Cost-effectiveness of laparoscopic cholecystectomy

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
Laparoscopic and open cholecystectomies.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients who underwent open or laparoscopic cholecystectomy. The mean age for all open patients was 49.1 years compared with 46.1 years for laparoscopic patients. Approximately 77% of patients involved in the study were female.

Setting
Hospital. The economic study was carried out in Dayton, Ohio, USA.

Dates to which data relate
The effectiveness data for open cholecystectomy patients were collected in 1989, whilst the data for laparoscopic cholecystectomy patients were collected in 1990. Resource data were collected during the period 1989 to 1990 from operative reports. Prices used were not explicitly stated but the study implies that 1989 prices were used for open cholecystectomy patients and 1990 prices for laparoscopic cholecystectomy patients.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that used for the effectiveness data.

Study sample
All 211 patients who underwent open cholecystectomy in 1989 were compared with all 254 patients who underwent laparoscopic cholecystectomy in 1990. Power calculations were not used to determine sample size. 8 patients (3.15%) were excluded from the laparoscopic group due to conversion to open cholecystectomy. Patients having cholecystectomy incidental to another procedure, and those having common bile duct explorations were also excluded. The groups were further subdivided into elective and emergent groups. There were 136 and 75 patients respectively in the open elective and emergent groups. This compared with 207 and 39 patients in the laparoscopic elective and emergent groups. Only 50 patients from each elective group were randomly selected to monitor the length of time to
full recovery.

**Study design**
This was a retrospective cohort study with historical controls carried out in a single centre. Only 100 patients were followed up until full recovery (23%). The duration of the study was up to the point at which full recovery had been achieved.

**Analysis of effectiveness**
The principle (intention to treat or treatment completers only) used in the analysis of the clinical study was not stated. The primary health outcomes were the number of days spent in hospital and duration of time before returning to "full preoperative activities" (full recovery). The rate of "successfully completed" operations with the laparoscopic procedure was also reported.

**Effectiveness results**
The study found a shorter length of hospital stay for the laparoscopic group compared with the open group (2.29 days versus 5.63 days; p<0.05). The study also found that the duration of time to full recovery was shorter for patients who had undergone elective laparoscopic cholecystectomy compared with elective open cholecystectomy. (8 days versus 29 days; p<0.05).

**Clinical conclusions**
Laparoscopic surgery, because of its shorter hospital stay and recovery time, allows patients an earlier return to full preoperative activities.

**Measure of benefits used in the economic analysis**
The benefit measure was days of hospital stay avoided and days of rehabilitation avoided. Duration of hospital stay and recovery time were used as surrogate measures of health status.

**Direct costs**
The length of hospital stay was reported separately from hospital charges. The costs of cholecystectomy were measured using hospital charges. Specifically these included surgeons' standard charges for operative procedures and hospital charges, which were obtained for each patient from the hospital billing office. Data on anaesthesiologist's fees were obtained from the anaesthesia department. Patient records were used to determine admission and discharge dates and postoperative complications. Price data refer to the years 1989 and 1990.

**Statistical analysis of costs**
Analysis of variance and chi square at 5% significance level.

**Currency**
US dollars ($).

**Sensitivity analysis**
Not stated.

**Estimated benefits used in the economic analysis**
For emergent surgery, patients were spared 2.34 days in hospital using laparoscopic surgery. The corresponding figure
for elective surgery was 2.71 days. The duration of required recovery time was reduced by 21 days using laparoscopic surgery.

Cost results
The total average costs for open cholecystectomy per patient were $6,695.67, with elective surgery averaging $5,739.83 per patient and emergent surgery $8,326.24 per patient. For laparoscopic cholecystectomy the overall costs were $6,993.31 per patient, the average costs for elective laparoscopic surgery being $6,741.40 per patient and for emergent laparoscopic surgery $8,365.79 per patient. The costs were significantly higher for laparoscopic surgery (p<0.05). Costs were measured up to the point of hospital discharge.

Synthesis of costs and benefits
Costs and benefits were not combined.

Authors' conclusions
Although laparoscopic cholecystectomy is associated with increased total charges when compared to open cholecystectomy in (the authors') early experience with the procedure, it is associated with a greatly reduced recovery time. This factor should be considered when evaluating its cost-effectiveness. In addition, further experience with laparoscopic cholecystectomy and refinements in management of patients undergoing laparoscopic cholecystectomy should improve its cost-effectiveness.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator, open cholecystectomy, was clear.

Validity of estimate of measure of benefit
The measure of effectiveness used was intermediate in nature and the validity of the results may have been compromised by the type of clinical study from which the estimate was derived (a retrospective study). Furthermore, the principle used in analysing the data was not clear.

Validity of estimate of costs
The economic analysis excluded the cost savings to the patient of reduced convalescence, thus making the intervention (laparoscopy) appear less attractive from an economic point of view. The date of the prices used was not clearly stated, and charges, as opposed to costs, were used to value resource utilisation. The uncertainty in the data was addressed using statistical tests of between-group differences in costs and benefits, although a degree of uncertainty remains, given the lack of experience with the new procedure (laparoscopic cholecystectomy), which may result in reduced costs for its future performance due to a natural learning process.

Implications of the study
A well designed study is required which values the cost savings associated with laparoscopic surgery on patients due to a quicker return to full activity after surgery.

Source of funding
None stated.

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