

OPEN THORACOTOMY

SUMMARY RECOMMENDATIONS

Notes on PROSPECT recommendations

PROSPECT provides clinicians with supporting arguments for and against the use of various interventions in postoperative pain based on published evidence and expert opinion. Clinicians must make judgments based upon the clinical circumstances and local regulations. At all times, local prescribing information for the drugs referred to must be consulted.

Pain after open thoracotomy

Open thoracotomy remains a common procedure despite the growing use of video-assisted thoracoscopic surgery and is considered one of the most painful surgical interventions ([Gonzalez 2021](#); [Mehta 2023](#)). Severe postoperative pain not only impacts immediate recovery but is associated with postoperative pulmonary complications ([Makkad 2023](#)). Additionally, inadequate postoperative pain control increases the risk of chronic post-thoracotomy pain ([Makkad 2023](#)). Therefore, timely and effective analgesia is essential to optimize postoperative rehabilitation and reduce long-term morbidity.

Aims and methods of the PROSPECT review

This review ([Lemoine 2026](#)) aimed to assess the current literature and update previous PROSPECT recommendations for optimal pain management after open thoracotomy. The first PROSPECT recommendations on pain management after open thoracotomy were available online in 2004 (subsequently published: [Joshi 2008](#)) and updated online in 2015 ([Thoracotomy 2015 summary recommendations](#)).

The current systematic review and formulation of the recommendations were performed using the unique PROSPECT methodology, available at <https://esraeurope.org/prospect-methodology/>. This methodology was first published in [Joshi 2019](#) and updated in [Joshi 2023](#). Literature databases (Embase, Medline, PubMed, and Cochrane) were searched from January 2015 to April 2024 to identify randomised controlled trials, systematic reviews, and meta-analyses (in English) that investigated pharmacological, non-pharmacological, or surgical interventions and assessed postoperative pain scores. 100 studies met the inclusion criteria. PROSPECT recommendations were based on interpretation of the evidence, considering the current clinical relevance of the studied interventions and their risk/benefit profile, use of baseline pain treatment, and the procedure-specific context. This review is registered on PROSPERO: CRD42022309453.

Summary of recommendations and key evidence

Summary of recommendations and key evidence for pain management in patients undergoing open thoracotomy

A basic analgesic regimen including paracetamol and NSAIDs or COX-2-selective inhibitors should be administered pre- or intra-operatively, and continued postoperatively

- In accordance with PROSPECT methodology ([Joshi 2023](#)), these analgesics are considered as basic analgesia, and were therefore not assessed in this review.

Either thoracic epidural analgesia or paravertebral blockade is recommended as a first line intervention

- For thoracic epidural analgesia, PROSPECT recommends using a combination of local anaesthetic and lipophilic opioid.
- For paravertebral blockade, PROSPECT recommends use of a catheter.
- Evidence since 2015 shows no clear superiority between thoracic epidural analgesia and paravertebral blockade for pain control after open thoracotomy ([Yeung 2016](#); [Tamura 2017](#); [Li 2021](#); [Onur 2023](#); [Wojtyś 2019](#); [Sundari 2023](#)); the choice between these techniques should be at the discretion of clinicians and patients.
- A recent systematic review supported this recommendation ([Eaves 2025](#)). Results found that thoracic epidural provided better pain relief only in the immediate postoperative period, while both techniques were associated with similar pain control and opioid use beyond the first postoperative day. Paravertebral blockade provided greater haemodynamic stability during the first 24 hours. The authors concluded that the choice between these two techniques should be tailored to the patient.
- The lowest concentration of epidural local anaesthetic with the lowest dose of epidural opioid should be used to limit the occurrence of adverse effects. However, a concentration of local anaesthetic of $\leq 0.125\%$ appears insufficient.
- The level of epidural placement should depend on the surgical incision level.

Erector spinae plane, rhomboid intercostal or intercostal nerve blockade are recommended if thoracic epidural analgesia and paravertebral block are not used

- The analgesic efficacy of the erector spinae plane block, rhomboid intercostal block and intercostal nerve block was broadly equivalent ([Sobhy 2020](#); [Şimek 2022](#); [Elsabeeny 2021](#); [Shaker 2023](#); [Fang 2019](#); [Fiorelli 2020](#); [Wang 2019](#); [Kozanhan 2022](#); [Vilvanathan 2020](#); [Ranganathan 2020](#); [Guclu 2023](#)).
- The choice of block should be based on clinician and patient preference.

Acupuncture or cryoanalgesia is recommended when no regional analgesia can be performed

- In the absence of thoracic epidural analgesia, acupuncture or cryoanalgesia can also be combined with other recommended regional analgesic techniques.
- Due to their favourable benefit/risk balance, these techniques are recommended albeit based on a low level of evidence ([Chen 2016](#); [Park S 2021](#); [Ba 2015](#); [Lau 2021](#); [Park R 2021](#)).

Opioids

- Systemic opioids should be reserved for rescue analgesia.

COX, cyclo-oxygenase; NSAID, non-steroidal anti-inflammatory drug.

Interventions that are NOT recommended

Analgesic interventions that are not recommended for pain management in patients undergoing open thoracotomy.

Intervention		Reason for not recommending
Regional techniques	Dexmedetomidine as an adjuvant for thoracic epidural analgesia, paravertebral blockade, erector spinae plane blockade and intercostal nerve blockade	Insufficient evidence and risk of adverse effects
	Magnesium sulphate as an adjuvant for thoracic epidural analgesia	Risk of adverse effects
	Dexamethasone as an adjuvant for paravertebral blockade	Insufficient evidence
	Serratus anterior plane blockade	Inconsistent evidence
	Subpleural analgesia	Lack of evidence
	Phrenic nerve blockade	Inconsistent evidence and risk of severe complications
	Lidocaine patch	Lack of evidence
Systemic drugs	Pre-operative or postoperative oral pregabalin or gabapentin	Unfavourable benefit/risk profile
	Intravenous magnesium sulphate	Lack of evidence
	Intravenous dexmedetomidine	Inconsistent evidence and adverse effects
	Intravenous ketamine	Insufficient evidence
	Intravenous dexamethasone	Lack of evidence for analgesia; other determining factors
Others	Transcutaneous electrical nerve stimulation	Inconsistent evidence
	Tracheal tube placement	Lack of evidence
	Physiotherapy	Lack of evidence for analgesia; other determining factors
	Patient education	Insufficient evidence
	Surgical techniques	Lack of evidence for analgesia; other determining factors

Overall PROSPECT recommendations table

Overall recommendations for procedure-specific pain management in patients undergoing open thoracotomy	
Pre-operative interventions	<ul style="list-style-type: none"> Paracetamol and NSAIDs/COX-2 selective inhibitors.
Regional techniques	<ul style="list-style-type: none"> Either thoracic epidural analgesia using a combination of local anaesthetic and lipophilic opioid <i>OR</i> paravertebral blockade with a catheter as a first line intervention. Erector spinae plane blockade, rhomboid intercostal blockade or intercostal nerve blockade if thoracic epidural analgesia and paravertebral blockade are not feasible.
Postoperative interventions	<ul style="list-style-type: none"> Basic analgesic regimen including regular paracetamol and NSAID/COX-2 selective inhibitor as scheduled. Acupuncture or cryoanalgesia when no regional analgesia is possible. Systemic opioids reserved for rescue analgesia.

COX, cyclo-oxygenase; NSAID, non-steroidal anti-inflammatory drug.

PROSPECT publication

Lemoine A, Alber A, Joshi GP, Van de Velde M, Dewinter G, Pogatzki-Zahn E, Bonnet M-P, on behalf of the PROSPECT Working Group of the European Society of Regional Anaesthesia and Pain Therapy (ESRA).

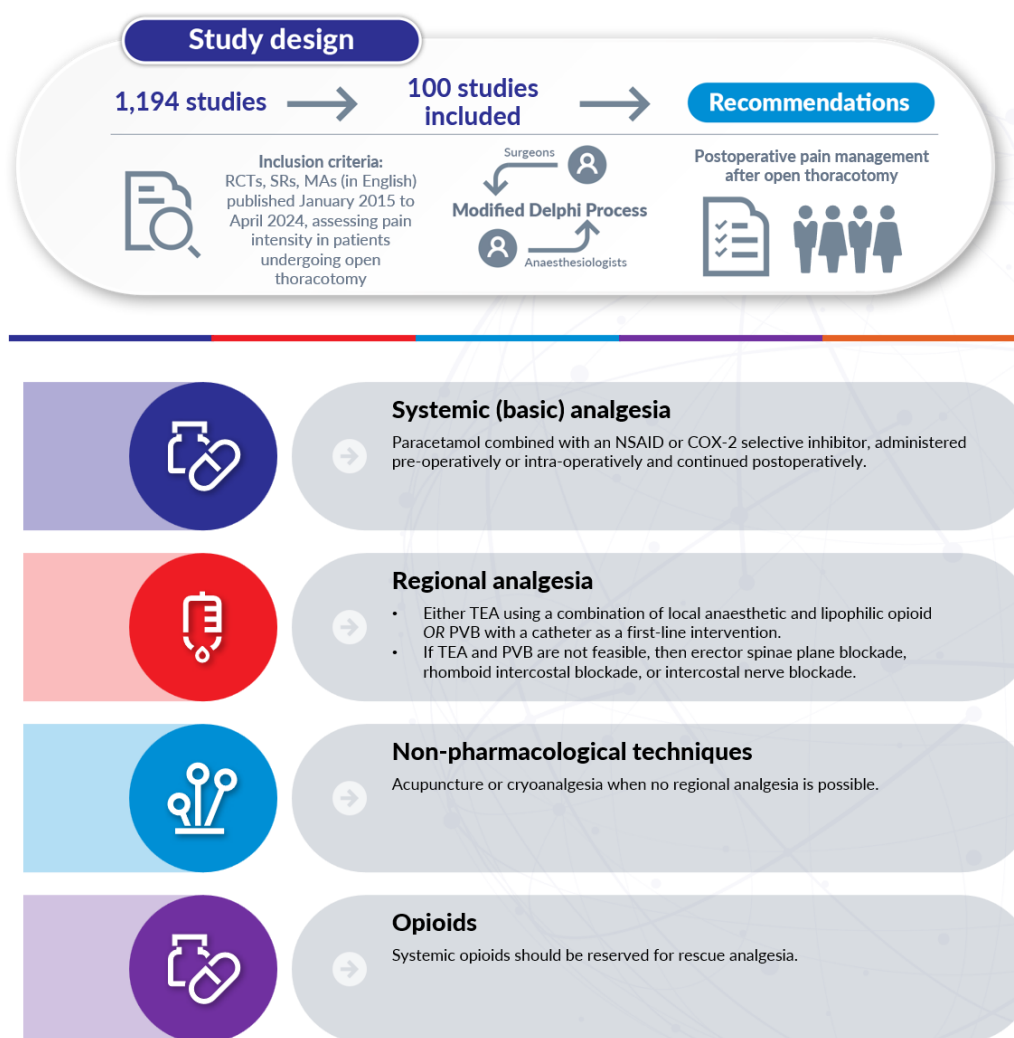
Pain management after open thoracotomy 2025: procedure-specific postoperative pain management (PROSPECT) recommendations.

[Anaesthesia 2026 Jan 12. doi: 10.1111/anae.70123. Online ahead of print.](#)

PROSPECT recommendations for open thoracotomy – [Infographic](#)

Recommendations for open thoracotomy

An updated systematic review with recommendations for postoperative pain management



Lemoine A, Alber A, Joshi GP, Van de Velde M, Dewinter G, Pogatzki-Zahn E, Bonnet M-P, on behalf of the PROSPECT Working Group of the European Society of Regional Anaesthesia and Pain Therapy (ESRA). Pain management after open thoracotomy 2025: procedure-specific postoperative pain management (PROSPECT) recommendations. Anaesthesia 2026 Jan 12. doi: 10.1111/anae.70123. Online ahead of print.

COX, cyclo-oxygenase; MA, meta-analysis; NSAID, non-steroidal anti-inflammatory drug; PVB, paravertebral block; RCT, randomised controlled trial; SR, systematic review; TEA, thoracic epidural analgesia.

