Comparison of open and laparoscopic treatment of acute appendicitis

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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
The study compared open and laparoscopic appendectomy for the treatment of acute appendicitis.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients undergoing surgical treatment with a preoperative diagnosis of acute appendicitis. Patients undergoing incidental appendectomy as part of another operative procedure were excluded.

Setting
The setting was secondary care. The economic analysis was carried out at the Mount Sinai Medical Center, New York, USA.

Dates to which data relate
Patient records between 1994 and 1998 were reviewed. The price year was not reported.

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

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

Study sample
No power calculations to determine the sample size were reported and no specific sample size was planned. All records of patients undergoing appendectomy at the Mount Sinai Hospital between 1994 and 1998 were reviewed. A total of 758 patients undergoing appendectomy during the 5-year period were included in the study, of which 271 (36%) underwent open appendectomy and 487 (64%) underwent laparoscopic appendectomy. The mean age of all the patients included in the study was 32 years. There were 345 (46%) female patients and 413 (54%) male patients.

Study design
The study was a retrospective cohort study that was carried out at the Mount Sinai Hospital in New York. The duration
of follow-up of the groups was not reported. There was no loss to follow-up as this was a retrospective study.

**Analysis of effectiveness**

All the patients included in the study were accounted for in the analysis. The outcomes used were the number of postoperative days in hospital, the number of deaths and the number of readmissions. Reoperations and readmissions were obtained from an analysis of computerised hospital records. The groups were shown not to be comparable at analysis. Children under the age of 15 were more likely to have an open appendectomy whereas adults had more laparoscopic operations (27% versus 72%; p<0.01). Female patients had a significantly higher rate of laparoscopic operations than male patients (71% versus 57%; p<0.01). Further, patients with a normal appendix had the highest rate of laparoscopic appendectomy (74%), whereas patients with gangrenous appendicitis were more likely to have an open appendectomy than those with suppurative appendicitis (43% versus 35%). These differences were found to be statistically significant.

**Effectiveness results**

The mean postoperative length of stay (LOS) was 3.75 days. There was a significant decline in the postoperative LOS during the study from 5.58 to 2.81 days. A decline was present for both the open and laparoscopic groups. Overall, laparoscopic cases had a shorter LOS than open cases (2.7 versus 5.7 days; p<0.01). During the study, there was only a minimal decline in the mean LOS for laparoscopic cases (from 3.0 to 2.5 days), whereas the mean LOS for open cases declined more drastically (from 6.6 to 3.8 days). Hence, at the end of the study, the LOS for open cases approached that of laparoscopic cases, with a modest improvement of one day in the LOS when using laparoscopic appendectomy.

In the entire study, there was only one death and two readmissions for pelvic collections requiring drainage. However, the authors did not report the group to which these patients belonged.

**Clinical conclusions**

In conclusion, the authors reported that any differences in outcomes between open and laparoscopic appendectomy were minor.

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

No summary measure of benefit was derived. The study was, in effect, a cost-consequences analysis.

**Direct costs**

The resource quantities and the costs were not reported separately. The direct costs included in the analysis were those of the hospital. However, the only costs that appear to have been included in the study were the costs of disposable laparoscopic equipment. The costs appear to have been obtained from the authors' setting. As all costs were incurred during a short time, discounting was not relevant and was not performed. The study reported the incremental costs. The dates of the price data were not reported. The authors explicitly reported that only the cost of laparoscopic equipment, and not the operating room and staff, were included in the analysis.

**Statistical analysis of costs**

The authors reported the average incremental costs and the incremental cost ranges.

**Indirect Costs**

The indirect costs were not included in the study.

**Currency**

US dollars ($).
Sensitivity analysis
No sensitivity analysis was performed.

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

Cost results
The incremental cost of disposable laparoscopic equipment for appendectomy was $1,152 (range: 852 - 2,582).

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

Authors’ conclusions
Any differences in outcomes between open and laparoscopic appendectomy were minor. The authors also concluded that savings from the slightly shorter hospital stay after laparoscopic appendectomy were offset by the higher surgical cost of the laparoscopic equipment.

CRD COMMENTARY - Selection of comparators
Open appendectomy was used as the comparator because it represented current practice alongside laparoscopy in the authors' setting. You should decide if the comparator represents current practice in your own setting.

Validity of estimate of measure of effectiveness
The study was a retrospective cohort study. This was appropriate for the study question, as it allowed easy and quick comparison of the effects of using laparoscopic appendectomy over open techniques. The study sample appears to have been representative of the study population. However, the patient groups were not shown to be comparable at analysis in terms of age and gender. More importantly, the highest rate of open appendectomy was performed in patients with a gangrenous appendicitis. The authors pointed out that these patients were more likely to require extended stay, regardless of the surgical technique used, as these patients were more ill and also more likely to be either young children or older adults. Even though there would have been no difference in mortality rates or readmissions between the two groups, as there were only one death and two readmissions, it would have been useful if the authors had reported the group these patients belonged to. Differences in the mean LOS in hospital for the two groups were appropriately tested using statistical techniques. Further, the authors also reported the mean difference in LOS for each of the 5 years of the study. By the last year, the difference in LOS between both groups was much lower than that for the entire study period because of a downward trend in LOS in the open appendectomy group.

Validity of estimate of measure of benefit
The authors did not derive a measure of health benefit. The analysis was, in effect, a cost-consequences analysis.

Validity of estimate of costs
If the perspective adopted in the economic analysis was indeed that of the hospital, all the categories of cost were included in the analysis. However, important cost omissions were made. The authors did not include the staff salary spent during operation, nor the costs of inpatient hospitalisation. These omissions would favour open appendectomy, as mean LOS and operation time were lower than for laparoscopic appendectomy. The costs and the quantities were not reported separately, which will hamper the generalisability of the authors' results. The unit costs appear to have been derived from the authors' setting. The authors conducted neither statistical or sensitivity analyses to test for uncertainty or variability in the cost data. Discounting was unnecessary since all the costs were incurred during a short time. The
prices year was not reported, which will hamper any potential inflation exercises.

**Other issues**
The authors made appropriate comparisons of their findings with those from another study that also found that cost-differences between the two groups were minor. The issue of generalisability to other settings was not addressed. The authors do not appear to have presented their results selectively and their conclusions reflected the scope of the analysis. The authors reported no limitations to their study.

**Implications of the study**
From the results and conclusions of the present study, it would appear that there is no difference in terms of outcomes or costs in using open or laparoscopic appendectomy.

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None stated.

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**Other publications of related interest**


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