Primary versus delayed surgery for spontaneous pneumothorax in children: which is better

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
Two surgical strategies for spontaneous pneumothorax (SP), both involving video-assisted bullectomy and pleurodesis (VATS), were examined. Primary VATS, performed at the first development of SP, was compared with secondary VATS, which was performed after a recurrent SP had occurred, while a nonoperative treatment was attempted.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised paediatric patients with SP. Patients who underwent open thoracotomy were excluded.

Setting
The setting was a hospital. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness and resource use data were gathered from 1991 to 2003. The price year was unclear.

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

Link between effectiveness and cost data
The costing was carried out retrospectively both on the same sample of patients as that used in the clinical study and on a hypothetical group of patients.

Study sample
Power calculations were not reported. The hospital charts of consecutive paediatric patients who had undergone surgical treatment for SP were reviewed. Over the study period (1991 to 2003), 54 spontaneous pneumothoraces were identified in 43 patients, but 3 patients were excluded because they had undergone open thoracotomy. Thus, 51 SP cases were included in the final study sample. Nonoperative treatment was attempted in 37 cases (secondary VATS group), while primary VATS was performed in 14 cases (primary VATS group). The mean age was 15.9 (+/- 0.35) years in the primary VATS group and 16.1 (+/- 0.4) years in the secondary VATS group. The numbers of male patients were 13 (primary VATS) and 17 (secondary VATS), respectively.
Study design
This was a retrospective cohort study that was carried out at a single institution, the Children's Hospital of Pittsburgh at the University of Pittsburgh in Pennsylvania. The length of follow-up was unclear, but the patients could have been followed until hospital discharge. No patient was lost to the follow-up assessment. The outcomes were assessed by extracting clinical data from the patients' charts.

Analysis of effectiveness
All of the patients included in the initial study sample were accounted for in the analysis of effectiveness. The outcome measures used were length of stay (LOS) and the number of recurrences after VATS. Other procedural outcomes were also reported. The study groups were comparable at baseline in terms of their clinical and demographic factors.

Effectiveness results
The average LOS was 7.1 (+/- 0.96) days in the primary VATS group and 10.5 (+/- 1.2) days in the secondary VATS group, (p=0.04).

The number of recurrences after VATS was 4/14 in the primary VATS group and 0/20 in the secondary VATS group, (p=0.02).

Five patients underwent a computed tomography (CT) scan of the chest before either surgical treatment.

Two patients in each group had successful VATS (no postoperative recurrence).

The identification of blebs on a CT scan had no predictive impact on the success of either primary or secondary VATS.

Of the 14 patients undergoing primary VATS, 10 had successful procedures without recurrence and blebs were identified in 9 of these patients. Of the 4 patients that had a recurrence, blebs were identified in 3 patients. In the 20 patients undergoing secondary VATS in whom there were no recurrences, blebs were identified in 15 patients.

Clinical conclusions
The effectiveness analysis showed that both procedures were safe. However, a higher frequency of recurrences was observed in the primary VATS-managed patients. Primary VATS was associated with a shorter hospital stay.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used in the economic evaluation. In effect, a cost-consequences analysis was performed.

Direct costs
Discounting was not relevant since the costs were incurred during a short timeframe. The unit costs were not presented separately from the quantities of resources used. The economic evaluation considered VATS, non-surgical treatment (i.e. chest tube alone) and the treatment of recurrences. A detailed breakdown of the cost items was not given. The cost/resource boundary of the study was unclear. Resource use was estimated using patient-level data derived from the sample of individuals included in the clinical study. However, a cost calculation in a hypothetical cohort of patients undergoing primary VATS was also carried out. The costs were presumably estimated from the hospital database. The price year was not reported.

Statistical analysis of costs
The costs were presented as mean values with standard deviations. A statistical test was used to assess the statistical significance of differences in the total costs.
Indirect Costs
The indirect costs were not taken into consideration.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not performed.

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

Cost results
The overall treatment charges were $23,712 (+/- 3,149) with primary VATS and $29,724 (+/- 3,678) with secondary VATS. The difference between charges did not reach statistical significance.

Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant since a cost-consequences analysis was performed.

Authors' conclusions
Increased morbidity and costs did not justify a strategy of primary video-assisted bullectomy and pleurodesis (VATS) in children with spontaneous pneumothorax (SP).

CRD COMMENTARY - Selection of comparators
A justification was provided for the choice of the comparators, which reflected a different timing for the treatment of SP. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The clinical evidence came from a retrospective review of patient charts. The use of a prospective study would have been more appropriate. The lack of random allocation of the patients to the hospital groups could have introduced selection bias and confounding factors. However, the study groups were quite well matched at baseline. A small group of patients was considered and there no evidence that this sample size was appropriate. The evidence came from a single hospital, which makes it unclear whether the study sample was representative of the patient population.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The authors did not state explicitly which perspective was adopted in the study. A detailed breakdown of the cost items was not presented, which limits the possibility of replicating the results of the analysis. Further, the cost estimates were specific to the study setting and caution is required when extrapolating the results of the economic analysis to other contexts. The source of the data was unclear. The price year was not reported, which makes reflation exercises in other periods difficult. It was unclear whether charges rather than costs were used.
Other issues
The authors did not make extensive comparisons of their findings with those from other studies, although they stated that the recurrence rate observed in their series was higher than that observed in the literature. The issue of the generalisability of the study results to other settings was not addressed, and no sensitivity analyses were carried out. This reduces the external validity of the study results. The analysis referred to paediatric patients with SP and this was reflected in the authors’ conclusions.

Implications of the study
The authors recommended the use of initial tube thoracostomy for decompression in children with SP, with secondary VATS being performed only for recurrence.

Source of funding
None stated.

Bibliographic details

PubMedID
15868579

DOI
10.1016/j.jpedsurg.2004.09.042

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Blister /surgery; Child; Child, Preschool; Cost-Benefit Analysis; Female; Humans; Male; Pleurodesis /methods; Pneumothorax /surgery; Recurrence; Retrospective Studies; Rupture, Spontaneous; Thoracic Surgery, Video-Assisted /economics; Time Factors

AccessionNumber
22005000235

Date bibliographic record published
30/11/2005

Date abstract record published
30/11/2005