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Inadequate protein intake after laparoscopic sleeve gastrectomy surgery is associated with a greater fat free mass loss

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Abstract

Background: Low postoperative protein intake may represent a modifiable risk factor that leads to fat free mass (FFM) loss postlaparoscopic sleeve gastrectomy (LSG), but data concerning this phenomenon is scarce.

Objectives: To evaluate the association between daily protein intake and relative FFM loss at 6 (M6) and 12 (M12) months after LSG surgery.

Settings: Private hospital and university hospital

Methods: A prospective cohort study with 12 months follow-up of 77 patients who underwent LSG surgery. Anthropometrics including body composition analysis measured by multifrequency bioelectrical impedance analysis, 3-day food diaries, food intolerance, and habitual physical activity were evaluated at baseline and at M3, M6, and M12.

Results: Repeated body composition measurements and food diary were available for 77 patients (45 women) at M6 and for 68 patients at M12. Mean age was 42.7 ± 9.4 years and mean preoperative body mass index was 42.2 ± 4.8 kg/m^2. A protein intake of ≥60 gr/d was achieved in 13.3%, 32.5% and 39.7% of the study participants at M3, M6 and M12, respectively. FFM significantly decreased at M6 and stabilized at M12. Protein intake of ≥60 g/d was associated with a significantly lower relative FFM loss at M6 among women (8.9 ± 6.5% versus12.4 ± 4.1%; $P = .039$) and this trend was also reported among men (9.5 ± 5.5% versus 13.4 ± 6.0%; $P = .068$). A logistic regression for the prediction of FFM loss of ≥10% at M6, indicated that protein intake ≥60 g/d is a strong protective factor (odds ratio = 0.29, 95% confidence interval .09–.96, $P = .043$).

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Conclusion: Our study supports the currently recommended protein intake goal of ≥60 g/d as an efficient strategy for better preservation of FFM post-LSG. (Surg Obes Relat Dis 2016;▮:00–00.) © 2016 American Society for Metabolic and Bariatric Surgery. All rights reserved.

Keywords: Obesity; Sleeve gastrectomy; Body composition; Fat free mass; Protein intake

Morbid obesity is highly prevalent worldwide and a major public health burden [1]. Bariatric surgery is usually considered when other treatments to lose weight have failed [2]. The main benefits of this intervention include sustained weight loss and long-term attenuation and control of

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associated co-morbidities, with consequent improvement in quality of life [3]. Laparoscopic sleeve gastrectomy (LSG) is a bariatric procedure consisting of the resection of the majority of the greater curvature that leaves a narrow stomach tube [4]. Current data provide evidence that LSG is a safe and effective procedure for the management of morbid obesity, resulting in excess weight loss (%EWL) of between 33% and 90% [5]. The total number of bariatric procedures performed worldwide during 2013 was 468,609, 37% of them were LSG surgeries [1]. In Israel, almost 9000 people with morbid obesity underwent bariatric surgery during 2014 and LSG was the leading procedure accounting for about 80% of surgeries [6].

Body mass index (BMI) is the most common parameter used to classify the weight status of individuals. However, there may be considerable variation in body composition even between individuals with the same BMI [7]. To improve the assessment of the quality of weight loss after bariatric surgery, it was suggested that body composition assessment should become an integral part of the clinical evaluation preoperatively and postoperatively [7]. Bariatric surgery markedly affects fat free mass (FFM) along with fat mass (FM) [8]. At 1 year after surgery, LSG was reported to be more effective in inducing EWL and body fat loss compared with conservative weight loss treatments, but with the cost of more pronounced FFM and protein loss [9]. The loss of FFM is a negative phenomenon, as nonadipose tissues are responsible for the majority of resting metabolic rate, the regulation of body temperature and weight maintenance [9]. Hypoalbuminemia (serum albumin level < 3.5 mg/dL) may occur especially during the first months postsurgery and it is more common in malabsorptive procedures. Suggested diagnostic methods to detect FFM loss include the determination of serum albumin and direct FFM evaluation [10]. However, blood proteins are less sensitive indicators of nutritional status [11].

The degrees of physical activity or sedentary behavior, protein intake, age, and male gender modulate the risk of FFM depletion postsurgery [8,10,12,13]. Postoperative protein intake leads to satiety induction, improves nutritional status, and reduces muscle breakdown [11]. Therefore, current consensus guidelines recommend average daily protein intake of 60–80 g or 1.1 g/kg of ideal weight (IBW) after LSG to minimized postsurgical FFM loss [10,14], although there is no conclusive evidence to support this recommendation [12]. Only a few small studies tested the effect of protein intake on FFM change after LSG [12,15]. Therefore, the aim of the present study was to evaluate the association between daily protein intake and relative FFM loss at 6 (M6) and 12 (M12) months post-LSG surgery.

Materials and methods

This prospective cohort study is a part of a randomized clinical trial of 6 months treatment with probiotic versus placebo and another 6 months follow-up of 100 nonalcoholic fatty liver disease patients who underwent LSG surgery during February 2014 to January 2015. Inclusion criteria were 18–65 years old, BMI > 40 kg/m² or BMI > 35 kg/m² with co-morbidities, approval of the Assuta Hospital's committee to undergo bariatric surgery, ultrasound diagnosed nonalcoholic fatty liver disease, and ability to sign an informed consent. Major exclusion criteria were excessive alcohol consumption, mental illness or cognitive deterioration, and previous bariatric surgery. Diabetic patients who were treated with antidiabetic medications other than Metformin exclusively at a stable dose for at least 6 months were also excluded. Medical history for co-morbidities was obtained from the patients' medical records.

Data of the combined treatment groups is presented in this study, since no difference between them was observed for the measurements discussed here. All procedures performed in this study were approved by the institutional review boards of both participating hospitals and all participants signed an informed consent. The study was preregistered in the NIH registration website (TRIAL no. NCT01922830).

Anthropometric measurements

Anthropometric measurements were performed following a uniform protocol at baseline, M3, M6, and M12. Weight and height were measured on a digital medical scale, and waist circumference was measured twice at the level of the umbilicus according to a uniform protocol. BMI was calculated using weight (in kilograms) divided by the height squared (in square meters). EWL percentages were calculated as follows: ([pre-operation weight − postoperation weight]/[pre-operation weight − IBW]) × 100. IBW was considered as the weight for BMI 25 kg/m² [16]. Percentages of total weight loss were calculated as follows: ([pre-operation weight − postoperation weight]/[pre-operation weight]) × 100.

Patients underwent measurement for body composition (%FM, FM [kg] and FFM [kg]) using a multifrequency bioelectrical impedance analysis (BIA, Inbody 200®, Biospace) at baseline, M6, and M12. Body composition was not measured at M3 since we anticipated that only a very small proportion of the patients will reach a recommended protein intake at this time point. Patients were evaluated after an overnight fast of 12 hours and according to the specifications from the manufacturer. BIA is a noninvasive and relatively inexpensive method that has been used for measuring body composition [7,17], and was found to be a valid alternative to assess body composition in morbidly obese patients [7]. The researcher who performed the measurements was blinded to the dietary intake records at the time of the measurement.