Financial impact of endoscopic vein harvest for infrainguinal bypass
Ilig K A, Rhodes J M, Sternbach Y, Green R M

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 endoscopic saphenous vein harvest (ENDO) for lower extremity bypass.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients undergoing saphenous vein harvest for lower extremity bypass.

Setting
The setting was a teaching hospital. The economic study was conducted in the USA.

Dates to which data relate
The effectiveness and resource use data were gathered from March 1999 to December 2001. The price year was 2001.

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

Link between effectiveness and cost data
The costing was conducted retrospectively on a sub-sample of patients used in the effectiveness analysis.

Study sample
Power calculations were not reported. All patients who underwent harvest of the greater saphenous vein for infrainguinal bypass during the study period were considered for the study. There were 99 patients (108 limbs) in the ENDO group and 128 patients (134 limbs) in the OPEN group. The mean age was 68.9 (+/- 16.2) years in the OPEN group and 68.5 (+/- 13.9) years in the ENDO group. The proportions of male patients were 69% (OPEN) and 61% (ENDO), respectively. During sample selection, 2 patients in the ENDO group were converted to OPEN surgery because of equipment failure or contamination before the start of the operation. Five additional patients (2 ENDO and 3 OPEN) were found to have unsuitable veins. These patients were not included in the study sample.

Study design
This was a retrospective cohort study that was conducted at two teaching hospitals. The decision of which technique to
use was based on surgeons' preferences only. Vein size or patient factors (with the exception of a few patients in the early period who were excluded due to equipment failure or unsuitable vein) did not affect the choice of the procedure. The length of follow-up was 30 days postoperative. No patient appears to have been lost to follow-up.

**Analysis of effectiveness**

The analysis of effectiveness was conducted on all patients included in the initial study sample. The outcome measures used were:

- the rate of wound complications (Types I, II, III; haematoma, and seroma),
- the postoperative length of stay (LOS),
- the postoperative ankle-brachial index (ABI),
- the overall 30-day primary patency rate,
- the rate of patients who were re-explored acutely,
- the rate of readmission within 30 days, and
- primary patency and limb salvage rates.

The study groups were comparable at baseline in terms of demographics, risk factors, preoperative characteristics, and operative details. However, 18% of OPEN patients underwent in situ bypass versus none in the ENDO group, (p<0.005).

**Effectiveness results**

The overall rate of wound complications was 34.1% in the OPEN group and 20.4% in the ENDO group, (p<0.02).

- The rate of Type I wound complications was 13.5% (OPEN) versus 11.2% (ENDO), (p non significant).
- The rate of Type II wound complications was 15.9% (OPEN) versus 6.5% (ENDO), (p<0.03).
- The rate of Type III wound complications was 4.8% (OPEN) versus 2.8% (ENDO), (p non significant).
- The rate of haematoma was 8.7% (OPEN) versus 6.5% (ENDO), (p non significant).
- The rate of seroma was 10.9% (OPEN) versus 6.4% (ENDO), (p non significant).

The mean postoperative LOS was 10.1 (+/- 12.3) days (median 7; mode 7) in the OPEN group and 8.3 (+/- 7.8) days (median 6; mode 3) in the ENDO group, (p<0.03).

The postoperative ABI was 0.90 (+/- 0.20) in the OPEN group versus 0.94 (+/- 0.16) in the ENDO group, (p non significant).

The overall 30-day primary patency rate was 91% in the OPEN group versus 92% in the ENDO group, (p non significant).

The rate of patients who were re-explored acutely was 0% in the OPEN group versus 2.8% in the ENDO group, (p non significant).

The rate of readmission within 30 days was 11.4% in the OPEN group versus 4.1% in the ENDO group.

Primary patency and limb salvage rates were not significantly different in the two groups.
Clinical conclusions
The effectiveness analysis showed that the two procedures were quite comparable for most outcome measures. However, shorter hospital stay and fewer wound complications were observed in the ENDO patients.

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

Direct costs
Discounting was not relevant since the costs were incurred during a short time. The unit costs were not presented separately from the quantities of resources used. The health services included in the cost analysis were categorised according to operating room, intensive care unit (ICU), non-ICU, laboratory, pharmacy, imaging, hospital stay, and other costs. Fixed costs and nursing staff salaries were considered in the analysis. The cost/resource boundary of the hospital appears to have been used. The resource use data were obtained from a sub-sample of patients included in the effectiveness analysis. Patients undergoing concomitant procedures were excluded since the objective of the study was to focus on the bypass costs. Only patients admitted at one of the study hospitals (the Strong Memorial Hospital) were included in the analysis. This left a sample of 84 patients (49 in the OPEN group and 35 in the ENDO group). The costs were derived from the financial office of the authors' hospital.

The actual costs of the procedures were estimated in the main analysis, while in a secondary analysis, the total costs were calculated with two additional factors. More specifically, the theoretic extra cost of ENDO harvest, assuming all other factors during operation were held constant, and the costs of readmission for wound complications. All the costs were converted into 2001 values using the medical Consumer Price Index correction factor.

Statistical analysis of costs
Statistical analyses were conducted to test the statistical significance of differences in the estimated costs.

Indirect Costs
The indirect costs were not considered.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not conducted.

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

Cost results
The total costs per patient were $7,456 (+/- 3,186) in the OPEN group and $6,203 (+/- 3,326) in the ENDO group, (p<0.02).

The greatest savings were observed for non-ICU and imaging costs.

The hypothetical inpatient costs, based on readmission rates and actual cost of index operation, were $9,404 with OPEN and $7,231 with ENDO.
Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant since a cost-consequences analysis was conducted.

Authors' conclusions
Endoscopic saphenous vein harvest (ENDO) for lower extremity bypass led to a reduction in the wound complication rate and costs, mainly due to reduced inpatient stay, in comparison with traditional open surgery.

CRD COMMENTARY - Selection of comparators
The choice of the comparator was appropriate as it reflected the traditional approach use for patients undergoing harvest of the greater saphenous vein for infrainguinal bypass. You should decide whether this is a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The analysis of effectiveness was based on a cohort study, which was conducted retrospectively. The patients' charts were retrospectively reviewed to identify eligible patients. The retrospective nature of the study limited the validity of the analysis, and no justification for the choice of sample size was provided. In fact, power calculations were not reported. The study groups were fairly comparable at baseline, which reduced the potential impact of confounding factors. The analysis considered all patients initially included in the study sample since no loss to follow-up was observed. The study sample appears to have been representative of the study population. The analysis had a short-term time horizon. The choice of the surgical approach was based on surgeons' preferences rather than on a random process. The authors noted that some bias could have been introduced, owing to the lack of randomisation and masking. In fact, surgeon preference could have affected the results of the study. These issues tend to limit the internal validity of the analysis.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted.

Validity of estimate of costs
The perspective of the study was not explicitly stated, although it appears to have been that of the hospital. A breakdown of the cost items was provided, although information on the unit costs and quantities of resources used was not presented. This limits the possibility of replicating the study. Statistical tests were conducted, but the authors acknowledged the limited power of the economic analysis due to the small sample size. The cost estimates were specific to the study setting and no sensitivity analyses were conducted. The price year was reported, which makes reflation exercises in other settings easy.

Other issues
The authors reported the findings of other studies that stressed the advantages of ENDO over OPEN techniques. However, it was noted that very few studies estimated the long-term impact of ENDO. The issue of the generalisability of the study to other settings was not addressed and no sensitivity analyses were conducted. This reduced the external validity of the analysis. The authors noted some drawbacks of their study. The analysis referred to patients undergoing saphenous vein harvest for lower extremity bypass and this was reflected in the authors' conclusions.

Implications of the study
The authors noted that a prospective randomised trial should be conducted to corroborate their findings and to overcome the limitations of the current analysis.
Source of funding
None stated.

Bibliographic details

PubMedID
12563202

DOI
10.1067/mva.2003.2

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Aged, 80 and over; Blood Vessel Prosthesis Implantation /adverse effects /economics; Endoscopy /adverse effects /economics; Female; Humans; Inguinal Canal /blood supply /surgery; Leg /blood supply /surgery; Length of Stay /economics; Male; Middle Aged; Peripheral Vascular Diseases /economics /surgery; Postoperative Complications; Saphenous Vein /transplantation; Severity of Illness Index; Tissue and Organ Harvesting /adverse effects /economics

AccessionNumber
22003000363

Date bibliographic record published
28/02/2005

Date abstract record published
28/02/2005