Minimal incision aortic surgery

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 minimally invasive aortic surgery (MIAS) for the treatment of patients with abdominal aortic aneurysms and aortoiliac occlusive disease (AIOD).

Type of intervention
Treatment.

Cost-effectiveness analysis.

Study population
The study population comprised patients requiring surgical treatment for abdominal aortic aneurysms and AIOD. Patients were generally excluded if they had a ruptured aneurysm, pararenal or suprarenal aneurysms, or required concomitant mesenteric renal or infrainguinal arterial reconstruction. The specific exclusion criteria in the endovascular repair group were a short infrarenal aortic neck (less than 1.5 cm), a dilated aortic neck (greater than 26 mm), and small tortuous iliac arteries (less than 6 mm in diameter).

Setting
The setting was a hospital. The economic study was carried out at the Section of Vascular Surgery, Department of Surgery, University of Wisconsin Medical School (Wisconsin, USA).

Dates to which data relate
The effectiveness evidence and resource use data were gathered between June 1999 and June 2000. The price year was not reported.

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

Link between effectiveness and cost data
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness analysis.

Power calculations were not performed to determine the sample size. Patients with abdominal aortic aneurysms or AIOD consecutively presenting at the study institution during the study period were included in the analysis, in effect, intention to treat. Fifty patients underwent MIAS. Their mean age was 65 (+/- 10) years and 36 were men. Fifty patients underwent standard repair. Their mean age was 67 (+/- 12) years and 33 were men. Thirty-two patients underwent
endovascular repair. Their mean age was 71 (+/- 9.8) years and 30 were men. None of the patients were excluded from the initial sample.

**Study design**
This was a prospective case-control study carried out in a single centre (Section of Vascular Surgery, Department of Surgery, University of Wisconsin Medical School). The patients were followed for 30 days and no loss of follow-up was reported. The same surgeon in each group performed the interventions.

**Analysis of effectiveness**
All patients included in the study were accounted for in the analysis. The primary health outcomes were the length of stay in the intensive care unit (ICU), days of postoperative general diet, the overall length of stay, the mortality and morbidity rates, the number of transfusion units, and the volume of intraoperative fluids used. The groups were showed to be similar in terms of their age, gender distribution, aneurysm size, or body weight.

**Effectiveness results**
Length of stay in the ICU was 1.0 (+/- 1.2) days in the MIAS group, 1.8 (+/- 1.5) days in the standard repair group, and 1.1 (+/- 0.7) days in the endovascular repair group.

Days of postoperative general diet and the overall length of stay were statistically lower in the MIAS group and endovascular group, compared with the standard repair group. The days of postoperative general diet were 3.0 (+/- 1.3) in the MIAS group, 2.0 (+/- 0.5) in the endovascular group, and 4.7 (+/- 2.8) in the standard repair group. The overall length of stay was 4.8 (+/- 1.9) days in the MIAS group, 4.3 (+/- 3.7) days in the endovascular group, and 9.7 (+/- 4.6) days in the standard repair group.

The mortality and morbidity rates were similar among the study groups. The mortality rates were 2% for MIAS, 2% for standard repair, and 3% for endovascular repair. The morbidity rates were 14% for MIAS, 24% for standard repair, and 19% for endovascular repair.

The transfusion units and intraoperative fluids were not statistically different between the three groups. The number of units transfused was 0.9 (+/- 0.9) in the MIAS group, 0.9 (+/- 1.4) in the standard repair group, and 0.9 (+/- 0.7) in the endovascular repair group. The volume of intraoperative fluids used was 3,560 (+/- 1,625) cm³ in the MIAS group, 4,105 (+/- 1,034) cm³ in the standard repair group, and 3,483 (+/- 1,562) cm³ in the endovascular repair group.

**Clinical conclusions**
MIAS was a safe surgical technique. It was more effective than standard repair in reducing the length of hospitalisation and stay in the ICU, and in speeding the return to normal feeding after the intervention.

**Measure of benefits used in the economic analysis**
The health outcomes were left disaggregated and no summary benefit measure was used. A cost-consequences analysis was therefore conducted.

**Direct costs**
Discounting was irrelevant due to the short time horizon of the study (less than one year). The unit costs were reported but the quantities of resources were not. The cost/resource boundary adopted was that of the hospital. The health service costs included were for medical and non-medical direct costs, the operating room, cardiovascular costs, the medicine department, radiology, the recovery room, anaesthesia, the laboratory, the ICU, the cardiovascular laboratory, the emergency department, electrocardiogram, dialysis, electroencephalogram, rehabilitation, respiratory therapy, and routine expenses.
The costs were estimated as reimbursement rates for the university health care providers, and were obtained from the University Health System Consortium. The costs were also estimated as actual costs, from the patients’ bills. The net hospital revenue was then calculated as the total hospital reimbursements minus the total actual cost per patient. The resources used were collected between June 1999 and June 2000. The price year was not reported.

Statistical analysis of costs
Statistical analyses were conducted to assess the statistical difference of total costs among the groups.

Indirect Costs
The indirect costs were not included.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analyses were carried out.

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

Cost results
The total average reimbursement was $21,030 in the MIAS group, $23,434 in the standard repair group, and $24,777 in the endovascular group.

The total standard costs were $12,585 in the MIAS group, $18,445 in the standard repair group, and $32,040 in the endovascular group.

The net revenue was $8,445 in the MIAS group, $4,989 in the standard repair group, and -$7,263 in the endovascular group. The differences were statistically significant.

Synthesis of costs and benefits
Not relevant.

Authors’ conclusions
Minimally invasive aortic surgery (MIAS) proved to be a safe technique, which reduced recovery time and overall costs while maintaining the quality of the outcome.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparators was clear. Standard repair represented the traditional approach for the treatment of the patients in the study, whilst endovascular repair represented the alternative surgical procedure. You should assess whether these techniques represent widely used health interventions in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness analysis used a case-control study, which appears to have been appropriate for the study question. However, as the authors acknowledged, the sample size was quite small and no randomisation was conducted.
Therefore, selection bias and confounding factors could limit the validity of the analysis, although the study groups were fairly similar at baseline.

Validity of estimate of measure of benefit
No benefit measure was used, as a cost-consequences analysis was conducted. It would have been interesting to have used a measure reflecting the patients' preferences for the interventions in the study, since MIAS has the advantage of reducing pain and discomfort.

Validity of estimate of costs
The costs were estimated as both the reimbursement rates and the charges paid by the patients. Neither of these estimates reflected the true costs, although this was consistent with the perspective adopted in the analysis. Statistical analyses of the costs were conducted only to assess the relevance of the difference in the total costs among the study groups. The price year was not reported. The cost estimates appear to have been quite specific to the university providers.

Other issues
The issue of the generalisability of the study results to other settings was not addressed. In addition, sensitivity analyses were not conducted. Thus, the external validity of the study was somewhat limited.

Implications of the study
The authors stated that MIAS procedures should be performed for the elective treatment of patients with moderate-sized infrarenal aortic aneurysms (less than 10 cm) and for the treatment of patients with AIOD. A further advantage of MIAS over laparoscopic procedures was that it could be easily carried out, given the technical skills possessed by any competent vascular surgeon.

Source of funding
None given.

Bibliographic details

PubMedID
11436074

DOI
10.1067/mva.2001.115809

Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Aortic Aneurysm, Abdominal /surgery; Aortic Diseases /surgery; Arterial Occlusive Diseases /surgery; Female; Humans; Iliac Artery; Length of Stay; Male; Middle Aged; Minimally Invasive Surgical Procedures; Prospective Studies; Vascular Surgical Procedures

AccessionNumber
22001001443