, as the 24-hour quality of recovery difference was not significant after Bonferroni correction.
4. **4**
   This narrative review includes the erector spinae plane block among the regional analgesic techniques reviewed for rib fracture management as part of a broadly recommended multimodal analgesia approach aimed at reducing morbidity and mortality.
5. **5**
   This review identifies erector spinae nerve blocks as one of the commonly performed interventional procedures that, when combined with physical therapy and pharmacologic interventions, can help manage post-mastectomy pain syndrome, which affects 25-60% of breast surgery patients.

KEY TAKEAWAYS

What to carry into the next case

This meta-analysis found that for laparoscopic surgeries, an erector spinae plane
BMC anesthesiology 2024

This randomized trial found that for patients undergoing uniportal thoracoscopic
Anesthesiology 2025

This narrative review includes the erector spinae plane block among the regional

This randomized controlled trial found that for patients undergoing thoracoscopic
England) 2025

This meta-analysis found that for laparoscopic surgeries, an erector spinae plane

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. A systematic review of 29 anatomical studies — 113 cadavers and 79 volunteers — measured where injectate actually goes after a thoracic erector spinae plane block. What proportion of subjects showed spread into the erector spinae plane itself, and what proportion into the paravertebral space?

   A. Essentially all into the erector spinae plane, but only about 57% into the paravertebral space
   B. Essentially all into the erector spinae plane and essentially all into the paravertebral space
   C. About 57% into the erector spinae plane and essentially all into the paravertebral space
   D. Essentially all into the erector spinae plane and about 95% into the epidural space

2. Bilateral ultrasound-guided erector spinae plane blocks were performed at T2 and at T8 in 11 fresh frozen cadavers and the dye spread was dissected. Describe what was found, including the difference between the two levels, and say what it predicts clinically.
3. A multicentre, randomised, double-blind trial in 292 women having major oncological breast surgery compared the erector spinae plane block against the thoracic paravertebral block, with the percentage needing morphine in the first two hours as the primary outcome. What did it show, and what should you take from it about substituting the erector spinae plane block for a paravertebral block?

ANSWER KEY

1. A. Essentially all into the erector spinae plane, but only about 57% into the paravertebral space

Spread reached the intercostal space in about half and the epidural space in about 38%. The block consistently fills the compartment you inject into and reaches the paravertebral space only about half the time, which is why the reviewers say paravertebral spread cannot be taken as the established mechanism of action. Keep the boundary in view: this is an anatomical review measuring where injectate goes, not a comparison of how the block performs, so it constrains the proposed mechanism rather than showing anything about clinical reliability.

Lim H et al., Anatomical insights into injectate spread after thoracic erector spinae plane block: A systematic review, J Clin Anesth 2023 · PMID 39491273

2. Methylene blue spread variably and extensively deep to the fascia of the erector spinae muscles, but involvement of the spinal rami and the paravertebral space was uncommon and level-dependent: it occurred in 1 of 11 cadavers when injected at T8 and in 4 of 11 at T2, and there was crossover to the contralateral side of the spine. The authors state the clinical implication as a possibility rather than a demonstration: in cadavers the block follows the fascial planes with unpredictable spread, which might explain its varying clinical efficacy. Hold it at that strength — this study dissected dye, not analgesia, so it offers an explanation for variable performance rather than evidence that performance varies.

An injection that follows fascia goes where the fascia allows, not where you intend. Contralateral crossover in a cadaver is also a reminder that a bilateral block is not necessarily two independent blocks.

Dautzenberg KHW et al., Unpredictable Injectate Spread of the Erector Spinae Plane Block in Human Cadavers, Anesth Analg 2019 · PMID 31107261

3. The erector spinae plane block failed to meet its non-inferiority criterion: 75.2% of the erector spinae plane group needed morphine within two hours against 50.3% of the paravertebral group. Pain scores were higher with the erector spinae plane block, particularly on movement, and the required dermatomal area was not covered in 55.9% of erector spinae plane patients against 20.4% of paravertebral patients. Total morphine consumption and patient satisfaction were similar and no major complications were observed in either arm. The authors' conclusion is that for major breast surgery the thoracic paravertebral block remains the preferred technique. What follows from this trial is that the erector spinae plane block is not an equivalent swap; where it does belong — as a fallback when the paravertebral block is contraindicated or unavailable — is a question the trial did not put to the test.

The dermatomal coverage figure explains the analgesic one. A block that misses the required area in more than half of patients cannot be non-inferior, and this is the anatomical variability of the cadaver studies showing up as a clinical endpoint.

Raft J et al., Erector spinae plane block versus paravertebral block for major oncological breast surgery: a multicentre randomised controlled trial, Br J Anaesth 2025 · PMID 40707285

This meta-analysis found that for laparoscopic surgeries, an erector spinae plane

SOURCES

[1] Erector spinae plane block for laparoscopic surgeries: a systematic review and meta-analysis, BMC anesthesiology 2024 · PMID 39472781
[2] Erector Spinae Plane Block versus Intercostal Nerve Blocks in Uniportal Videoscopic-assisted Thoracic Surgery: A Multicenter, Double-blind, Prospective Randomized Placebo-controlled Trial, Anesthesiology 2025 · PMID 40537064
[3] Analgesia for rib fractures: a narrative review, Canadian journal of anaesthesia = Journal canadien d'anesthesie 2024 · PMID 38459368
[4] Esketamine vs. placebo combined with erector spinae plane block vs. intercostal nerve block on quality of recovery following thoracoscopic lung resection: a randomized controlled factorial trial, International journal of surgery (London, England) 2025 · PMID 39172717
[5] Interventional Treatment Options for Post-mastectomy Pain, Current oncology reports 2023 · PMID 37646901
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[10] Local anesthetic dosing for fascial plane blocks, Can J Anaesth 2025 · PMID 40954415
[11] ESP versus paravertebral block for breast surgery RCT, Br J Anaesth 2025 · PMID 40707285
[12] ASRA antithrombotic guidelines, 5th edition, Reg Anesth Pain Med 2025 · PMID 39880411
[13] ESP versus paravertebral catheter after VATS RCT, Br J Anaesth 2023 · PMID 36109206
[14] Plasma levobupivacaine after ESP block RCT, BMC Anesthesiol 2022 · PMID 35350983

1 draft point(s) dropped: no citation resolved.