A Comparison of the Effects of Roux-en-Y Gastric Bypass and Sleeve Gastrectomy on Body Mass Composition as Measured by Air Displacement Plethysmography
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Introduction

- The roux-en-y gastric bypass (RYGB) and sleeve gastrectomy (SG) are the most commonly performed bariatric surgeries worldwide.
- The SG is traditionally considered to be primarily a restrictive procedure where as the RYGB imparts restriction and malabsorption.
- Loss of lean mass may impart deleterious effects on the patient such as an inability to complete activities of daily living, decreased bone mineral density and impaired basal metabolic rate.
- Current evidence suggests that the RYGB leads to disparate changes in fat and lean mass when compared to that which is seen with restrictive-centric efforts.
- Given the lack of malabsorptive component of the SG it is thought that the SG may have less profound effects on loss of lean mass.
- This study seeks to compare patients who underwent a RYGB to SG with regards to change in excess body weight and body composition using Air Displacement Plethysmography (BodPod™).
- It is hypothesized that patients who undergo RYGB will experience more profound loss in lean body mass than those patients undergoing a SG.

Methods

Patients were selected according to NIH guidelines for bariatric surgery and completed a full multidisciplinary evaluation and monitored weight loss preoperatively. Patients underwent SG or RYGB based on surgeon recommendation, preoperative testing, patient preference and medical comorbidities. Body composition was calculated using whole body densitometry (BodPod™, Cosmed Chicago, IL; Figure 1). Patients underwent testing pre-operatively and at six months and 12 months post-operatively. Patients were followed postoperatively according to ASMBS guidelines with standardized postoperative dietary instruction and monitoring. Measurements of change in total body mass, fat mass and lean mass as well as calculation of change in percent excess body weight were performed. Statistical analysis was completed using SPSS.

Table 1. Number of patients undergoing each procedure and mean % of IBW.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number of Patients</th>
<th>Mean % of Ideal Body Weight</th>
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<tbody>
<tr>
<td>SG</td>
<td>33</td>
<td>207%</td>
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<tr>
<td>RYGB</td>
<td>30</td>
<td>196.5%</td>
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Statistical analysis was completed using SPSS.

Discussion

This study demonstrates that both the SG and RYGB provide equivalent and significant reduction of excess body weight. This study also demonstrates that the overwhelmingly greatest proportion of total mass that is lost after surgery is fat mass but that lean mass is also lost after both SG and RYGB. This study demonstrates that there is no significant difference between the two procedures with regards to loss of fat and lean body mass. Finally, while a greater absolute amount of fat mass is lost compared to lean mass after bariatric surgery, an equivalent proportion of fat and lean mass are lost after surgery and there is no statistical difference in this regard between SG and RYGB.

The results of this study impart greater knowledge regarding body mass composition changes after bariatric surgery and specifically provide valuable information regarding body mass composition changes after SG which is relatively lacking in the literature. In certain patient populations, especially older patients or patients with impaired mobility or low baseline functional status, loss of lean mass may have detrimental effects. This study demonstrates that this postoperative concern is not alleviated by undergoing SG over RYGB. Finally, given that an equivalent proportion of lean and fat mass are lost after bariatric surgery, this study lends further support to the emphasis of adequate protein repletion after bariatric surgery. The results of this study also lend support to the recommendation of attempting to build lean mass through exercise preoperatively and maintain lean mass through exercise postoperatively.

Figure 1. BodPod™

Figure 2. Mean %EBW lost after SG and RYGB. No statistical difference.

Figure 3. Mean decrease in mass after bariatric surgery by mass composition.

No significant difference observed between procedures.

Figure 4. Mean percent change in fat and lean mass after bariatric surgery. No significant difference observed between procedures.