Thoracoscopic vs open resection of congenital lung lesions: a meta-analysis

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CRD summary
This review found no difference in complication rates between open and minimally invasive surgery for congenital lung lesion resection, but length of stay in hospital and days with chest tube were longer after open surgery. The limited size and quality of the evidence base plus unexplained variation in results across studies means these conclusions are not likely to be reliable.

Authors' objectives
To compare the open (thoracotomy) with the minimally invasive (thoracoscopy) approach for the resection of congenital lung lesions.

Searching
The Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, and CINAHL were searched from inception onwards (no end date was specified) without language restrictions; search terms were reported. Searches of reference lists, journals, and conference proceedings were also performed to identify further studies.

Study selection
Controlled trials, case-control studies, or cohort studies which compared open with thoracoscopic resection of congenital lung lesions were eligible. Studies had to report at least one of the following outcomes: complication rates (the primary outcome of the review), duration of hospitalisation, days with chest tube in place, duration of surgery, and postoperative pain management. Study quality criteria were also used to select studies.

No population or intervention characteristics were presented.

Multiple reviewers independently selected studies for inclusion.

Assessment of study quality
It appeared that studies had to satisfy the following quality criteria to be included in the review: appropriate selection of comparison/control group; control of factors such as selection bias, observation bias, and confounding; completeness of follow-up; and accurate outcome measurement. No further details were reported.

Data extraction
Data were extracted to calculate odds ratios (OR) or mean differences with 95% confidence intervals (CI). Authors were contacted for missing data when necessary.

It appeared that two reviewers extracted data, with disagreements resolved by discussion.

Methods of synthesis
Meta-analyses were performed to calculate pooled odds ratios or weighted mean differences, with 95% confidence intervals. A random-effects model was used when heterogeneity was significant ($I^2$ values more than 50%, or $Q$ test $p<0.10$), otherwise a fixed-effect model was used. A subgroup analysis was performed for studies which included patients with congenital cystic adenomatoid malformation.

Results of the review
Six studies (four retrospective, two prospective) were eligible including 142 patients (range 7 to 36 patients).

There were no significant differences between the two techniques for overall complication rates (OR 0.6, 95% CI 0.27 to 1.33; six studies; $I^2$=0%), respiratory complications (six studies; $I^2$=0%) or duration of surgery (four studies; $I^2$=90%).

Length of hospital stay (mean difference 2.75 days, 95% CI 1.08 to 4.42; four studies; $I^2$=77%) and days with chest tube in place were longer after open surgery (mean difference 2.51 days, 95% CI 0.75 to 4.27; four studies; $I^2$=71%).
tube in place (mean difference 1.22 days, 95% CI 0.09 to 2.35; four studies; I²=85%) were significantly longer following open surgery.

The authors stated that the subgroup analysis results (not presented) showed robustness of the previous results (of all studies).

**Authors' conclusions**
The data available suggested no difference in complication rates between the open and minimally invasive surgical approaches. However, the length of hospital stay and days with chest tube in place were longer after open surgery.

**CRD commentary**
The review addressed a clear question and was supported by broad but reproducible eligibility criteria. Attempts to identify all relevant studies in any language were undertaken using a number of methods (although little detail was provided about the conference proceeding searches). It appeared that duplicate processes were employed to reduce the risks of reviewer error and bias throughout the review.

It appeared that study quality was assessed as part of the study selection process, but only very basic details about the criteria used were presented. However, most studies were retrospective in nature, so may have been prone to bias. Also, all the studies had small sample sizes, so the possibility of chance results cannot be ruled out. Very few study details were provided, which meant it was difficult to understand which population the results related to. Appropriate methods were used to pool data, but significant heterogeneity was often found. The causes of this heterogeneity were not investigated further using sensitivity or subgroup analyses, so the value of some of the pooled results presented was questionable.

Although the authors' conclusions appeared to reflect the evidence presented, the limited size and quality of the evidence base, coupled with the considerable heterogeneity found, means their conclusions are not likely to be reliable.

**Implications of the review for practice and research**
**Practice:** The authors stated that thoracoscopic resection was a safe and feasible alternative to open resection of congenital lung lesions in experienced hands.

**Research:** The authors stated that standardised methodology and reporting of long-term outcomes were needed in future studies.

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