Video assisted thoracic surgery for treatment of pneumothorax and lung resections: systematic review of randomised clinical trials

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CRD summary
This well-conducted systematic review compared video-assisted thoracic surgery with conventional surgery in patients undergoing operations for pneumothorax, minor resections or lobectomy. The authors concluded that video-assisted surgery has better outcomes and equivalent complication rates for pneumothorax and minor resection, but further research is needed to compare procedures for lobectomy. The authors' conclusions are likely to be reliable.

Authors' objectives
To compare video-assisted thoracic surgery with thoracotomy for pneumothorax, minor resections and lobectomy.

Searching
MEDLINE, EMBASE, the Cochrane Database of Systematic Reviews and the Cochrane Controlled Trials Register were searched from 1980 to 2003; some search terms were given. A standard RCT filter was applied to MEDLINE and EMBASE. No language restrictions were applied to the search. The reference lists of RCTs and reviews were also checked.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion in the review.

Specific interventions included in the review
Studies of video-assisted thoracic surgery compared with conventional surgery for pneumothorax, minor resection, or lobectomy were eligible for inclusion. Studies where another experimental medication or device was used concurrently were excluded from the review. The comparison groups included in the review were conventional thoracotomy (7 studies), pleural drainage (2 studies) and conventional lobectomy (3 studies).

Participants included in the review
Studies of general thoracic surgery patients were eligible for inclusion. Patients with lung disease requiring pneumothorax surgery, minor resection, or lobectomy for conditions including pneumothorax, interstitial disease, and solitary or multiple nodules were included in the review. The mean ages of the participants included in the review were 34 years (pneumothorax surgery), 50 years (minor resection) and 63 years (lobectomy).

Outcomes assessed in the review
The following outcomes were eligible for inclusion in the review: recurrence of disease or failure (for pneumothorax surgery), surgery time, measurement of pain and medication for pain, major complications, length of hospital stay, and costs.

How were decisions on the relevance of primary studies made?
The authors stated that studies were reviewed independently for relevance, but did not state how many reviewers performed the selection.

Assessment of study quality
A modified form of the Jadad criteria based on study description, randomisation procedure, allocation concealment, reporting of drop-outs and use of intention-to-treat analysis, but excluding assessment of blinding, was used to assess the validity of the studies. At least two reviewers assessed the validity of the studies.
Data extraction
At least two reviewers extracted the data. Any discrepancies were resolved by all reviewers. Data were extracted on patient demographics, percentage with cancer, procedure performed, frequency of events in the intervention and control groups (including complications), pain medication, quality indicators and costs.

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative.

How were differences between studies investigated?
Differences between the studies, particularly in study quality and interventions employed, were discussed in the narrative synthesis and were also apparent from the evidence tables.

Results of the review
Twelve studies with 670 patients were included in the review. Six trials (n=327) assessed surgery for pneumothorax, 3 trials (n=147) assessed minor resection surgery, and 3 trials (n=196) assessed lobectomy.

Pneumothorax surgery.
Six studies (n=327) compared video-assisted thoracic surgery with conventional surgery for pneumothorax. Four studies (n=179) compared video-assisted thoracic surgery with conventional thoracotomy for pneumothorax. Two studies (n=148) compared video assisted thoracic surgery with pleural drainage for pneumothorax.

All studies reported a reduced requirement for pain medication which was significant (P<0.05) in 5 studies. Three studies reported significantly shorter hospital stays for the video-assisted groups than for the conventional groups (P<0.05 in all studies). Two studies reported more recurrences of pneumothorax in the intervention group and one reported more cases of lung atelectasis in the intervention group, but none of these differences were significant. There were fewer recurrences of pneumothorax in the video-assisted thoracic surgery groups than the pleural drainage groups (P<0.05 in both studies).

Minor resection. Three studies (n=147) compared video-assisted thoracic surgery with conventional thoracotomy for minor resection. In 2 studies, video-assisted surgery groups had a reduced need for pain medication, shorter surgery time and shorter hospital stays. There were no differences between the groups in the third study.

Lobectomy.
Three studies (n=196) compared video-assisted lobectomy with conventional lobectomy. No significant differences between the groups were found, with the exception of one study (n=55) that found fewer air leaks in the intervention group (P<0.05).

Cost information
Three trials found higher costs with video-assisted thoracic surgery than conventional procedures. In two of the trials the increased operating room costs for video-assisted surgery compared with pleural drainage were offset by reduced costs resulting from fewer complications and reduced hospital stay, thus producing no overall cost-differences. The third trial found increased costs for video-assisted surgery compared with conventional minor resection.

Authors’ conclusions
Video-assisted thoracic surgery is associated with better outcomes and a complication profile comparable with that of thoracotomy for the treatment of pneumothorax and minor resections. However, further studies comparing it with lobectomy are required.
**CRD commentary**
The inclusion criteria were clear, although they appeared broader than the review question suggested was necessary. The search was adequate and the lack of language restrictions reduced the likelihood of bias being introduced into the review. However, the authors did not report any attempts to locate unpublished studies, which might have led to the introduction of publication bias. The authors appear to have used appropriate methods to reduce bias and error in the study selection, data extraction and validity assessment processes. The decision to employ a narrative synthesis appears appropriate and the authors’ conclusions accurately reflect the evidence presented in the review.

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

Research: The authors stated that further research is required to assess video-assisted lobectomy in comparison with conventional lobectomy.

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