CRD summary
The authors concluded that the incidence of clinically relevant epidural haematoma after surgery was low, ranging from zero to 1%, and there were insufficient data to define the safety of anticoagulation prophylaxis. The authors acknowledged the limitations of the evidence and their cautious conclusions seem reliable.

Authors' objectives
To describe the incidence of epidural haematoma, and assess the effects of chemical thromboembolic prophylaxis on the risk of epidural haematoma, in patients after spine surgery.

Searching
MEDLINE was searched for articles from 1966 to January 2007. Search terms were reported. Reference lists of the retrieved articles were reviewed.

Study selection
Studies that reported the incidence of clinically relevant epidural haematoma, in patients who had received spinal surgery, were eligible for inclusion. Each study had to report the total number of surgeries performed during the study period. Studies that reported asymptomatic haematoma, diagnosed by radiological imaging; needle-based anaesthetic procedures; or spontaneous epidural haematomas (not after surgery) were excluded.

In the included studies, the methods of anticoagulation or prevention of deep vein thrombosis (where reported) were compression stockings, pneumatic compression devices, low molecular weight heparin, subcutaneous heparin, or intravenous unfractionated heparin.

Two reviewers were involved in study selection.

Assessment of study quality
The studies were graded for level of evidence, based on the Journal of Bone and Joint Surgery, American volume criteria for therapeutic and prognostic studies. Level I was high-quality randomised controlled trials; level II was low-quality randomised controlled trials, prospective comparative studies, or prospective studies with historical controls; level III was case-control studies or retrospective comparative studies; level IV was case series; and level V was expert opinion or case reports.

The number of reviewers who assessed the level of evidence was not reported.

Data extraction
Various information, such as study design, type of surgical procedure, number of patients, method of prophylaxis, incidence of epidural haematoma after surgery, and major or minor bleeding events, were extracted.

The number of reviewers who extracted the data was not reported.

Methods of synthesis
The studies were combined in a narrative synthesis.

Results of the review
Sixteen studies were included in the review; six included patients who received anticoagulation. One study was a prospective randomised controlled trial (46 patients), and the remainder were retrospective case series or case-control studies (range 104 to 14,932 cases, where reported). The authors stated that the quality of the retrospective studies was inconsistent, which corresponded to a low level of evidence.

The incidence of epidural haematoma ranged from zero to 0.7% in studies where patients received chemical
anticoagulation, and zero to 1% in all included studies. None of the studies reported an incidence of clinically relevant epidural haematoma that was greater than 1%.

**Authors’ conclusions**
The incidence of clinically relevant epidural haematoma after surgery was low, ranging from zero to 1%, and there were insufficient data to define the safety of anticoagulation prophylaxis.

**CRD commentary**
The review question was clear and the inclusion and exclusion criteria were reported. The literature search was limited to one database, and it was unclear whether language restrictions were applied, therefore publication and language bias cannot be ruled out. Studies that reported higher complication rates may have been the ones that were missed.

Appropriate methods to reduce reviewer error and bias were used for study selection, but it was unclear whether similar methods were used for data extraction and assessment of the evidence. Formal quality assessment was not reported, but most studies were case series, which corresponded to a low level of evidence. A narrative synthesis was appropriate in view of the diversity of included studies, with various populations, surgical procedures, and types of prophylaxis.

The authors acknowledged the limitations presented above, and their cautious conclusions seem reliable.

**Implications of the review for practice and research**

**Practice:** The authors stated that clinicians should consider other risk factors in addition to chemical anticoagulation.

**Research:** The authors stated that well-controlled, prospective studies were needed to describe the safe use of prophylactic anticoagulants after surgery.

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