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Original article

Changes in the body composition after laparoscopic gastric plication: a short-term prospective case series

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Abstract

Background: While laparoscopic gastric plication (LGP) results in a rapid weight loss in the first postoperative months, changes in body composition after LGP have not been studied previously.
Objective: To evaluate the body composition after LGP.
Setting: A tertiary referral hospital.
Method: This is a consecutive case series. Body composition was measured using bioimpedance analysis with a Tanita BC-418 by 1 nutritionist. Weight, fat mass (FM), fat-free mass (FFM), and total body water (TBW) were measured at baseline and at 1, 3, and 6 months postoperative.
Results: Sixteen consecutive patients underwent LGP. No intraoperative or major postoperative complications occurred during the follow-up period. No patient was lost to follow-up at any point during the study period. Mean postoperative total weight loss was 31 kg after 6 months, of which 25.5 kg (83%) was due to FM reduction. %FM was decreased by 15% after 6 months, whereas %TBW increased by 11%.
Conclusions: Most of the weight loss caused by LGP is attributable to FM loss, and FFM loss is minimal after LGP. Therefore, LGP shifts body composition toward normal. (Surg Obes Relat Dis 2015;▮:00–00.)

Keywords: Bariatric surgery; Gastric plication; Body composition; Bioimpedance analysis

Obesity is a major public health problem that has been on the rise for the past decades [1]. Traditionally, dietary and lifestyle changes were considered the mainstay of therapy, albeit efficacy of such nonsurgical interventions is limited [2,3]. Consequently, bariatric surgery has gradually emerged as an effective, sustainable, and relatively well-tolerated method for weight reduction in severely obese patients [4,5].

Initial development of laparoscopic gastric plication (LGP) as bariatric procedure started in 2000. It was subsequently introduced in 2007 as a restrictive bariatric technique [6]. Later studies by the same team as well as other research groups had satisfactory efficacy for LGP compared with other restrictive modalities [6–8]. Furthermore, LGP is regarded as one of the least invasive bariatric procedures, since it does not involve any resection of the gastric mucosa and intestinal rearrangement of the gastrointestinal tract. In addition, foreign materials are not used in LGP, and it is a reversible bariatric surgery [9].

Patients experience a rapid weight loss after bariatric surgery, especially during the first postoperative months [8–10]. Furthermore, restrictive bariatric techniques result in early satiety and reduced calorie and protein intake, which could theoretically predispose patients to malnutrition and wasting [11]. The ideal objective of any bariatric procedure is to reduce the body fat mass (FM) while preserving the

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body fat-free mass (FFM). However, weight reduction has been reported mostly as changes in body mass index (BMI) and weight. Although BMI is measured easily and is widely applicable, it is a function of total weight and cannot differentiate between a reduction in FFM or FM. Body composition analyses could be used to address this problem, although they are not as readily available as BMI [12]. LGP is a relatively new technique, and its effects on body composition have not been studied adequately, which is especially important during the first months after LGP when patients are experiencing rapid weight loss. Therefore, we conducted this study to determine the changes in the patients' body composition during the first 6 months after LGP.

Methods

Study design and population

This was a prospective longitudinal case series. The study was approved by the Institutional Review Board. Patients were referred to the bariatric clinic for LGP and were given information regarding LGP as well as other bariatric techniques and nonsurgical therapies. Informed consent was obtained from all the participants before they could be considered eligible. All patients who met the inclusion and exclusion criteria were enrolled consecutively. Inclusion criteria were BMI ≥ 40 kg/m^2 or BMI ≥ 35 kg/m^2 in the presence of at least 1 major obesity-related co-morbidity, such as type 2 diabetes mellitus, dyslipidemia, or sleep apnea [13]. Exclusion criteria were psychological conditions that could impair patients' decision making capabilities (defined by a psychiatrist), age <18 years, endocrine disorders causing obesity such as Cushing's syndrome, and congestive heart failure.

All patients underwent a multidisciplinary preoperative workup, including psychiatry, cardiology, endocrinology, and anesthesiology consults, before the operation.

Intervention

All procedures were performed by a surgeon who was proficient in LGP in a tertiary referral academic hospital. Technical details of the procedure have been described previously [8,10,14]. In essence, the greater curvature of the stomach was dissected from the pylorus up to 2 cm proximal to the angle of His, thus preserving the anatomy of the angle. Thereafter, a 2-row plication of the greater curvature was performed from the fundus to the antrum using 2-0 polypropylene or nylon, resulting in invagination of the gastric mucosa and restriction of the total gastric volume to about 50 mL.

Postoperative care

Nausea, heartburn, and occasional vomiting were anticipated and were treated with pantoprazole and promethazine [6,8,10]. Patients were monitored in the hospital for signs of dehydration during the first postoperative 48 hours and were then discharged if they could tolerate adequate oral fluid intake (2 L).

Outcome measurements

The primary outcomes of this study were fat mass (FM), FFM, and total body water (TBW), measured by bioelectric impedance analysis (BIA). %FM, %FFM, and %TBW were calculated as well, by dividing FM, FFM, and TBW by weight, respectively. Baseline measurements were performed preoperatively and were repeated after the procedure at 1, 3, and 6 months. Excess weight loss percent (%EBWL) was calculated, with the calculation of ideal weight corresponding to a BMI of 25 kg/m^2.

Patients were instructed not to exercise for 12 hours and not to eat or drink for 3 hours before the measurements. All measurements were done using Tanita BC-418 (Tanita Corporation of America, Arlington Heights, IL) by a nutritionist during afternoon hours.

Analysis

Sample size was estimated by G power with 95% power a priori, assuming a large effect size (Cohen's d = 1) based on the previous studies [8–10,15]. Statistical analyses were performed using Statistical Package of Social Science software (SPSS version 20, IBM, Armonk, NY, USA). Shapiro-Wilk analysis was performed to test distributions normality. Repeated measures of ANOVA were used to test the significance within variable changes in the body composition over time. Mauchly's sphericity test was performed, and Greenhouse-Geisser correction was implemented in cases of violation of the sphericity assumption.

Results

Sixteen consecutive patients who met inclusion and exclusion criteria underwent LGP. No intraoperative complication occurred, and all procedures were completed laparoscopically. No major complication occurred during the study period. There was no loss to follow-up at any point during follow-up. Baseline characteristics and preoperative co-morbidities are presented in Table 1. T1

Mean BMI at baseline and at 6 months postoperative was 40 and 28.5, respectively (95% CI of change: 8–15 kg). Excess weight loss percent (%EBWL) was 77% (SD = 13). Mean postoperative weight loss was 31 kg after 6 months, of which 25.5 kg (83%) was due to FM reduction. Changes in weight, FM, and FFM are illustrated in Fig. 1. Overall, F1 %FM decreased by 15% 6 months after LGP, while %TBW increased by 11%. Changes in BMI, %FM, %FFM, and %TBW are depicted in Fig. 2. F2