Cost-effectiveness of extraperitoneal laparoscopic inguinal hernia repair: a randomized comparison with conventional herniorrhaphy

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 repair versus conventional anterior herniorrhaphy for inguinal hernia.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with a unilateral primary or first recurrent inguinal hernia.

Setting
The setting was six hospitals in the western and central part of the Netherlands.

Dates to which data relate
The effectiveness data were from patients enrolled in the trial between January 1994 and July 1995. Resource use data were collected during the period August 1994 to July 1995. The price year was 1993.

Source of effectiveness data
The evidence for effectiveness was based on a single randomised controlled trial.

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

Study sample
Out of a group of 1,051 patients, 273 patients were randomised between the laparoscopic group (134 patients) and the open group (139 patients). The mean age was 55 years in both groups. The laparoscopic group was made up of 131 male and 8 female patients compared to 128 male and 6 female patients in the open group. To detect a 30% improvement of return to work as statistically significant (power of 90% and p<0.05), a sample size of 100 patients in each group was needed.

Study design
The study was a multi-centre randomised controlled trial which took place in six hospitals. Patients were followed up for a total of 6 weeks after surgery. No details were reported about the subject allocation method or the blinding method for assessing outcomes. No patients were lost to follow-up. However, quality of life data could only be obtained for 130 patients in the conventional group (93.5%) and 128 in the laparoscopic group (95.5%).

**Analysis of effectiveness**
The analysis was based on the intention to treat principle. The primary health outcomes included the number of procedures with general anaesthesia, operative time in minutes, the number of days before patients returned to work, the need for housekeeping, recurrence rate and the quality of life at 1 and 6 weeks after surgery (measured using the Short Form 36 questionnaire adjusted and validated for the Netherlands). Overall, baseline characteristics were comparable. These characteristics included age, sex, height, weight, number of patients with paid work, 9 dimensions of quality of life, potential risk factors and physical condition.

**Effectiveness results**
Statistically significant differences were found in the number of procedures with general anaesthesia, operative time in minutes and the number of days before patients returned to work. Patients undergoing conventional herniorrhaphy required more help for housekeeping. Recurrence rate in the laparoscopic group was 3.5% compared to 6.1% in the conventional group. This implies that 1 recurrence is averted for every 38 patients undergoing laparoscopic hernia repair instead of conventional repair. Quality of life for the laparoscopic group was better at both 1 and 6 weeks after surgery. The most striking differences were seen for the following dimensions: physical functioning (1 week: p<0.00005; 6 weeks: p=0.0003), physical role function (1 week: p<0.00005; 6 weeks: p=0.005), bodily pain (1 week: p<0.00005; 6 weeks: p=0.002) and social functioning (1 week: p<0.00005; 6 weeks: p=0.01).

**Clinical conclusions**
A better quality of life in the recovery period and a lower recurrence rate result in laparoscopic repair becoming the more effective procedure.

**Measure of benefits used in the economic analysis**
The measures of benefit were the recurrence rate and the number of recurrences averted.

**Direct costs**
Direct costs included costs of preoperative screening, anaesthesia, operating room, medical personnel during operation, sterilisation and maintenance and hospitalisation. Costs were discounted at 3% and 5% (reciprocal interest rate). Quantities and costs were reported separately. The quantity/cost boundaries adopted were those of the hospital and society. The estimation of costs and quantities was based on actual data. Detailed standardised cost calculations were made by two economists. In-hospital costs were provided by the administration of each hospital. Average retail prices for medication in the Netherlands were used. The quantity of resources was measured and quoted. The price data was 1993.

**Statistical analysis of costs**
For normally distributed continuous data, Student's t-tests were used to detect statistically significant differences between the groups. If appropriate, a Mann-Whitney U test was used. All p-values were two-tailed. A p-value <0.05 was considered statistically significant.

**Indirect Costs**
Indirect costs were based on costs to the health service and society, incurred following surgery, including visits to the family GP, outpatient visits and help with housekeeping. Costs for time off work were calculated by means of the friction cost method. Costs incurred for primary medical care were based on previous studies in the Netherlands.

**Currency**
Dutch guilders (Dfl).

**Sensitivity analysis**
Multiple sensitivity analyses were performed. Variables were considered if the costs were appreciable and a change in the costs of the variable could be possible and clinically relevant. A sensitivity analysis was carried out on three variables: laparoscopic disposable equipment, return to work after laparoscopy by the friction cost method and the recurrence rate five years after surgery.

**Estimated benefits used in the economic analysis**
The recurrence rate in the laparoscopic group was 3.5% compared to 6.1% in the conventional group. This implies that 1 recurrence is averted for every 38 patients undergoing laparoscopic hernia repair instead of conventional repair.

**Cost results**
Average total hospital costs were Dfl 1,385 for the conventional group and Dfl 2,417 for the laparoscopic group. From a societal perspective, the laparoscopically operated patient (Dfl 4,916) cost on average Dfl 251.5 more than the patient who underwent conventional hernia repair (Dfl 4,665). The analysis of the costs of the disposable kit shows that a 37.2% reduction in costs would have resulted in a break-even point for total societal costs. Employed laparoscopic patients should have returned to work 2 days sooner in order to fully compensate hospital costs. Finally, 14.5 and 15.9 laparoscopic repairs must avert 1 recurrence for equal average total costs of both alternatives (at discount rates of 5% and 3% respectively).

**Synthesis of costs and benefits**
Costs and benefit measure were combined in a cost-effectiveness ratio of Dfl 9,557.58 per averted recurrence, seen from a societal point of view.

**Authors’ conclusions**
Given a larger difference between recurrence rates and less expensive laparoscopic equipment, either by economy of scale or the use of reusable equipment, laparoscopic hernia repair may become dominantly superior in terms of both effectiveness and costs.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear.

**Validity of estimate of measure of benefit**
The measure of benefit seems to be valid because it is the most relevant outcome of inguinal hernia repair. A follow-up period of 6 weeks after surgery may be too short since recurrences after laparoscopic repair may occur until up to one year after surgery. If a longer time perspective is adopted, quality adjusted life years could be calculated. A more detailed report on the number of procedures with general anaesthesia, operative time in minutes, the number of days before patients returned to work, and the need for housekeeping could have been provided. Some confidence intervals and p-values were missing.

**Validity of estimate of costs**
The estimation of costs was conducted in a valid and appropriate way. All relevant costs in and out of hospital seem to
have been included. The detailed report of cost figures made it possible to distinguish between a hospital and a societal perspective. However, resources used prior to randomisation were not taken into account.

**Other issues**
This trial was well conducted in terms of study design and analysis. The detailed reporting of the results enabled assessment of their robustness and generalisability. The only flaw in the study was the short time perspective adopted.

**Implications of the study**
The possibility of replacing parts of the disposable kit with reusable instruments may make laparoscopic hernia repair both less costly and more effective.

**Source of funding**
None stated.

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**Other publications of related interest**


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