Six hundred fifty-six consecutive explorations for primary hyperparathyroidism

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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 use of minimally invasive parathyroidectomy (MIP) in the treatment of primary hyperparathyroidism (HPTH). This procedure consisted of preoperative localisation with high-quality sestamibi scans imaged with SPECT, surgeon-administered cervical block anaesthesia, limited exploration, rapid intraoperative PTH assay (Nichols Institute Diagnostics, San Juan Capistrano), and same-day discharge. The technique was compared with bilateral cervical exploration, routinely performed under general anaesthesia.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with biochemically confirmed HPTH. Patients with secondary or tertiary HPTH were excluded from the study.

Setting
The setting was secondary care. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness study was carried out between January 1990 and March 2001. The price year was not reported.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study.

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

Study sample
No study sample size seems to have been determined in the planning phase of the study. In addition, no power calculations were performed retrospectively. One surgeon explored 656 consecutive patients with biochemically-confirmed, primary HPTH. There were 459 (70%) female patients and 197 (30%) male patients, with a mean age of 57.5 (+/- 0.5) years (range: 13 - 93). These were then stratified, based on the surgeon’s recommendation and the patient’s consent, to undergo either the standard or the MIP exploration. Out of the 656 patients, 401 (61%) underwent standard bilateral cervical exploration under general anaesthesia and 255 (39%) patients underwent MIP. Thirteen
patients with either multiple endocrine neoplasia type 1 (n=9) or type 2 (n=4) were included in the standard group. No patient with multiple endocrine neoplasia was offered MIP. One patient who underwent MIP was excluded from the analysis of length of stay and total hospital charges because she presented with life-threatening pancreatitis in the setting of primary HPTH.

**Study design**
This was a cohort study that was carried out in a single centre in the USA. All the patients were seen 7 to 10 days after surgery and in long-term follow-up, at which time the serum PTH and calcium levels were obtained. The authors quoted no loss to follow-up.

**Analysis of effectiveness**
All of the patients in the study appear to have been accounted for in the analysis. The primary health outcomes used in the analysis were:

- the results of preoperative sestamibi scans,
- the cure rates,
- conversion to general anaesthesia,
- the number of complications,
- the length of surgery and anaesthesia, and
- the length of hospital stay.

The successful outcome of surgery was determined by the maintenance of eucalcemia at the arbitrarily accepted interval of 6 months after surgery. The groups were shown to be comparable at analysis. There were no significant differences between patients who underwent conventional or MIP exploration in terms of their age, gender distribution, symptoms and signs, or preoperative PTH or calcium levels.

**Effectiveness results**
Sestamibi scans were obtained in 77% of the patients undergoing standard exploration and 98% of those undergoing MIP exploration. Positive scans were obtained in 53% (standard) and 96% (MIP) of the patients, respectively.

The overall cure rate for the entire series was 98%. It was indistinguishable when the two groups were compared, with 97% for standard exploration and 99% for MIP exploration.

The complication rate was 3.0% for the standard group and 1.2% for the MIP group. Two of the 12 complications in the standard group and 1 of the 3 in the MIP group occurred during remedial cervical exploration. The only complication unique to the MIP group was a seizure that resulted from lidocaine toxicity.

Of the 255 patients undergoing MIP, 126 (89%) were successfully treated. However, 29 (11%) patients required conversion to general anaesthesia.

The length of surgery was significantly shorter for MIP (1.3 hours) than for standard explorations (2.4 hours), (p<0.001). The length of anaesthesia was also significantly shorter for MIP (1.6 hours) than for standard explorations (3.1 hours), (p<0.001).

The mean length of hospital stay was 0.24 (+/- 0.06) days for the MIP patients versus 1.64 (+/- 0.14) days for those who underwent standard exploration, (p<0.001).
Clinical conclusions
The complication and cure rates were found to be similar for both groups. However, duration of surgery, anaesthesia and length of hospital stay were found to be significantly lower for the MIP group than for the standard exploration group.

Measure of benefits used in the economic analysis
No summary benefit measure was used in the economic analysis. In effect, a cost-consequences approach was adopted.

Direct costs
The resource quantities and the costs were not reported separately. The direct costs included in the analysis were those of the hospital. Only the mean total charges per patient were given, with no reference to the costs included or the sources of the unit costs. Discounting was irrelevant since the patients were hospitalised for a very short time. Hence, the author, appropriately, did not perform any discounting. The author did not state the dates to which the price data referred.

Statistical analysis of costs
The costs were treated stochastically. Statistical analyses were performed using a two-tailed Student's t-test, with significance set at the 0.05 level.

Indirect Costs
No indirect costs were included in the analysis.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analyses were performed.

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

Cost results
The total mean hospital charges per patient were, approximately, $5,500 for those undergoing standard explorations and $2,900 for those undergoing MIP, (p<0.0001). Thus, the mean saving per individual MIP patient was $2,693, which represented 49% of the total hospital charge.

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

Authors' conclusions
The success of the minimally invasive parathyroidectomy (MIP) technique was confirmed by evidence that the cure and complication rates were at least as good as those achieved by conventional exploration, and by the fact that it yielded cost-savings of around 50% per procedure.
CRD COMMENTARY - Selection of comparators

The choice of standard exploration as the comparator was justified on the grounds that it represented current practice in the author's setting. You should decide if the comparator represents current practice in your own setting.

Validity of estimate of measure of effectiveness

The use of a randomised controlled trial (RCT) would have been more appropriate than the cohort study design employed here. This is because well-conducted RCTs are the 'gold' standard study design when comparing different health technologies, as they minimise the potential of confounding and bias. Further, the MIP technique was instituted in 1998, with no MIP explorations being performed before that date, and since then it has rapidly replaced traditional exploration for the majority of patients. In effect, this is similar to the study being undertaken in two different timeframes, which has the potential to affect the author's results. Factors such as improved medical technologies, better health care delivery, new management styles and other such trends taking place over time, may also have biased the author's results. Apart from these limitations, the analysis was handled credibly. The patient groups were shown to be comparable at analysis, and appropriate statistical tests were performed to test for any statistically significant differences between the two groups. Further, the study sample was large and representative of the study population.

Validity of estimate of measure of benefit

The authors did not derive a summary measure of health benefit. The analysis was therefore categorised as a cost-consequences study.

Validity of estimate of costs

Due to the lack of information on the costs included in the analysis and the sources of these costs, it is unclear whether all the relevant costs were included in the analysis and whether any omissions affected the author's results. Further, the costs and quantities were not reported separately and the price year was not reported. These two limitations will weaken the generalisability of the results and hinder any reflation exercises. It is also possible that factors such as improved management or policy changes over time could explain some of the differences in the results. However, using appropriate statistical tests, the author showed that any cost differences between the two groups were statistically significant. Discounting was unnecessary since all the costs were incurred in a short time, and was therefore not performed.

Other issues

The author did not make appropriate comparisons with the findings from other studies. The issue of generalisability to other settings was not addressed. The generalisability was further hampered by the fact that the costs and the quantities were not reported separately. The author does not appear to have presented his results selectively. The author's conclusions reflected the scope of the analysis, with all the patients being accounted for in the analysis. The author reported no further limitations to the study.

Implications of the study

The author pointed out that the fact that the study found cost-savings of around 50% per procedure for MIP would be viewed as a favourable attribute by patients, third-party payers and the global health care delivery system. The author also mentioned that it appears likely that the successful adoption of MIP will shift recommendations of endocrinologists, some of whom recommend referral of all patients with HPTH for surgical evaluation.

Source of funding

None stated.

Bibliographic details

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Cost Savings; Databases, Factual; Female; Hospital Charges; Humans; Hyperparathyroidism /epidemiology /radionuclide imaging /surgery; Length of Stay /statistics & numerical data; Male; Middle Aged; Minimally Invasive Surgical Procedures /economics /utilization; Outcome and Process Assessment (Health Care); Parathyroidectomy /economics /methods; Preoperative Care; Prospective Studies; Radiopharmaceuticals; Technetium Tc 99m Sestamibi

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