Thromboembolic disease in spinal surgery: a systematic review

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CRD summary
The authors concluded that since deep vein thrombosis rates after spinal surgery were fairly low, it seemed fairly reasonable to use compression stockings with pneumatic sequential compression device as the primary method of antithrombotic prophylaxis. The very limited search, inadequate assessment of study quality and differences between studies made it difficult to be confident about the reliability of these conclusions.

Authors’ objectives
To determine the incidence of deep vein thrombosis (DVT), pulmonary embolism and thromboembolic disease after spinal surgery.

Searching
MEDLINE was searched from 1966 to November 2006 for studies published in English. Search terms were reported. Reference lists were also screened.

Study selection
Studies that evaluated anticoagulation, deep vein thrombosis, pulmonary embolism or thromboembolic disease in patients who had undergone spinal surgery were eligible for inclusion. Case reports, studies that evaluated anaesthetic procedures, lumbar punctures and studies of patients with spinal cord injury were excluded.

Where reported, primary studies involved patients who underwent various types of spinal surgery, including spine reconstruction, anterior and posterior interbody fusion, lumbar disc surgery, scoliosis surgery, trauma surgery and laminectomy. Where specified, methods of antithrombotic prophylaxis included none, pneumatic sequential compression device (PSCD), PSCD plus thigh length compression stockings (TED), elastic compression stockings, pharmacological methods, inferior vena cava filter insertion and mixed methods. Studies used different methods of thromboembolic disease surveillance including clinical, Doppler ultrasound and venogram.

Two reviewers screened all titles and abstracts and selected studies.

Assessment of study quality
The authors did not state that they assessed validity, but they graded each study according to study design using a hierarchy of evidence published in the Journal of Bone and Joint Surgery.

Data extraction
For each study, numbers of events of interest were extracted.

The authors did not state how many reviewers extracted data.

Methods of synthesis
Simple summation was used to determine rate of deep vein thrombosis for each method of prophylaxis and method of surveillance, rate of pulmonary embolism for each method of prophylaxis and rates of deep vein thrombosis and pulmonary embolism for each type of spinal surgery. Some differences between studies were discussed.

Results of the review
Twenty-five studies were included (n=9,991): 11 prospective cohort studies (n=1,803); 12 retrospective cohort studies (n=7,709); and two studies with prospective and retrospective cohorts (n=479).

Risk of deep vein thrombosis varied and ranged from 0.3% to 31%. The overall rate of deep vein thrombosis was 2.1%.
Rates varied as follows with the method of prophylaxis: no prophylaxis 2.7% (11 studies); compression stockings or TEDs 2.7% (six studies); PSCD 4.6% (three studies); PSCD plus compression stockings 1.3% (seven studies); pharmacological methods 0.6% (four studies); and inferior vena cava filters with or without other methods 22% (two studies).

Rates of deep vein thrombosis also varied with the method of surveillance: clinical 1%; ultrasound 3.7%; venogram 12.3%.

Other results were also reported.

Authors’ conclusions
Since deep vein thrombosis rates after spinal surgery were fairly low, it seemed fairly reasonable to use elastic compression stockings with PSCD as the primary method of antithrombotic prophylaxis. There was insufficient evidence about the use of pharmaceutical prophylaxis in routine elective spinal surgery and insufficient evidence to suggest to justify screening elective spinal surgery patients with ultrasound or venogram.

CRD commentary
The review question was clear and supported by generally broad but appropriate inclusion criteria. Limiting the search to English-language studies listed in one database plus references may have resulted in the omission of relevant studies and raised the possibility of publication and language biases. Methods were used to minimise reviewer error and bias in the selection of studies, but it was unclear whether similar methods were used for data extraction. Study validity was not assessed, which made the reliability of review findings difficult to evaluate. Grouping the studies by intervention and method of surveillance was appropriate, but even within these groupings studies were clinically heterogeneous. Summarising findings from such diverse studies is challenging. In this review, simple summation was used to calculate rates of thromboembolic disease and this did not take account of differences in sample size or variability of event rates among studies. The authors’ conclusions appeared to be supported by the evidence presented, but a very limited search, inadequate assessment of study quality and considerable clinical heterogeneity among studies makes it difficult to be confident about their reliability.

Implications of the review for practice and research
Practice: The authors stated that compression stockings with or without PSCD should be used in most cases as the primary method of antithrombotic prophylaxis after routine elective spinal surgery. For patients at increased risk, use of pharmaceutical prophylaxis and/or use of an inferior vena cava filter may be considered, although data were sparse.

Research: The authors stated that well-controlled prospective trials were required to determine the true incidence of deep vein thrombosis in high-risk patients and evaluate the need for pharmaceutical prophylaxis.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.