Endoscopic versus open carpal tunnel release: a cost-effectiveness analysis
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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
Endoscopic versus open carpal tunnel release in the treatment of carpal tunnel syndrome.

Type of intervention
Treatment.

Economic study type
Cost-utility analysis.

Study population
Patients with a history of hand numbness and tingling sensations along the median nerve distribution, and persistent hand pain.

Setting
Hospital setting. The study was carried out at the University of Michigan, Ann Arbor, Michigan, USA.

Dates to which data relate
Effectiveness data were collected from studies previously published between 1992 and 1993. Resource use data were collected between 1996 and 1997. The price year was 1997.

Source of effectiveness data
Effectiveness data were derived from a review of previously published studies and estimates of effectiveness.

Modelling
A decision analytic tree was constructed to model QALYs and costs associated with the two treatment strategies.

Outcomes assessed in the review
The review assessed probabilities of various outcomes and complications of the two treatment strategies.

Study designs and other criteria for inclusion in the review
Randomised controlled trials with at least 50 subjects in each group were included in the review.

Sources searched to identify primary studies
MEDLINE was searched.
Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Two trials were included (Brown trial, Agee trial).

Methods of combining primary studies
Results were not combined.

Investigation of differences between primary studies
Not stated.

Results of the review
For endoscopic carpal tunnel release, the following probabilities of outcomes were found (Brown trial, Agee trial):

- no complication (0.939, 0.942);
- persistent symptoms (0.012, 0.024);
- finger numbness (0.026, 0.024);
- wound infection (0.013, 0.000);
- scar tenderness (0.010, 0.010);
- transection of median nerve (0.000, 0.010).

For open carpal tunnel release, the following probabilities of outcomes were found (Brown trial, Agee trial):

- no complication (0.824, 0.924);
- persistent symptoms (0.026, 0.000);
- finger numbness (0.000, 0.000);
- wound infection (0.000, 0.031);
- scar tenderness (0.150, 0.030);
- transection of median nerve (0.000, 0.015).

Methods used to derive estimates of effectiveness
Effectiveness data were also derived from authors’ assumptions.

Estimates of effectiveness and key assumptions
After six months, it was assumed that patients would revert to a perfectly healthy state with a utility of 1.0. For chronic states that would last for a lifetime, it was assumed that subjects would discount the utilities for future years.

**Measure of benefits used in the economic analysis**
The benefit measure was quality adjusted life years (QALYs). QALYs were converted from utilities obtained from resident therapists, hand therapists and nurse researchers by means of an anonymous utility assessment questionnaire. The rating method was used to derive utilities.

**Direct costs**
Costs were not discounted given the short time period of treatment (less than 1 year). Quantities and costs were not reported separately. The direct costs were calculated as the costs of endoscopic and open carpal tunnel release and costs of treating complications. Direct costs included surgeon's fees, anaesthesia fees, and hospital costs. The quantity/cost boundary adopted was that of the health service. The estimation of quantities and costs was based on actual data. Cost data were derived from the Medicare Resource-Based Relative Value Units published in the Federal Register and from a private, nonprofit, community hospital in south-eastern Michigan. The price year was 1997.

**Statistical analysis of costs**
Not reported.

**Indirect Costs**
Indirect costs related to lost productivity and lost leisure time were included in the benefit measure.

**Currency**
US dollars ($).

**Sensitivity analysis**
A one-way sensitivity analysis was conducted on costs. A two-way sensitivity analysis was conducted on costs and QALYs.

**Estimated benefits used in the economic analysis**
No statistical difference (p<0.14) was found in the utility scales between the two groups for all outcomes. Based on the effectiveness results reported in the Brown trial, the marginal utility of endoscopic release over open release varied between 0.235 QALYs (age 25) and 0.066 QALYs (age 65). Based on the effectiveness results reported in the Agee trial, the marginal utility of endoscopic release over open release varied between 0.025 QALYs (age 25) and 0.021 QALYs (age 65).

**Cost results**
Based on the effectiveness results reported in the Brown trial, the marginal costs of endoscopic release over open release were $46 (Medicare costs) and $769 (private sector costs). Based on the effectiveness results reported in the Agee trial, marginal costs of endoscopic release over open release were $23 (Medicare costs) and $744 (private sector costs).

**Synthesis of costs and benefits**
When using Medicare costs, endoscopic release exhibited cost-utility ratios that ranged from $195 to $1,074 per QALY. When using private sector costs, endoscopic release exhibited cost-utility ratios that ranged from $3,271 to $35,427 per QALY. This cost-utility ratio was highly dependent on the effectiveness data, and in particular, the
incidence of median nerve injury.

Authors' conclusions
Endoscopic carpal tunnel release appears to be a cost-effective procedure. The marginal effectiveness, however, is very sensitive to a major complication such as median nerve injury in the endoscopic carpal tunnel release branch.

CRD COMMENTARY - Selection of comparators
The rationale for the selection of the comparator was clear. Open procedures are the more traditional in carpal tunnel syndrome and the intervention is considered by many practitioners to be somewhat controversial.

Validity of estimate of measure of benefit
The relevant measure of benefit was examined. The results are highly dependent on the nature of techniques performed and experience levels. Assumptions were made regarding the duration of disability secondary to complications, because this duration has not been well established in the literature. Both the former and the latter imply that results may differ across settings and countries. Two different samples were used to derive utilities. Further studies could elicit values from the general population and the population of patients with carpal tunnel syndrome.

Validity of estimate of costs
Direct costs were included in the cost measure and indirect costs in the QALY measure. To assess the variability in costs and their impact on cost-utility ratios, costs derived from two sources were used. No statistical analysis was reported.

Other issues
Future studies must better define the actual incidence of nerve injuries for both endoscopic and open carpal tunnel release in the community setting. The generalisability of the results is variable due to the skill factor of the surgeons performing this intervention.

Implications of the study
The cost-effectiveness of endoscopic carpal tunnel release, as noted by the authors, can be improved by placing more emphasis on the training of surgeons in this technique so that major complications can be avoided. Future studies need to define the incidence of nerve injuries for both procedures.

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Other publications of related interest


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