A comparison of open and laparoscopic Roux-en-Y gastric bypass surgery for morbid and super obesity: a decision-analysis model

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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 study compared laparoscopic Roux-en-Y gastric bypass (LGBP) with open Roux-en-Y gastric bypass (OGBP) for the treatment of morbid obesity versus super obesity. Morbid obesity refers to a body mass index (BMI) of between 35 and 49 kg/m2, while super obesity refers to a BMI of more than 50 kg/m2.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised hypothetical cohorts of 100 patients. The cohorts were categorised according to the BMI of the patients into three groups. Group A comprised patients with a BMI of between 35 and 49. Group B comprised patients with a BMI of between 50 and 60. Group C comprised patients with a BMI of more than 60. In each group patients underwent either OGBP or LGBP.

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

Dates to which data relate
The effectiveness data used to populate the model came from literature published after 1990. However, these studies were not appropriately referenced and the dates relating to these studies were not reported. The resource use and cost data were derived from sources published between 2002 and 2005. The price year was 2004.

Source of effectiveness data
The clinical parameters associated with the two treatment options included immediate complications, post-surgery mortality, 1-year complications, and mortality for each of the different BMI groups.

Modelling
The authors used a decision analytic model to determine the clinical outcomes, complications and costs associated with each of the treatment options using DATA 3.5 software (TreeAge Software Inc., Williamstown). The time horizon of the model was 1 year.

Sources searched to identify primary studies
The clinical effectiveness data were derived from 21 randomised controlled trials, 8 case series studies and 6 review articles. The authors combined data from the available studies on each model parameter using weighted means.

**Methods used to judge relevance and validity, and for extracting data**
The authors reported that MEDLINE was searched to identify relevant research for their review of the literature. The search terms used, the number of studies included, and the inclusion criteria applied were all reported. However, although the dates to which the search related were reported, the studies included were not appropriately referenced, and the dates when those studies providing effectiveness evidence were published were not reported.

**Measure of benefits used in the economic analysis**
The authors did not derive a summary measure of benefit in the economic analysis. In effect, a cost-consequences analysis was performed.

**Direct costs**
Costs to the health service were included in the analysis. These comprised OGBP and LGBP procedural costs (including operating room), the cost of major immediate complications and 1-year complications, and revision of surgery. The cost and resource use data were obtained from official published sources. The costs were reported as the average cost per patient. The costs were not discounted and adjustments for inflation were not reported. The costs and the quantities were not analysed separately. The price year was 2004.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
Productivity costs were not included in the analysis.

**Currency**
US dollars ($).

**Sensitivity analysis**
Parameter uncertainty was investigated through one-way and multi-way sensitivity analyses. The threshold value of complication was also investigated to determine the optimal strategy. The parameters tested in the sensitivity analyses were the baseline transition probabilities, success rate of therapy, and complications. A two-way sensitivity analysis was also performed, in which the immediate surgical complications of both LGBP and OGBP were varied simultaneously to investigate the robustness of the results. Simultaneous variation of recurrent surgical complications in OGBP and LGBP and surgical mortality were investigated using a three-way sensitivity analysis. The ranges used in the analyses were reported, but the methods used to determine the ranges over which the variables were tested were not.

**Estimated benefits used in the economic analysis**
No summary measure of benefit was reported in the economic analysis. However, the authors comprehensively reported the clinical outcomes, success rates and complication rates for both interventions in all BMI categories.

**Cost results**
Over 1-year of follow-up:

for a BMI of between 35 and 49 kg/m², LGBP cost $23,629 per patient and OGBP cost $27,630 per patient;
for a BMI of between 50 and 60 kg/m², LGBP cost $28,654 per patient while OGBP resulted in an average cost of $34,312;

for a BMI greater than 60 kg/m², LGBP cost $39,770 per patient and OGBP cost $30,769 per patient.

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

The results of the sensitivity analyses demonstrated that, for a BMI of between 35 and 49 kg/m², the threshold surgical complications rate of LGBP was 17% (baseline 8.7%), above which OGBP became the preferred strategy. For a BMI greater than 60 kg/m², the respective threshold was 23% (baseline 18.7%). For a BMI of between 50 and 60 kg/m², the two-way sensitivity analyses demonstrated that LGBP was the preferred strategy in terms of success and complications up to the point where surgical complications for LGBP become greater than 12%.

Authors’ conclusions
Based on the results of the modelling study, laparoscopic Roux-en-Y gastric bypass (LGBP) would appear to be the preferred strategy to open Roux-en-Y gastric bypass (OGBP). However, the authors acknowledged that possible selection and publication bias in the trials assessed for the analysis may impose limitations to their conclusions.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used. OGBP represents the most commonly used technology in the authors’ setting. You should decide if this represents a widely used technology in your own setting.

Validity of estimate of measure of effectiveness
The parameters were derived from published research. Although the study designs were reported, the primary studies were not appropriately referenced. Data from the available studies were combined appropriately using the weighted mean method. The search methods and inclusion criteria were provided.

Validity of estimate of measure of benefit
The authors did not derive a summary measure of benefit. In effect, a cost-consequences analysis was performed. The comments under the ‘Validity of estimate of measure of effectiveness’ field (above) therefore apply.

Validity of estimate of costs
Although the perspective adopted was not explicitly reported, it appears to have been that of the health care provider. However, the authors only reported summary average costs per patient, and it was therefore not possible to determine which aspects of costs were included (e.g. overhead costs, drug costs etc.). The unit costs and the resource quantities were not reported separately, which will prevent the analysis from being easily reworked for other settings. No statistical analysis of the costs or resource use was conducted, and no sensitivity analysis of the costs was performed to assess the robustness of the estimates used. This may limit the interpretation of the study findings. Although the price year was reported, it appears that no adjustments for inflation were made.

Other issues
The authors did not directly compare their findings with those from other studies, owing to the lack of published literature in the same research area. Although the authors evaluated the impact of varying clinical parameters in the sensitivity analysis, they acknowledged, as a limitation to their model, that it did not capture all aspects from clinical practice. They also recognised that from the studies included in the review, there may be a selection bias in favour of laparoscopic procedures which may limit the generalisability of the study findings to other settings. The authors do not appear to have presented their results selectively and their conclusions appear to have reflected the scope of analysis.
Implications of the study
The authors did not make explicit recommendations for changes in policy or practice. However, they did call for a prospective blinded study to compare the optimal bariatric surgical method in patients with super obesity.

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