Incidence of epidural haematoma and neurological injury in cardiovascular patients with epidural analgesia/anaesthesia: systematic review and meta-analysis

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CRD summary
This review reported no cases of epidural haematomas or persistent neurological injury, and few transient neurological injuries following epidural analgesia or anaesthesia. The authors estimated that the maximum risks for epidural haematoma were 1 in 1,700, 1 in 1,400 and 1 in 1,700 for epidural anaesthesia in cardiac, thoracic and vascular surgery, respectively. The review had some methodological weaknesses, but the authors’ conclusions appear appropriate and are likely to be reliable.

Authors’ objectives
To evaluate the incidence of epidural haematoma and neurological injury in patients undergoing epidural analgesia or anaesthesia for cardiovascular and thoracic surgery.

Searching
MEDLINE and EMBASE were searched from inception to 2005. No language restrictions were applied. The journals Anesthesiology, Anesthesia and Analgesia, British Journal of Anaesthesia, Anaesthesia and Acta Anaesthesiologica Scandinavica were handsearched (1999 to 2005) and reference lists checked for additional studies.

Study selection
Study designs of evaluations included in the review
There were no restrictions on the types of study design eligible for inclusion. Studies that included at least 100 patients were eligible for inclusion.

Specific interventions included in the review
Interventions eligible for inclusion were epidural catheters used during vascular, cardiac and thoracic surgery.

Participants included in the review
Patients undergoing vascular, cardiac or thoracic surgery were eligible. All cardiac and vascular surgery patients received anticoagulation, while the majority of those undergoing thoracotomy were given heparin thromboprophylaxis.

Outcomes assessed in the review
Studies had to report numerical data for serious adverse effects such as haematoma and neurological injuries. The outcomes assessed were epidural haematoma and transient (resolved within 1 year) or persistent neurological injury.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors stated that a formal validity assessment was not performed.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
Only studies that made explicit mention of the adverse events of interest were included in the pooled analysis. Where the number of events across all studies was zero, the maximum risk was calculated using the rule of 3 (see Other Publications of Related Interest).
How were differences between studies investigated?
Studies were examined for clinical heterogeneity and were pooled if they had sufficient clinical homogeneity.

**Results of the review**
Twelve studies (14,105 patients) were included in the review: six retrospective and six prospective including one randomised controlled trial.

Epidural haematoma (12 studies): there were no cases of epidural haematoma and the maximal risk was estimated as 1 in 4700.

Transient neurological events (9 studies): 2 studies reported eight cases of transient neurological injury, which was estimated to correspond to a rate of 1 in 1,700 (95% confidence interval: 1 in 850, 1 in 3,300).

Persistent neurological events (11 studies): there were no cases of persistent neurological injury and the maximal risk was estimated as 1 in 4,600.

**Authors’ conclusions**
The maximum risks for epidural haematoma were 1 in 1,700, 1 in 1,400 and 1 in 1,700 for epidural anaesthesia in cardiac, thoracic and vascular surgery, respectively.

**CRD commentary**
The review addressed a focused question with appropriate inclusion criteria. Two databases were searched, supplemented with handsearching. However, only 5 studies (42% of studies and 14% of patients) were identified via the electronic searches and the rest via handsearching or by examining reference lists, suggesting that additional database searches would be unlikely to yield unidentified studies. The search terms were not reported. Although unpublished studies were not sought, it is unlikely that any publication bias would have an affect on the results. No language restrictions were applied, thus limiting the potential for language bias. It is unclear if the study selection and data extraction processes were performed in duplicate, therefore reviewer error and bias might have been introduced at these stages. Study quality was not formally assessed; this was not inappropriate given the range of study designs included and because it is not clear what biases would be checked for in the reporting of rare adverse effects

The authors’ conclusions appear appropriate and are likely to be reliable.

**Implications of the review for practice and research**
The authors did not state any implications for practice or further research.

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**Other publications of related interest**

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