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Original article

Five-year results after laparoscopic sleeve gastrectomy: a prospective study

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Abstract

Background: Whilst the early to mid-term efficacy of laparoscopic sleeve gastrectomy (SG) is well established, there is comparatively less detailing of long-term efficacy. The objectives of this study were to evaluate the long-term outcomes of patients undergoing SG at the authors' institution.

Methods: All patients undergoing SG during the past 5 or more years were eligible. Outcomes included baseline demographic data, preoperative characteristics, percentage excess weight loss (%EWL), co-morbidity improvement and resolution, serum hemoglobin A_{1c} (HbA_{1c}), serum lipid profile, and the Bariatric Analysis Reporting Outcome System (BAROS) questionnaire. A subset analysis was also performed with patients stratified in to super obese (body mass index $\geq$50 kg/m^2).

Results: There were 96 patients who underwent surgery between March 2007 and July 2008. Of these, 10 declined to participate, 28 were unable to be contacted, and 3 were deceased; therefore, 55 patients were included in the analysis. The mean yearly %EWL to postoperative year 5 was 56% (year 1), 55% (year 2), 46% (year 3), 43% (year 4), and 40% (year 5). Combined improvement and resolution rates at 5 years were 79%, 61%, and 73% for type 2 diabetes, hypertension, and obstructive sleep apnea, respectively. The HbA_{1c} was significantly reduced at long-term follow-up. The mean BAROS score was 3.13 (95% CI: 2.4, 3.9). Weight loss outcomes were less favorable in super obese patients.

Conclusion: Weight loss outcomes at 5 year follow-up were modest after SG though improvement in co-morbidity status was maintained. (Surg Obes Relat Dis 2014;▮:00–00.)

Keywords: Laparoscopic sleeve gastrectomy; Sleeve gastrectomy

Bariatric surgery remains the only evidence-based method of treating severe obesity and curing obesity-related co-morbidity [1,2]. Roux-en-Y gastric bypass and laparoscopic adjustable gastric banding remain the most common bariatric procedures used globally. However, laparoscopic sleeve gastrectomy (SG) is becoming increasingly popular as a stand-alone bariatric procedure [3,4].

SG was initially used as the first stage of the biliopancreatic diversion with duodenal switch procedure. What has since followed is a growing body of evidence that demonstrates excellent early to mid-term weight loss results and co-morbidity resolution associated with SG as a stand-alone

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procedure. These results have consistently been shown to be comparable, and in some cases superior, to more established bariatric procedures [5–9].

Whilst the early to mid-term efficacy of SG is well established, there are comparatively less data detailing long-term efficacy at 5 years or more. The weight loss data in the current published literature evaluating long-term results are highly variable, as are the means by which they have been reported [10–17]. Evaluation of co-morbidity has been even less reliable with inconsistent reporting and variability in the obesity-related conditions selected for evaluation, as well as how resolution is evaluated [10,14,16–20].

This study evaluates the long-term outcomes of patients who have had SG as a stand-alone bariatric procedure at the authors' institution. The aim of this study is to determine whether short-term and mid-term weight loss outcomes and co-morbidity resolution are sustained out to 5 years.

Methods

Study design

This study was a retrospective cohort study approved by The University of Auckland Human Participants Ethics Committee (Ref. No. 9061). The results of this study are reported in accordance with guidelines outlined in the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [21].

Setting

The study was conducted at Counties Manukau District Health Board (CMDHB), a tertiary teaching hospital, between June 2013 and August 2013. Since 2007, more than 1000 procedures have been performed, with yearly volume now between 150–200 procedures.

Participants

All patients who had SG performed at CMDHB and were 5 or more years past surgery were eligible for inclusion in the study. These patients were identified using a preexisting, prospectively maintained database of all patients who had SG at CMDHB. Those patients who were less than 5 years from the time of their surgery and those who were unable to be contacted by telephone despite numerous attempts were excluded. For those patients who agreed, an appointment time was arranged to meet with the first author (D.P.L.) at CMDHB. For patients who agreed to participate but were not able to travel to CMDHB due to having moved to another city, permission was obtained to send the study questionnaire in the mail and to contact the current general practitioner for information pertinent to the study. During the appointment, informed consent was obtained before the acquisition of study measurements. For patients not able to travel, consent was obtained via telephone.

Variables and measurement

Baseline preoperative characteristics

Baseline demographic data (age, gender, ethnicity, and date of operation), preoperative weight characteristics (total weight [kg], body mass index [BMI, kg/m^2], and excess weight [kg]) were recorded from computerized patient records. The surgical technique has been described previously [22,23]. The mean bougie size used was 38French. Dissection started 4 cm from the pylorus.

Weight loss

For each participant, yearly weight data were collected from computerized patient records. A current weight was also measured at the study follow-up appointment using an electronic scale. The yearly absolute weight loss was then calculated, as were the current BMI and percentage excess weight loss (%EWL). The %EWL was calculated using the formula previously described by Deitel et al. [24].

Co-morbidity resolution

Preoperative co-morbidity status and medical treatment for these conditions were recorded from computerized clinical records. The co-morbidities of interest were type 2 diabetes mellitus (T2 DM), hypertension, and obstructive sleep apnea.

Participants were asked to identify their current treatment status in 1 of 4 categories: (1) no longer on treatment, (2) reduced treatment, (3) same treatment, and (4) increased treatment. Those participants who answered no to any preoperative co-morbidity before surgery but had since developed the co-morbidity during the 5-year follow up period were recorded as a new diagnosis. The treatment status was then confirmed through the computerized clinical records and, when required, by contacting the participants general practitioner.

Preoperative and postoperative (5 years after surgery) serum glycated hemoglobin (HbA_{1c}) were recorded from computerized patient records. The results of each patient's fasting preoperative and postoperative serum lipid profile were also recorded and analyzed. The tests included in this study were total cholesterol (TC), triglyceride, LDL, HDL, and TC:HDL ratio. Those participants who did not have a recent HbA_{1c} or serum lipid profile were provided with a blood test form for which these fasting tests were requested.

Resolution of T2 DM was defined as cessation of medical therapy and $HbA_{1c} < 6\%$ (or less than 42.1 mmol/mol) [25]. Resolution of HTN and OSA was defined as cessation of medical therapy. Co-morbidity improvement was defined as reduction in medical therapy.

Assessment of surgery outcome

Participants were asked to answer yes or no as to whether they considered their surgery successful. They were then asked to complete the Bariatric Analysis Reporting Outcome