Is video-assisted thoracic surgery justified at first spontaneous pneumothorax?

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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
The use of pleural drainage (PD) and video-assisted thoracic surgery (VATS) for the treatment of patients experiencing spontaneous pneumothorax. PD consisted of Maalinkrodt drainages of between 24 and 32 Ch. These were introduced under local anaesthesia, usually in the level IV or V intercostal space on the mean axillary line, connected to continuous suction. The VATS-based intervention consisted of wedge resection and pleurectomy under general anaesthesia, with selected bronchial intubation. After surgery the patients were connected to continuous suction.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients experiencing spontaneous pneumothorax.

Setting
The setting was secondary care. The economic study was conducted in Italy.

Dates to which data relate
The effectiveness evidence and resource use data were collected from January 1996 to June 1999. No price year was given.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the same group of patients as that used for the effectiveness analysis.

Study sample
No power calculations to determine the sample size were reported. The method used to select the sample was also not reported. A total sample of 70 patients was included in the analysis, with 35 patients in each group. Most of the patients in the study were experiencing their first spontaneous pneumothorax. In the PD group, there were 33 primary spontaneous pneumothorax and 2 secondary spontaneous pneumothorax. The mean age of the PD group was 24 years, and there were 21 males and 14 females. In the VATS group, there were 31 primary spontaneous pneumothorax and 4 secondary spontaneous pneumothorax. The mean age of the VATS group was 27.7 years, and there were 18 males and
17 females. No information was given on the patients who were invited to participate but refused, or of the patients excluded from the initial sample.

**Study design**
This was a case-control study conducted in a single centre (the Thoracic Department of University of L’Aquila, Hospital of Teramo, Italy). No randomisation was carried out. The method used to allocate the patients to the two groups was not described. The length of follow-up was 12 months. In terms of the VATS-based intervention, a complete wedge resection took place where it was possible (80% of the patients) to identify bullous dystrophic zone, air leaks or blebs. In the remaining 20%, an apical resection was carried out with a large and accurate pleurectomy.

**Analysis of effectiveness**
The analysis of the clinical study was conducted on an intention to treat basis. The primary health outcomes were prolonged air links, time of PD, hospital stay, and recurrences during the follow-up period.

The authors did not show that the two groups were comparable at baseline in terms of their demographics and prognostic features. However, they stated that the study groups were homogeneously chosen in terms of the age and gender.

**Effectiveness results**
The number of patients with prolonged air leaks was 4 (11.4%) in the PD group and 2 (5.7%) in the VATS group.

The length of time of PD was 9 days in the PD group and 3.9 days in the VATS group.

The mean length of hospital stay was 12 days for the PD group and 6 days for the VATS group.

The number of recurrences was 8 (22.8%) in the PD group and 1 (2.8%) in the VATS group.

**Clinical conclusions**
VATS provided a better long-term solution for spontaneous pneumothorax than PD. In addition, there was no evidence of undesirable side-effects or risks among the patients undergoing VATS.

**Measure of benefits used in the economic analysis**
No summary benefit measure was used in the economic analysis as the health outcomes were left disaggregated. A cost-consequences analysis was therefore carried out.

**Direct costs**
Discounting was not carried out. However, it would have been irrelevant since the costs for any one patient would be incurred over only one year. The resources measured were hospital stay (prices and quantities given separately) and surgical material (prices and quantities not given separately). The cost/resource boundary was that of the hospital. The costs were calculated from actual data. There was no evidence of any adjustments to a common price year.

**Statistical analysis of costs**
No statistical analysis of the costs was reported.

**Indirect Costs**
The indirect costs were not calculated.
Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
No summary benefit measure was used in the economic analysis. See the 'Effectiveness Results' section.

Cost results
The cost per patient was $2,700.00 in the PD group and $1,925.00 in the VATS group.

The above costs do not take into account the costs of treating recurrences during the 12-month follow-up. When these are taken into account, the total costs for the whole group were $103,750.00 in the PD group and $69,515.00 in the VATS group.

Synthesis of costs and benefits
Not applicable due to the cost-consequences approach adopted. However, the results indicated that VATS was a dominant treatment since it resulted in lower costs and better outcomes, such as the higher success rate in preventing the recurrence of pneumothorax.

Authors' conclusions
Video-assisted thoracic surgery (VATS) was a superior treatment, as it had a high success rate in preventing future episodes of pneumothorax and it had lower costs. Although the side effects of treatment from the patient's perspective were not considered systematically, the authors stated that there was a psychological benefit to VATS because it was a longer term solution than pleural drainage (PD). On the other hand, with PD the patient has to be told that there is a 20 to 30% chance of recurrence.

CRD COMMENTARY - Selection of comparators
The choice of the comparator, PD, was justified as it represents current practice for spontaneous pneumothorax before the development of technology that enabled VATS to be possible. PD is often current practice for the first episode of spontaneous pneumothorax. You should assess whether it represents a currently used intervention in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness analysis used a case-control study and some aspects of the study design were suitable for the study question. There was no evidence that proper randomisation between the treatment groups had taken place. Also, although the authors stated that they were studying patients with primary spontaneous pneumothorax, both treatment groups included patients with secondary pneumothorax. The patient groups were not shown to be comparable at analysis although they were described as being comparable. Consequently, confounding and bias cannot be excluded.

Validity of estimate of measure of benefit
A cost-consequences analysis was carried out as no summary benefit measure was used in the economic analysis.

Validity of estimate of costs
The cost analysis was fairly limited. The price year and the original source of the prices were not reported. The costs and quantities were treated deterministically and sensitivity analyses were not carried out. The cost estimates were
somewhat specific to the study setting. The costs were only calculated from the perspective of the hospital. It would have been helpful had the authors assessed the costs from the perspective of the patients and their families. Overall, there was insufficient information on the costs.

**Other issues**
The authors made appropriate comparisons of their results with those of other studies. The issue of generalisability to other settings was not addressed. However, as the price of a day in hospital and the cost of surgical material was given, this would help to assess the generalisability of the results. The price year was not given, thus hindering any reflation exercise to other settings. The authors did not present their results selectively, but their conclusions did not reflect the scope of the analysis correctly. For instance, there was confusion as to whether the study was dealing with all spontaneous pneumothorax or merely primary spontaneous pneumothorax.

**Implications of the study**
The authors provide evidence in favour of the dominance of VATS over PD for spontaneous pneumothorax in terms of three main advantages. These were reduced costs and minimum hospital stay, limited invasiveness, and resolutive treatment. This evidence should be interpreted in the light of the issues outlined.

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