

Long-term prevention of mortality in morbid obesity through bariatric surgery: a systematic review and meta-analysis of trials performed with gastric banding and gastric bypass

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CRD summary

The authors concluded that compared to no surgery, bariatric surgery (both gastric banding and gastric by-pass) reduced the risk of global mortality, non-cardiovascular mortality and cardiovascular mortality in obese patients. This was a generally well-conducted review, but the low quality and variability of the evidence suggests the authors' conclusions should be interpreted with caution.

Authors' objectives

To assess the long-term effects of bariatric surgery on mortality in patients with morbid obesity.

Searching

MEDLINE, EMBASE and The Cochrane Library were searched up to December 2009 for articles in any language. Search terms were reported. Reference lists of articles, reviews, editorials and proceedings of international conferences were searched manually.

Study selection

Controlled clinical trials that compared bariatric surgery versus no surgery in patients with morbid obesity were eligible for inclusion if they reported on non cardiovascular-related mortality, cardiovascular-related mortality and global mortality (sum of non cardiovascular and cardiovascular mortality).

Included studies commenced between 1986 and 1997. Patients were recruited from clinics or community settings. Patient age ranged from 39 to 55 years. Most participants were women. One trial solely contained diabetic patients. Body mass index (where reported) ranged from 38 to 54kg/m². Where reported, weight loss (body mass index) ranged from zero to 17. Surgery included gastric banding, gastric by-pass and vertical-banded gastroplasty.

Two reviewers screened studies for inclusion. Disagreements were resolved through discussion.

Assessment of study quality

Trial quality was assessed based on four previously published criteria, which included the Jadad scale. No further details were provided.

Data extraction

Two reviewers extracted data on mortality to calculate odds ratios (ORs) and 95% confidence intervals (CIs). Where these data were not available, mortality was estimated from participants at risk at 10 years and odds ratios for global mortality. Disagreements were resolved by discussion.

Methods of synthesis

A random-effects model was used to pool odds ratios and 95% CIs by mortality type and subgroup these by trial size (<3,000 patients versus >3,000 patients) and type of surgery. Trials were also combined using a fixed-effect model. Statistical heterogeneity was assessed using X^2 and I^2 . Meta-regression was performed to assess the effects of various covariates on mortality: age, gender, presence of diabetes, body mass index for each study, weight loss, year study commenced, number of patients enrolled, type of controls, duration of follow-up and efficacy of treatment.

Results of the review

Eight controlled clinical trials (n=44,022 patients; 14,052 surgery and 29,970 controls) were included in the review. All trials were reported to be of low quality. Follow-up ranged from 2.5 to 12 years.

Risk of mortality was significantly reduced in patients who underwent bariatric surgery compared to controls for global mortality (OR 0.55, 95% CI 0.49 to 0.63, $I^2=91.4%$; eight trials), cardiovascular mortality (OR 0.58, 95% CI 0.46 to 0.73, $I^2=73.6%$; four trials) and non-cardiovascular mortality (OR 0.70, 95% CI 0.59 to 0.84, $I^2=60.4%$; four trials).

Subgroup analysis by trial size did not significantly alter the results, but reduced statistical heterogeneity and showed greater risk of mortality in large trials compared to small trials. Risks of non-cardiovascular and global mortality were similar for gastric banding and gastric by-pass techniques. Risk of cardiovascular mortality was higher in patients who underwent banding versus bypass (OR 0.71, 95% CI 0.51 to 1.00 versus OR 0.48, 95% CI 0.35 to 0.66). There were no significant differences when trials were subgrouped by type of control (data not presented).

Meta-regression showed a significant association between global mortality and increasing body mass index when one trial was excluded.

Results that compared fixed-effect versus random-effects models were reported in the review.

Authors' conclusions

Compared to no surgery, bariatric surgery (both gastric banding and gastric by-pass) reduced the risk of global mortality, non-cardiovascular mortality and cardiovascular mortality in obese patients. Risk reduction seemed lower in large compared to small trials and tended to be greater in more obese patients.

CRD commentary

The review question and supporting inclusion criteria were clearly stated. A number of sources were searched for relevant trials. There were no language restrictions, which reduced risk of potentially

relevant data being missed. Study selection and data extraction were performed in duplicate; it was unclear whether this was true for quality assessment and so reviewer error and bias could not be ruled out. Details on the quality assessment were limited, but the authors reported that the quality of trials was low. There was evidence of heterogeneity within and between trials, which the authors acknowledged and went some way to investigate. Given the heterogeneity, pooling of the trials may not have been appropriate. Few trials reported on patient details, which the authors highlighted as a limitation.

This was a generally well-conducted review, but poor study quality and significant variability across studies mean the authors' conclusions should be interpreted with caution.

Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors stated that further research was needed to assess the effect of surgery on mortality between diabetic and non-diabetic patients.

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Bibliographic details

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