Partial versus full sternotomy for aortic valve replacement

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
Partial versus full sternotomy for aortic valve replacement.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing aortic valve replacement.

Setting
Secondary care, namely Allegheny General Hospital, Pittsburgh, Pennsylvania, USA. The economic study was conducted in the USA.

Dates to which data relate
Effectiveness data were collected between March 1997 and September 1998. Cost dates and the price year were not stated.

Source of effectiveness data
The evidence for the final outcomes was based on a single study.

Link between effectiveness and cost data
Costing was performed retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
100 patients undergoing isolated valve replacement were considered. 50 patients (mean age 60 +/- 2 years and preoperative ejection faction 53 +/- 2 years) underwent aortic valve replacement through a partial upper sternotomy (group 1), and 50 patients (mean age 63 +/- 2 years, preoperative ejection fraction 54 +/- 2 years) through a median sternotomy (group 2). One procedure was converted to a full sternotomy to improve exposure of the right atrium, resulting in 49 patients in group one, and 51 patients in group 2. No power calculations were reported as being used in determining the sample size.

Study design
This was a retrospective, non-randomised review of a single institutional series of aortic valve replacements. The length of follow-up was 1 month following hospital discharge.

**Analysis of effectiveness**
The analysis of effectiveness was based on treatment completers only. The main health outcomes used in the analysis were: mortality, aortic occlusion time, intubation time, mediastinal drainage, transfusion incidence, narcotic requirement, ICU stay, length of stay in hospital, incidence of pleural and pericardial effusions, postoperative inotropic support and postoperative complications. The two groups were comparable in terms of age, preoperative ejection fractions and mean clinical risk score (CRS). CRS was an indicator developed by the hospital and both groups scored 6, placing the patients in the low risk category.

**Effectiveness results**
There was one death in each group. No differences were found in aortic occlusion time, intubation time, mediastinal drainage, transfusion incidence, narcotic requirement, or length of stay in the ICU and in hospital. The incidence of pleural and pericardial effusions was increased (18.4% versus 3.0%, p<0.03) and the need for postoperative inotropic support was higher (38.7% versus 19.6%, p<0.03) in the partial sternotomy group. The total incidence of complications was higher in group 1 than in group 2 (35/49 or 71% versus 25/51 or 49%).

**Clinical conclusions**
Aortic valve replacement through a partial upper sternotomy is a safe procedure.

**Measure of benefits used in the economic analysis**
The authors did not provide a summary measure of benefits. As such, a cost-consequences approach was adopted and the reader is referred to the effectiveness results reported above.

**Direct costs**
A health service perspective was used in considering costs, but the quantities and costs were not presented separately. It was unclear which cost items were included in the total cost, although the authors stated that all direct and indirect costs were considered. It appears that costs for intubation, mediastinal drainage, transfusion, PRBCs transfusion, inotropic support, narcotics, ICU stay and length of stay were considered. Costs were not discounted because of the short duration of the study. The price year was not stated.

**Statistical analysis of costs**
The authors used Student’s t test for unpaired data, and a Chi squared test or Fisher’s exact test where appropriate. A p value of less than 0.05 was taken to indicate statistically significant trends.

**Indirect Costs**
The authors stated that indirect costs were included in the analysis, but no details of these were provided.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was performed.
Estimated benefits used in the economic analysis
The authors did not provide a summary measure of benefits. The reader is referred to the effectiveness results reported above.

Cost results
Costs were not significantly different between the two groups: $17,410 (+/- $7,485) for group 1 and $16,382 (+/- $9,674) for group two.

Synthesis of costs and benefits
Costs and benefits were not combined because of the cost consequences approach adopted in the analysis.

Authors' conclusions
Aortic valve replacement can be performed through a partial sternotomy with results comparable to full sternotomy. The partial sternotomy offers a cosmetic benefit, but does not significantly reduce postoperative pain, length of stay or cost.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator, full sternotomy for aortic valve replacement, is clear. Full sternotomy was widely used in the authors' setting. You, as a database user, should consider if the same applies to your own setting.

Validity of estimate of effectiveness:
The analysis was based on a retrospective, non-randomised review of a single institutional series. Although this may have been appropriate for the study in question, a prospective randomised approach would have given more credibility to the final effectiveness estimates. The study sample was representative of the study population, but no power calculations were used to determine the sample size. Patient groups were shown to be comparable at analysis. Appropriate statistical analyses were undertaken to take account of potential biases and confounding variables.

Validity of estimate of health benefit:
The authors did not provide a measure of health benefit. The analysis was therefore categorised as a cost-consequences analysis only.

Validity of estimate of costs
The cost analysis was unclear and it is hard to judge whether important items were excluded from the total costs. Quantities and costs were not presented separately. Discounting was not performed due to the short duration of the study. The authors stated that they had included direct and indirect costs in the analysis, but indirect costs were not itemised.

Other issues
The authors made comparisons with similar studies. The generalisability of results could be affected by the important limitations to this study acknowledged by the authors, namely

the retrospective design;

selection bias arising from the method of allocating patients between the two groups by surgeon preference; and

the fact that the duration for intubation and hospital stay was ultimately determined by the surgeon's opinion.
Implications of the study
Randomised trials are needed fully to assess these two procedures before firm conclusions can be drawn.

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None stated.

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