Anatomic lung resections using minimally invasive thoracic surgery (MITS)
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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
A new, minimally invasive thoracic surgery (MITS) procedure was compared with conventional muscle-sparing thoracotomy (MST) for pulmonary resection.

Type of intervention
Treatment (surgery).

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with pulmonary resection. The inclusion criteria included pulmonary malignancy without hilar adenopathy (clinical stage I-II). The exclusion criteria included multiple adhesions and/or haemorrhages that could not be immediately controlled through the limited incision.

Setting
The setting was secondary care. The economic analysis was conducted in Philadelphia, USA.

Dates to which data relate
The effectiveness data related to 1995 to 1997. The dates to which the resource data and prices related were not reported.

Source of effectiveness data
The effectiveness data were derived from a single retrospective study.

Link between effectiveness and cost data
The costing was carried out retrospectively using the same sample of patients as that used in the effectiveness study.

Study sample
No power calculations to determine the sample size were reported. A total of 140 patients were included in the study. First, 70 consecutive patients who underwent MITS between 12 January 1996 and 1 January 1997 at the author's institution were included. Second, 70 patients who underwent MST for a similar pathology during 1995 at the author's institution were included. Nine (12.9%) of the 70 MITS patients were converted intraoperatively to a conventional incision (MST), 6 for adhesions and 3 for haemostasis. These patients were excluded from the analysis.
Study design
The study was a comparative study with a historical control, which was conducted in a single centre. The duration of follow-up was unclear, but it was likely to have been until discharge.

Analysis of effectiveness
The analysis of the clinical study was conducted on the basis of treatment completers only. The primary health outcomes used in the analysis were the number of complications and the mortality rate. Extubation times and analgesia requirements were also recorded. The two groups were fairly comparable at baseline (for mean age and pathologic stages), except for the gender ratio.

Effectiveness results
There were 6 complications in the MITS group versus 15 in the MST group. There were no deaths in the MITS group versus 2 in the MST group.

Clinical conclusions
The MITS procedure might be performed with lower morbidity in comparison with the conventional MST procedure.

Measure of benefits used in the economic analysis
The authors did not develop a summary benefit measure. A cost-consequences analysis was therefore performed.

Direct costs
The quantity/cost boundary adopted was that of the hospital. The direct costs were for operating room time and equipment, intensive care unit time and equipment, and hospital room use. The cost analysis did not include the professional fees of the physicians involved. Costs rather than charges were evaluated. The costs and the quantities were not reported separately. Discounting was unnecessary since the costs were incurred during less than one year. The quantities were derived from a review of the clinical records. The cost data were collected from the hospital's accounts department. The price year was not reported.

Statistical analysis of costs
Statistical analyses of the costs were carried out using Student's t-test.

Indirect Costs
No indirect costs were included in the analysis.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The mean length of stay was 2.87 days (standard deviation, SD=0.756) in the MITS group (excluding the 9 patients who were converted to MST) and 8.28 days (SD=1.55) in the MST group, (p=0.003).

The mean hospital cost was $6,480 in the MITS group and $11,490 in the MST group, (p=0.006).

**Synthesis of costs and benefits**
Not applicable.

**Authors' conclusions**
The minimally invasive thoracic surgery (MITS) procedure may be performed with low morbidity and cost. It also allows early ambulation and early hospital discharge.

**CRD COMMENTARY - Selection of comparators**
The reason for the choice of the comparator was clear. The comparator was chosen because it represented the standard care for patients with pulmonary resection in the author's setting. You should consider whether this is a widely used technology in your own setting.

**Validity of estimate of measure of effectiveness**
The sample size was small, suggesting a potential lack of power calculations. The study was a comparative study with a historical control. The potential for bias and confounding is considerable with this type of design. No statistical analyses were undertaken to take potential biases and confounding factors into account, particularly with gender. The inclusion and exclusion criteria were reported for MITS patients, but not for MST patients. This may bias the effectiveness outcomes in favour of the MITS procedure.

**Validity of estimate of measure of benefit**
The authors did not derive a measure of health benefit. The analysis was therefore a cost-consequences analysis.

**Validity of estimate of costs**
The study perspective was not stated, but it seems to have been that of the hospital. There were only limited details of the cost items used in the analysis. The unit costs and the quantities were not included, whereas it was unclear whether the costs of drugs, complications and nursing care were. Due to the short time period adopted, the cost analysis did not include the resources used after discharge. The author did not justify excluding the professional fees of the involved physicians from the analysis. These facts hinder the reproducibility of results to other settings. The cost analysis was conducted on two different historical interventions (1995 to 1997). However, the dates to which the resource data and prices related were not reported. No sensitivity analysis was conducted.

**Other issues**
The generalisability of the results was not discussed. Adequate comparisons were made with studies dealing with the same topic. The study enrolled patients with pulmonary resection and this was reflected in the author's conclusions. The author highlighted a few limitations of the study. The author does not appear to have reported the results selectively.

**Implications of the study**
The author suggested that the MITS procedure should be particularly effective in high-risk patients with severe co-morbidities such as compromised pulmonary function, obesity, and/or cardiac disease, where severe pain and prolonged bedrest are not tolerated. The author commented that the MST procedure should be reserved for special circumstances only (e.g. redo thoracotomies and clinical stage IIIa).
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