Laminectomy compared with laparoscopic diskectomy and outpatient laparoscopic diskectomy for herniated L5-S1 intervertebral disks

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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
Inpatient and outpatient laparoscopic lumbar diskectomy (LLD) was compared with laminectomy (LAM) in the surgical treatment of disabling L5-S1 disk herniation.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients suffering from disabling single-level lumbar (L5-S1) disk herniation. The definition of disabling was not reported.

Setting
The study was set in secondary care in the USA.

Dates to which data relate
The effectiveness evidence and resources used were collected during January 1992 and November 1994. The price year was not reported.

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

Link between effectiveness and cost data
Retrospective costing was carried out on the same sample of patients as that used to collect the effectiveness data.

Study sample
No power calculations were reported. The method of sample selection was not reported. The study sample comprised patients who had LLD (31) or LAM (32) operations between January 1992 and November 1994. The patients who had LLD were treated by the same laparoscopic and neurosurgical team. Four different surgeons treated patients who had LAM. Three of these surgeons did not perform LLD surgery. There was no clear evidence that the initial study sample was appropriate for the clinical study question.

A total of 62 patients (33 men and 38 women) were included in the study. Of these, 31 patients had LLD and 31
patients had LAM. Of the 31 patients who underwent LLD, 23 were treated as inpatients and 9 were treated as outpatients.

**Study design**
This was a single-centre, retrospective study. The median length of follow-up was 34 months. The number of patients lost to follow-up was not reported. LLD was not technically feasible in one patient because they were too obese. There was no blinding method for the assessment of outcomes.

**Analysis of effectiveness**
The analysis of the clinical study was based on treatment completers only. The study reported median rather than mean values. The groups were not comparable in terms of gender (12 men and 19 women in the LAM group and 22 men and 9 women in the LLD group, p<0.05) or age (the median age was 42 years in the LAM group and 37 years in the LLD group, p<0.05). Three LLD patients, but no LAM patients, had undergone previous laminectomies. There was no adjustment for any confounding factors.

The primary clinical outcome measure was time to rehabilitation measured in days.

Secondary clinical outcome measures were: estimated blood lost during the operation; time in the operating room; length of stay in the hospital; and percentage of pain free days on long-term follow-up.

**Effectiveness results**
LLD patients had significantly lower median rehabilitation time (23 days) compared with the LAM group (71 days, p<0.01).

LLD patients had significantly lower median estimated blood loss (10ml) compared with the LAM group (55ml, p<0.01).

LLD patients had significantly lower median operating room time (210 minutes) compared with the LAM group (158 minutes, p<0.01).

LLD patients had significantly lower median length of stay (2 days) compared with the LAM group (4 days, p<0.01).

On long-term follow-up, 58% of the LLD group remained pain free compared with 39% of the LAM group, (not significant).

**Clinical conclusions**
The authors concluded that LLD is a safe, minimally invasive operation for managing disabling L5-S1 lumbar disk herniation, and is superior to LAM in many respects.

**Measure of benefits used in the economic analysis**
No summary measure of benefits was used in the economic analysis.

**Direct costs**
Quantities and costs were not analysed separately. Hospital charges to the patients were measured but the type of costs included in the analysis was not reported explicitly. The time horizon for the study was not reported. It was not clear if the estimation of the quantities and costs was based on a guess or on actual data. The source of the quantity and cost data was not reported. The costs were collected for the period January 1992 to November 1994. The price year was not reported. Discounting was not carried out due to the short time of the study with respect to the valuation of costs (less than one year).
Statistical analysis of costs
The median costs were analysed using a Mann-Whitney test.

Indirect Costs
Indirect costs were not appropriate to the chosen study perspective.

Currency
US dollars ($). No conversion rate was reported.

Sensitivity analysis
No sensitivity analysis was reported.

Estimated benefits used in the economic analysis
The reader is referred to the effectiveness results reported above.

Cost results
Patient charges rather than costs to the hospital were reported.

The patient charges for the outpatient LLD group (n=9) were $4,405.

The patient charges for the inpatient LLD group (n=22) were $5,723.

The patient charges for the LAM group (n=31) were $7,192.

The patient charges for the LAM group versus the outpatient LLD group were significantly higher, (p<0.01).

Synthesis of costs and benefits
The estimated benefits and costs were not combined. The reported results suggest that LLD dominated LAM in terms of effectiveness and costs.

Authors’ conclusions
The authors concluded that the results of this study show LLD is a safe, cost-effective approach for treating herniated intervertebral disks. When performed as an outpatient procedure, LLD minimises hospital stay and patient charges.

CRD COMMENTARY - Selection of comparators
The selection of comparators was supported by published evidence from the USA and seemed to reflect potential clinical practice in this health care setting. You as a user of this database should consider carefully whether LLD or LAM reflect treatment options for the management of patients with herniated intervertebral disks in your own setting.

Validity of estimate of measure of effectiveness
This study was based on a retrospective design, which is less robust than a prospective design. The patients in the LLD group were treated by one surgical team with experience in the procedure. The patients in the LAM group were treated by one of four surgical teams, three of which did not perform LLD procedures. The authors noted that LLD is a complex procedure. These factors suggest that the results from the LLD sample may not be representative of the results in routine practice. The authors did not report details about the study design or power calculations, which means that it is not possible to assess the validity and robustness of the results.
Validity of estimate of measure of benefit
This study reported effectiveness measures but did not include measures to combine the different clinical outcomes into one measure or to evaluate the value of the improvements in clinical status to patients.

Validity of estimate of costs
This study reported patient charge data rather than costs associated with the management of patients with herniated intervertebral disks from the hospital perspective. The study did not report any details about the time horizon or methods of collecting the patient charge data. It is therefore not possible to assess whether the results of this US based study are robust or applicable to the UK health care setting.
Mean costs are the most appropriate statistical summary measure of costs to inform decision-making but this study reports median costs.

Other issues
There was a lack of evidence that the results of the study were internally valid. This meant that the study does not provide clear evidence that the alternatives compared were equivalent in terms of outcome.
The study did not report a sensitivity analysis and this omission together with the lack of detail regarding the measure of effectiveness and costs limits the internal validity and the generalisability of the study to other clinical settings.

Implications of the study
The authors suggested that, if the safety and beneficial therapeutic results of LLD reported here are maintained as minimally invasive spine surgery grows in popularity, the LLD by qualified general surgery-neurosurgery teams should be considered as an alternative to LAM.

Source of funding
None stated.

Bibliographic details

PubMedID
9820717

Indexing Status
Subject indexing assigned by NLM

MeSH
Adult; Ambulatory Surgical Procedures /economics /methods /statistics & numerical data; Chi-Square Distribution; Cost-Benefit Analysis; Diskectomy, Percutaneous /economics /methods /statistics & numerical data; Female; Humans; Intervertebral Disc Displacement /economics /surgery; Laminectomy /economics /methods /statistics & numerical data; Laparoscopy /economics /methods /statistics & numerical data; Lumbar Vertebrae /surgery; Male; Sacrum /surgery; Statistics, Nonparametric; Treatment Outcome

AccessionNumber
21998001687