

Are paravertebral block and thoracic epidural analgesia comparable for post-thoracotomy pain relief? A systematic review

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Background and Goals

- PROSPECT: web-based clinical decision support programme (www.postoppain.org), which aims to formulate robust evidence-based recommendations for procedure-specific postoperative pain management.
- Initiated by an expert Working Group of surgeons and anaesthesiologists.
- The aim of this systematic review, which was part of a larger review investigating postoperative pain management following thoracotomy (total included studies = 169; total excluded studies = 163), was to compare the efficacy and safety of paravertebral block (PV) and thoracic epidural (TE) analgesia for the management of post-thoracotomy pain.

PV (LA) vs. control

- There was a significant benefit of PV (LA) treatment over control for reducing VAS pain scores at rest, see Figure 2; the effect was evident from the early postoperative period (0–6 h) through to the third postoperative day.
- PV (LA) treatment was also significantly superior to control for reducing VAS pain scores on coughing¹ and on movement² at the time points recorded, see Figure 2.

Meta-analyses:

- PV (LA) was superior to control for reducing pain scores at rest on:
 - day 1 (four studies, including two arms of one study, WMD -12.28 mm, p=0.0007)
 - day 3 (three studies, including two arms of one study, WMD -18.25 mm, p=0.009)
- There were no significant differences between groups:
 - at 8 h (three studies, including two arms of one study, WMD -11.89 mm, p=0.11)
 - on day 2 (four studies, including two arms of one study, WMD -7.13 mm, p=0.36)

TE (LA + opioid) vs. control

- There was a significant benefit of TE (LA + opioid) treatment over control for reducing VAS pain scores at rest and on coughing, see Figure 3.
- This effect was evident at most time points recorded, with the exception of Day 2 and 8–12 h for pain at rest and on coughing, respectively; at those time points, half of the studies showed a significant benefit of TE (LA + opioid) treatment over control.
- TE (LA + opioid) treatment was also significantly superior to control for reducing VAS pain scores on movement at all time points recorded.
- One study that did not specify the time of assessment³ found no significant difference between groups for pain on movement.

Meta-analyses:

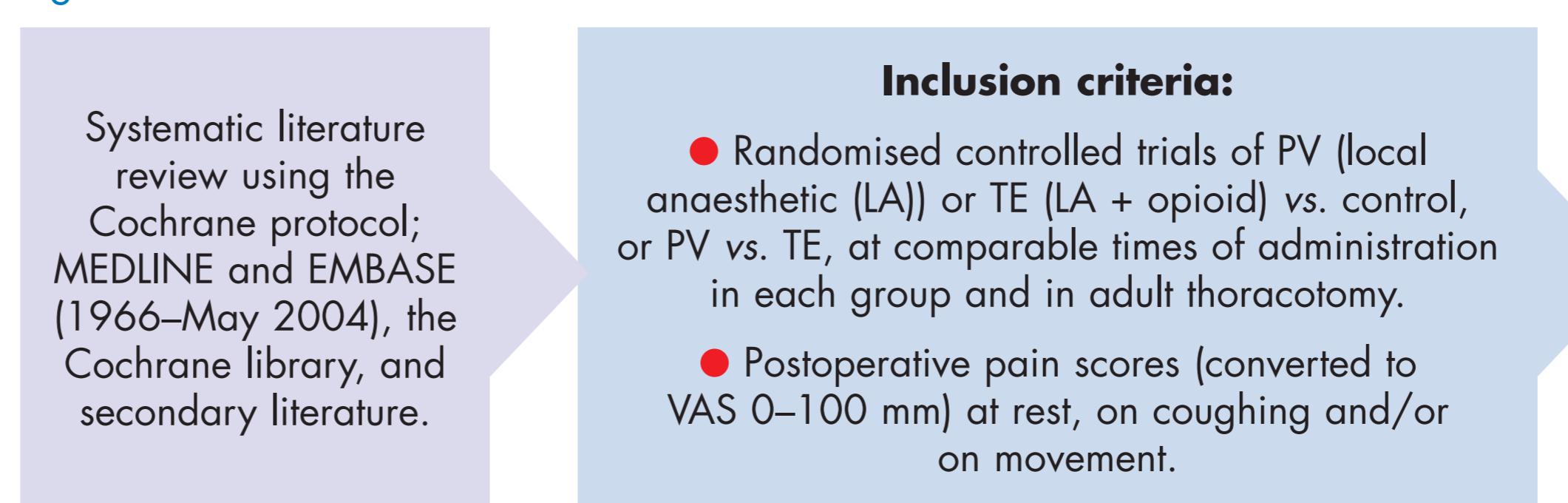
- TE (LA + opioid) was superior to control for reducing pain scores at rest:
 - at 12 h (one study plus two arms of one study, WMD -16.14 mm, p<0.0001)
 - on day 1 (three studies plus two arms of one study, WMD -12.66 mm, p<0.00001)
 - on day 2 (three studies plus two arms of one study, WMD -7.44 mm, p<0.00001)
 - on day 3 (three studies, WMD -8.20 mm, p<0.00001)

TE (LA ± opioid) vs. PV (LA ± opioid)

- TE (LA) and PV (LA) were largely comparable for reducing VAS pain scores both at rest and on coughing.
- There were no studies assessing VAS pain scores on movement for this particular comparison.
- TE (LA + opioid) is commonly used in clinical practice⁴ and it would be valuable to compare this technique with PV (LA).
- Only three studies included opioid in the LA solution in one or both groups^{5–7}; these studies showed mixed results.
- In the early postoperative period, PV (LA) and TE (LA) showed comparable effects on pain scores, see Figure 4a; studies including opioid in the LA solution showed a tendency towards higher pain scores in the PV group.
- Mean or median pain scores were comparable overall between TE (LA ± opioid) and PV (LA ± opioid) on day 1/at 24 h, see Figure 4b.

Materials and Methods

Figure 1



Results and Discussion

Figure 2
PV (LA) vs. control

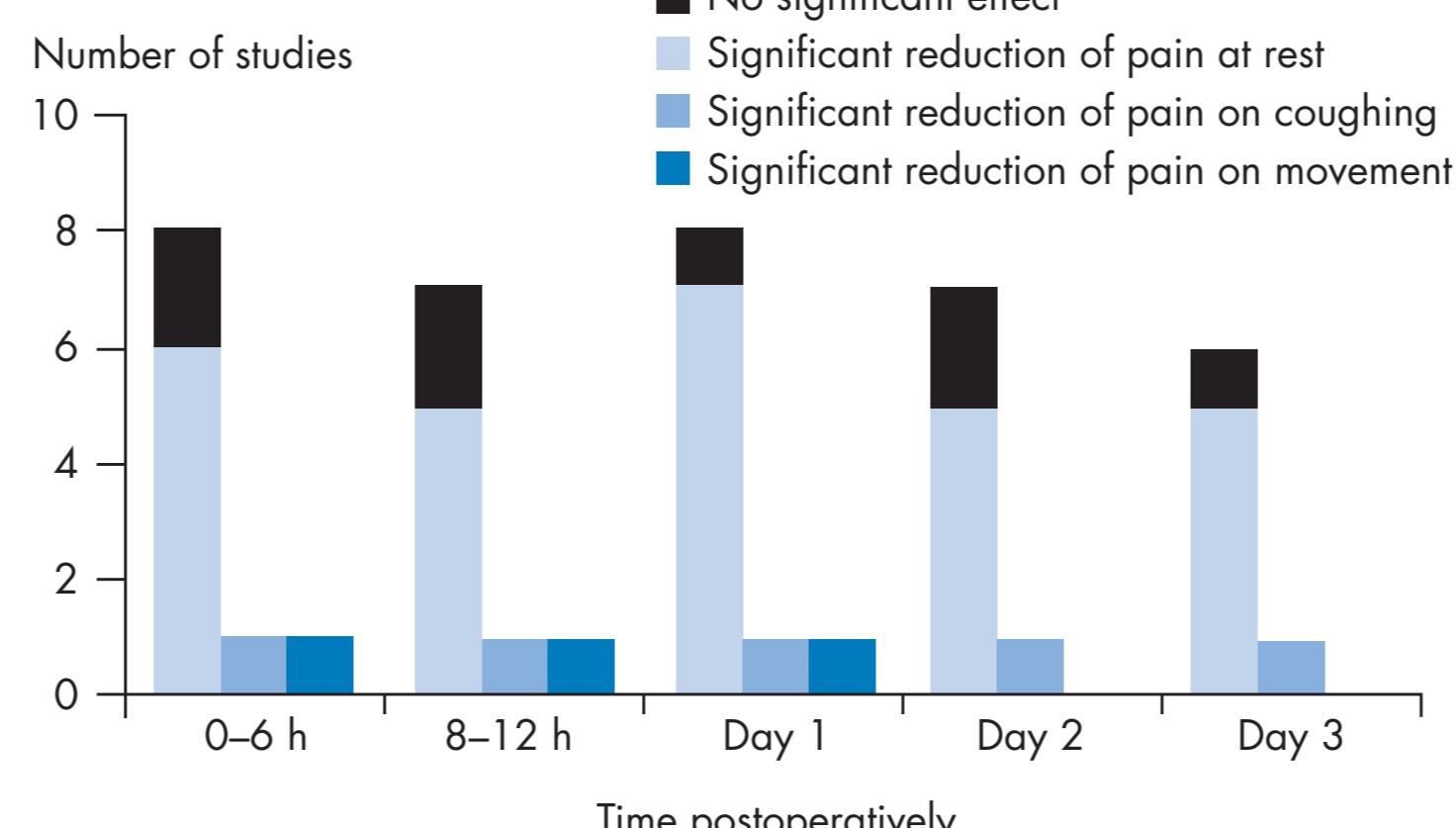


Figure 3
TE (LA + opioid) vs. control

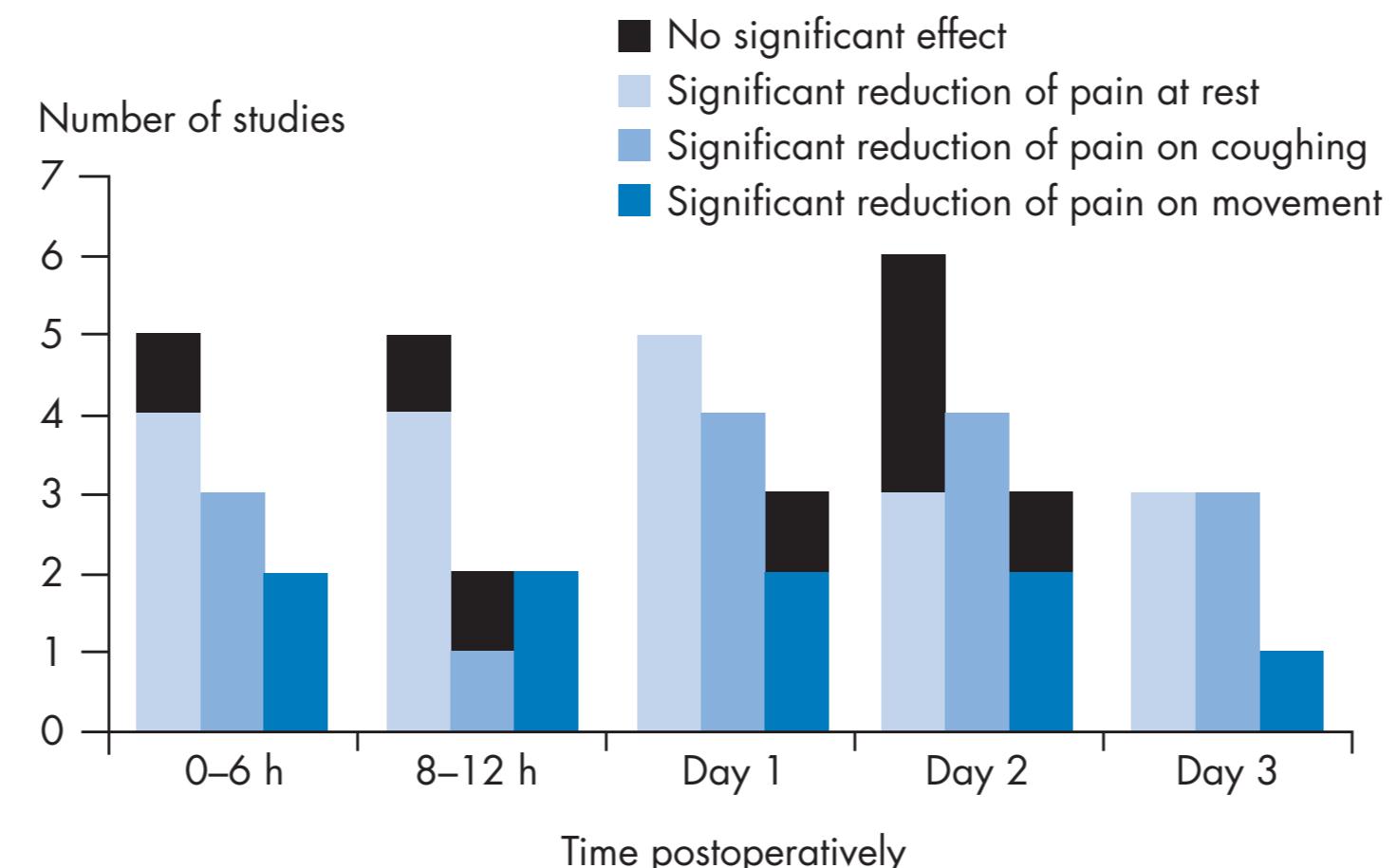


Figure 4a
TE (LA ± opioid) vs. PV (LA ± opioid)

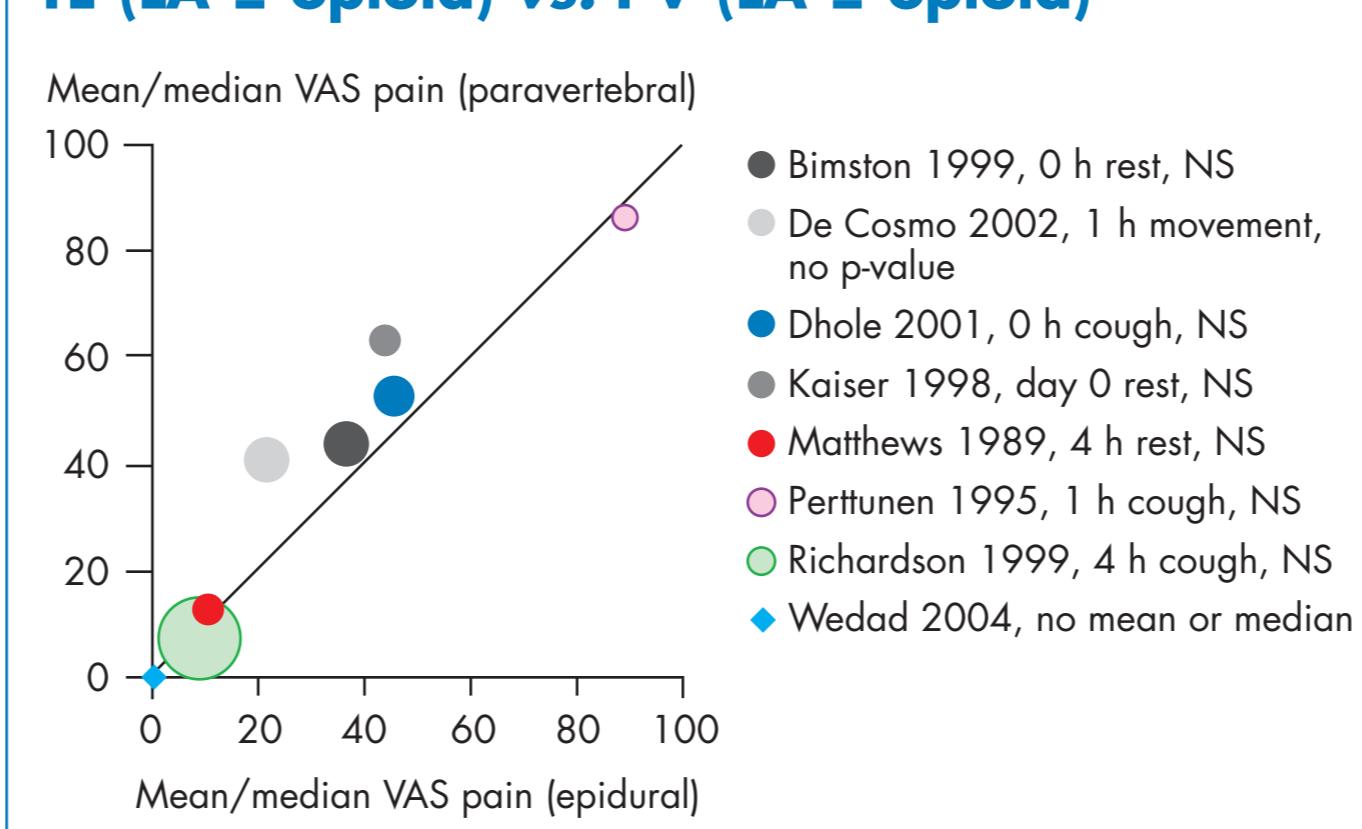
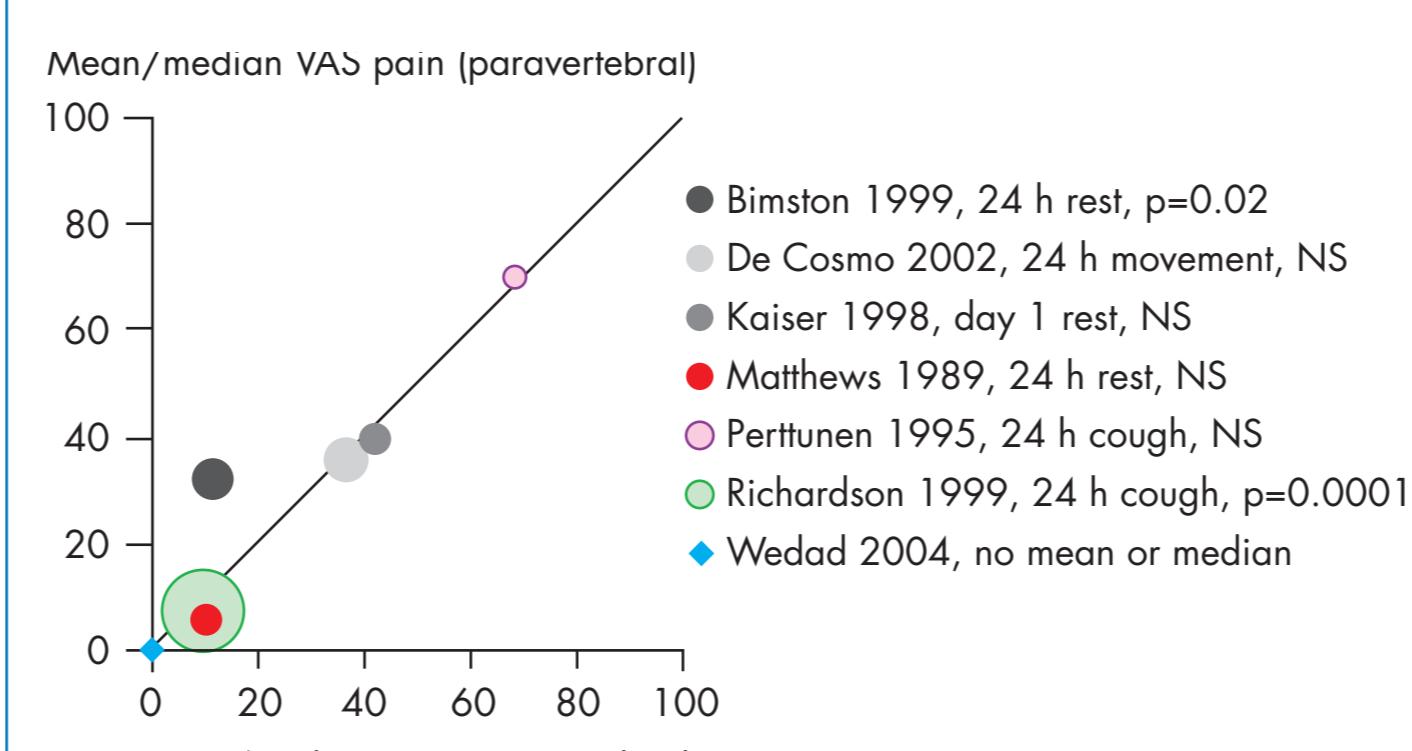


Figure 4b



NB: Bimston *et al.*⁵ De Cosmo *et al.*⁶ and Kaiser *et al.*⁷ included opioid in the LA solution in one or both groups; in addition, the time of administration for the thoracic epidural and paravertebral blocks differed in the De Cosmo *et al.*⁶ study, with epidural analgesia being started pre-operatively; larger circles represent studies with greater patient numbers than studies represented by smaller circles

Quantitative analysis of pain score data was not performed because there was heterogeneity in study design between studies that presented data suitable for meta-analysis.

Other outcomes, TE (LA) vs. PV (LA)

Meta-analyses:

- Compared with TE (LA), PV (LA) was associated with decreased incidence of:
 - hypotension (three studies, OR 0.07, p=0.003)
 - urinary retention (two studies, OR 0.28, p=0.01)
 - nausea (two studies, OR 0.26, p=0.01)

See Table 1 for details.

Table 1

Outcome	Incidence
Hypotension	PV (LA) 0/20 patients ⁸ TE (LA) 1/20 patients ⁸
	PV (LA) 0/10 patients ⁹ TE (LA) 6/9 patients ⁹
	PV (LA) 0/46 patients ¹⁰ TE (LA) 7/49 patients ¹⁰
Urinary retention	PV (LA) 1/10 patients ⁹ TE (LA) 6/9 patients ⁹
	PV (LA) 5/46 patients ¹⁰ TE (LA) 11/49 patients ¹⁰
PONV	Nausea PV (LA) 4/15 patients ¹¹ TE (LA) 7/15 patients ¹¹
	Vomiting PV (LA) 2/46 patients ¹⁰ TE (LA) 10/49 patients ¹⁰

- Two^{10,12} out of four studies found significantly improved pulmonary function in the PV (LA) group compared with the TE (LA) group.
- The other two studies^{8,11} reported no significant differences between groups for pulmonary function outcomes.

A recent systematic review comparing the analgesic efficacy and side-effects of paravertebral vs. epidural blockade also found that the two techniques were comparable for reducing pain scores, but PV (LA ± opioid) was associated with improvements in pulmonary function and a reduction in side-effects, compared with TE (LA ± opioid)¹³.

Conclusions

This systematic review found that:

- PV (LA) and TE (LA + opioid) were both effective for reducing pain after thoracotomy compared with control.
- When comparing PV (LA) with TE (LA), there was no overall benefit of either technique for reducing pain scores.
- PV (LA) was associated with fewer side-effects and improved pulmonary function compared with TE (LA).
- There were very few studies comparing PV (LA) with TE (LA + opioid), which currently prevents evaluation of the 'gold standard' for post-thoracotomy pain.

References

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