Laparoscopic versus open partial nephrectomy

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 laparoscopic partial nephrectomy (LPN) and open partial nephrectomy (OPN) for the treatment of small renal tumours. A detailed description of both surgical approaches was given.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with small renal masses who were undergoing partial nephrectomy. Only lesions that were 4 cm or less in size were considered.

Setting
The setting was a hospital. The economic study was carried out in Canada.

Dates to which data relate
The effectiveness and resource use data were gathered from September 2000 to September 2003 for LPN, and from November 1999 to September 2003 for OPN. The price year was not reported.

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

Link between effectiveness and cost data
The costing was carried out retrospectively on a sub-group of the patients who were involved in the effectiveness study.

Study sample
Power calculations were not reported. A sample of 28 consecutive patients who had undergone LPN was initially identified, but one patient was excluded for surgical reasons. A group of 27 patients was initially considered in the OPN group, but after applying the inclusion criteria 5 patients were excluded. Thus, the final study sample comprised 27 LPN patients (16 men) and 22 OPN patients (14 men). The mean age of the patients was 53.5 (+/- 17.7) in the LPN group 51.1 (+/- 16.4) years in the OPN group.

Study design
This was a retrospective, comparative study with historical controls. The patients were followed at two centres, the London Health Science Centre in London, Ontario (both LPN and OPN patients) and the St. Joseph's Hospital in Hamilton, Ontario (only LPN patients). The length of follow-up was unclear. No patient was lost to the follow-up assessment.

Analysis of effectiveness
All of the patients included in the initial study sample were accounted for in the analysis. The outcome measures used were:

- the operating time,
- the proportion of patients requiring a vascular clamp,
- ischaemic time,
- blood loss,
- morphine equivalents (MSO4),
- drain output,
- hospital stay,
- serum creatinine (pre- and postoperative), and
- the frequency of complications.

At baseline the study groups were comparable in terms of the demographics and clinical characteristics. However, a trend in performing ‘elective’ nephron sparing more frequently in the LPN versus OPN group was observed.

Effectiveness results
The operating time was 210 (+/- 76) minutes in the LPN group and 144 (+/- 24) minutes in the OPN group, (p<0.001).

The proportion of patients requiring a clamp was 22% (LPN group) versus 18% (OPN group), (p non significant).

The ischaemic time was 41 (+/- 15) minutes (LPN group) versus 28 (+/- 12) minutes (OPN group), (p non significant).

The blood loss was 250 (+/- 250) mL (LPN group) versus 334 (+/- 343) mL (OPN group), (p non significant).

MSO4 use was 43 (+/- 62) mg (LPN group) versus 187 (+/- 71) mg (OPN group), (p<0.001).

The drain output for the entire hospital stay was 324 (+/- 397) mL (LPN group) versus 169 (+/- 147) mL (OPN group), (p non significant).

The hospital stay was 2.9 (+/- 1.5) days (LPN group) versus 6.4 (+/- 1.8) days (OPN group), (p<0.0002).

The pre- and postoperative serum creatinine levels were 1.1 (+/- 0.6) and 1.1 (+/- 0.4) mg/dL, respectively, in the LPN group (change 0.1 +/- 0.2 mg/dL) versus 1.1 (+/- 0.6) and 1.1 (+/- 0.4) mg/dL in the OPN group (change 0.1 +/- 0.2 mg/dL), (all differences were non significant).

The frequency of complications was 11% (LPN group) versus 14% (OPN group), (p non significant).

Clinical conclusions
The effectiveness analysis showed that OPN and LPN were, in general, equivalent for several outcome measures. While
operating time was shorter with OPN, fewer morphine equivalents were used with LPN and the length of stay was shorter.

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

**Direct costs**
Discounting was not relevant since the costs were incurred during a short timeframe. The unit costs were not presented separately from the quantities of resources used. The health services included in the economic evaluation were operating room and postoperative management (which included good services, pharmacy, ward, nursing care, recovery room, radiology, and laboratory services). The surgeon's or anaesthesiologist's fees were not considered. The cost/resource boundary of the study appears to have been that of the hospital. The costs were estimated from the London Health Science Centre. Resource use was based on a sub-group of patients included in the effectiveness study. The price year was not reported.

**Statistical analysis of costs**
The costs were presented as the mean +/- standard deviation. Statistical tests were used to examine the statistical significance of differences in the costs.

**Indirect Costs**
The indirect costs were not considered in the economic evaluation.

**Currency**
Canadian dollars (Can$).

**Sensitivity analysis**
Sensitivity analyses were not performed.

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

**Cost results**
The operating room costs were Can$1,848 (+/- 516) in the LPN group and Can$1,488 (+/- 295) in the OPN group, (p<0.05).

The postoperative costs were Can$2,991 (+/- 1,539) in the LPN group and Can$4,809 (+/- 3,019) in the OPN group, (p<0.01).

The total costs were Can$4,839 (+/- 1,551) in the LPN group and Can$6,297 (+/- 2,972) in the OPN group, (p<0.05).

**Synthesis of costs and benefits**
A synthesis of the costs and benefits was not relevant since a cost-consequences analysis was undertaken.

**Authors' conclusions**
The use of laparoscopic partial nephrectomy (LPN) for the treatment of small renal masses was feasible and comparable to open partial nephrectomy (OPN) for several outcome measures. However, LPN had some advantages over OPN, such as a shorter hospital stay, lower costs and reduced use of narcotics.

**CRD COMMENTARY - Selection of comparators**
The authors justified their choice of the comparators. In particular, OPN represented the standard approach for the treatment of small renal tumours, while LPN was a more recent and less invasive surgical technique. You should decide whether they are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**
The effectiveness evidence came from a retrospective study where two cohorts of patients were compared. The baseline characteristics of the groups were comparable, thus the two cohorts were well matched, as the authors stressed. However, the retrospective design and the lack of randomisation could have introduced some bias and confounding factors. The use of a prospective randomised study would have been more appropriate for the study question. Moreover, no justification for the size of the sample was provided, which represents a further limitation to the validity of the analysis. The evidence came from two centres. In general, consecutive patients were included in the study and the study sample could have been representative of the patient population.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

**Validity of estimate of costs**
The perspective adopted in the study was not explicitly stated, although it appears to have been that of the hospital. The costs were presented as macro-categories and a detailed breakdown of items was not given. The unit costs, quantities of resources used and the price year were not provided. This limits the possibility of replicating and reflating the results of the analysis in other settings. The costs were specific to the study setting and sensitivity analyses were not carried out.

**Other issues**
The authors stated that a limited number of reports on the feasibility and efficacy of LPN had been published. In general, similar results were obtained and the authors provided a justification for the differences observed in comparison with the findings of one study.

**Implications of the study**
The authors highlighted that their conclusions had important administrative implications at their centre and could influence other centres that were planning to switch to resource-intensive and time-consuming advanced minimally invasive procedures such as LPN. However, it was noted that until long-term LPN data become available, OPN should remain the treatment of choice for small renal masses.

**Source of funding**
None stated.

**Bibliographic details**
Other publications of related interest


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Subject indexing assigned by NLM

MeSH
Adult; Aged; Cohort Studies; Feasibility Studies; Female; Hospital Costs; Humans; Kidney Neoplasms /surgery /ultrasonography; Laparoscopy /economics /methods /statistics & numerical data; Male; Middle Aged; Nephrectomy /economics /methods /statistics & numerical data; Ontario; Retrospective Studies; Treatment Outcome; Ultrasonography, Interventional

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