Cost-effectiveness of laparoscopic and mini-cholecystectomy in a prospective randomized trial

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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 (LC) and mini-cholecystectomy (MC) in the treatment of symptomatic cholelithiasis.

Type of intervention

Economic study type
Cost-effectiveness analysis.

Study population
Patients aged 16 to 85 years who presented for elective cholecystectomy and experienced at least one episode of right upper quadrant or epigastric pain, with ultrasound proven cholelithiasis.

Setting
The practice setting was a hospital. The economic study was carried out at McGill and Toronto Universities, Canada.

Dates to which data relate
Effectiveness and resource use data were collected from September 1990 to September 1991. The prices used were expressed in 1992 dollars.

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

Link between effectiveness and cost data
The cost analysis was based on the patients in the trial, who were recruited at McGill University. Resource use data were recorded both prospectively in the trial and retrospectively from review of hospital charts.

Study sample
Of the 70 patients randomised to the two groups, 37 subsequently underwent LC and 25 MC. Patients were excluded from the trial if they were unfit for general anaesthesia, had previously undergone upper abdominal surgery, had a suspected common bile duct stone, or were lithotripsy candidates. There was no mention of whether power calculations determined the sample size. Informed consent was given by all patients prior to randomization.

Study design
This study was a randomised controlled trial. The study was multi-centred with patients being recruited from two university hospitals. Patients were followed-up for the first eighteen months after hospital discharge. All patients received single dose antibiotic prophylaxis at the time of anaesthesia.

**Analysis of effectiveness**

The analysis of the clinical study was based on intention to treat. The major outcomes were the length of hospital stay and the time of full convalescence. The former counted from the day of admission (day prior to surgery) to the day of discharge from hospital. The latter was measured from the first post-operative day to the day preceding return to full usual activities. Outcome data were collected by nurses who were not directly involved in the care of the patients.

**Effectiveness results**

The median duration of hospital stay was shorter after LC (2 days versus 3 days for MC) as was the mean duration of convalescence: 11.9 (+/- 9.1) days versus 20.2 (+/- 16.5) days for MC, (p=0.03). One LC patient (2.7%) required conversion to MC and another (2.7%) developed a post-operative ileus requiring prolonged hospital stay. In the MC group, there was 1 wound infection (4%) requiring prolonged wound packing at home and 1 bile leak (4%) requiring re-admission to hospital.

**Clinical conclusions**

LC patients were found to require less post-operative analgesia, and their improvements in post-operative quality of life were achieved more quickly than MC patients.

**Measure of benefits used in the economic analysis**

The benefit measures were reduced length of hospital stay and time to full convalescence.

**Direct costs**

Quantities and costs were analysed separately. Resource use data were recorded from a review of hospital charts. The cost of the technical component of each test was estimated from data provided by the Management Information Systems Group, Canada. The costs of the medical test and medical visits were obtained from the Quebec Health Insurance Bureau sources. Hospital costs were obtained from the financial records of the Royal Victoria Hospital. Costs of the pre-operative phase, the hospital phase and the follow-up phase were measured. The capital cost were amortised over a 7-year period and factored over at least 50 patients per year. All costs were expressed in 1992 Canadian dollars.

**Statistical analysis of costs**

The authors treated some of the quantities of resource use in a stochastic way by expressing continuous variables as mean +/-standard deviation and, where appropriate, by presenting median figures. A Cox’s proportional hazards model was used to evaluate between-group differences for the time to full convalescence.

**Currency**

Canadian dollars (Can$).

**Sensitivity analysis**

Sensitivity analysis in the form of a best-worst case scenario for costs was performed. Also, the individual effects of some clinical factors on the economic results were explored.

**Estimated benefits used in the economic analysis**

The median duration of hospital stay was significantly shorter after LC (2 days versus 3 days for MC). The mean
duration of convalescence was 11.9 (+/- 9.1) days for LC versus 20.2 (+/- 16.5) days for MC. LC patients were found to require less post-operative analgesia and their improvements in post-operative quality of life were achieved more quickly than MC patients.

Cost results
Overall total costs amounted to Can$2,476.17 for LC and Can$2,844.31 for MC. The cost of treatment by LC ranged from Can$1,704 to Can$5,830 and for MC, the range was Can$2,133 to Can$6,331. An example was given showing that, if complications costing Can$20,000 occurred with a frequency of 0.5%, this would add Can$100 per patient to the total cost of a given approach. Similarly, if the rate of conversion to open cholecystectomy were 5% instead of 2.7%, it would increase the cost of the LC approach by Can$30.

Synthesis of costs and benefits
Since the LC strategy was dominant, costs and benefits were not combined.

Authors’ conclusions
In the context of a Canadian health care system, LC has been found to be cheaper than MC by almost 200 US dollars per patient, LC has moreover been associated with improvements in the rate of post-operative convalescence, thus confirming the overall superiority of the laparoscopic approach.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparators is clear.

Validity of estimate of measure of effectiveness
The study design, sample representation and trial methodology seemed to be sound.

Other issues
Sensitivity analysis could have explored the generalisability of results to other settings and countries in more detail. A well conducted study.

Implications of the study
The study provides valuable evidence on the economic superiority of Laparoscopic cholecystectomy relative to mini-cholecystectomy.

Source of funding
None stated.

Bibliographic details

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Cholecystectomy /methods /economics; Cholecystectomy, Laparoscopic /economics; Comparative Study; Convalescence /economics; Cost-Benefit Analysis; Costs and Cost Analysis; Hospital Costs; Humans; Length of Stay /economics; National Health Programs /economics; Ontario; Quebec; Single-Payer System

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