

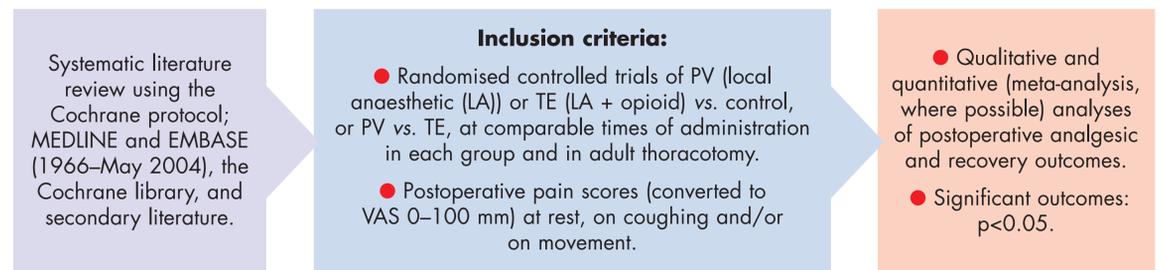
Are paravertebral block and thoracic epidural analgesia comparable for post-thoracotomy pain relief? A systematic review

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.

Materials and Methods

Figure 1



Results and Discussion

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.

Figure 2

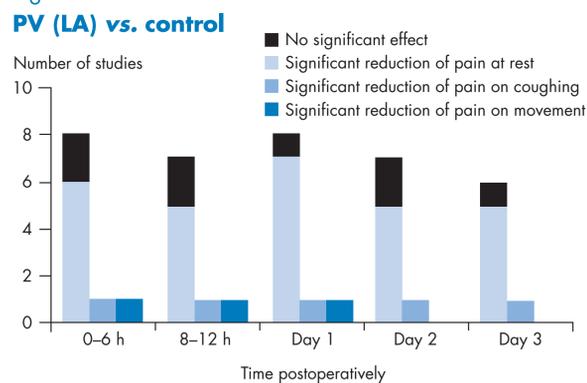


Figure 3

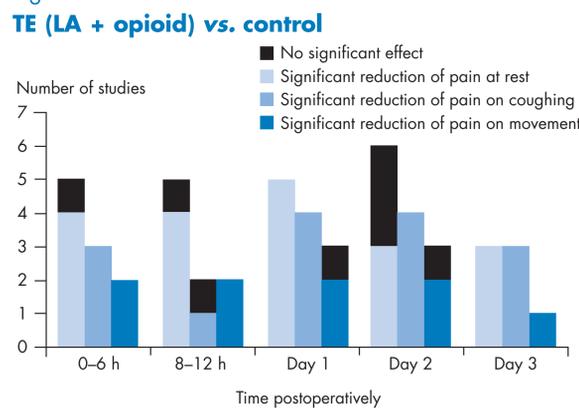


Figure 4a

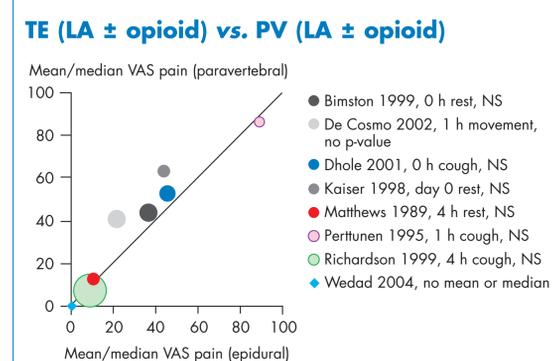
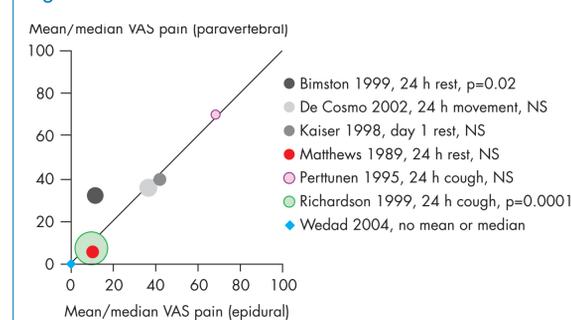


Figure 4b



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	
	PV (LA)	TE (LA)
Hypotension	0/20 patients ⁸	1/20 patients ⁸
	0/10 patients ⁹	6/9 patients ⁹
	0/46 patients ¹⁰	7/49 patients ¹⁰
Urinary retention	1/10 patients ⁹	6/9 patients ⁹
	5/46 patients ¹⁰	11/49 patients ¹⁰
PONV	Nausea	Nausea
	4/15 patients ¹¹	7/15 patients ¹¹
	2/46 patients ¹⁰	10/49 patients ¹⁰
	Vomiting	Vomiting
	1/14 patients ¹¹	0/15 ¹¹
	2/46 patients ¹⁰	7/49 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.

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