Treatment of super super morbid obesity by sleeve gastrectomy

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Summary

Interest of work > The longitudinal or “sleeve” gastrectomy was recently introduced into the therapeutic arsenal of the bariatric surgeon. It is a restrictive procedure that reduces stomach capacity by 75%. We present here a preliminary experience with four patients.  
Methods > Four patients with super super obesity (body mass index (BMI) > 60 kg/m²) underwent longitudinal or “sleeve” gastrectomy. Their average preoperative weight was 173 kg (range: 147-190 kg) and mean BMI 65 kg/m² (range: 61-67 kg/m²).  
Results > The average post-operative follow-up was 6 months (range: 2-12 months). Average weight loss at 6 months was 40 kg (range: 20-60 kg) and average decrease in BMI at 6 months 16.3 kg/m² (range: 6-23 kg/m²). We noted a postsurgical complication in only one patient (sub-diaphragmatic abscess treated with drainage).  
Perspectives > These preliminary results suggest that the sleeve gastrectomy is associated with few perioperative complications and offers rapidly effective treatment for super super morbid obesity. Long-term results require further investigation.
Obesity is a public health problem throughout the industrialized world [1]. In adults, morbid obesity is defined by a body mass index (BMI) of 40 kg/m² or higher [1, 2]. Only bariatric surgery has proven effective for these patients. In the long term, it reduces morbidity [3-5] and mortality [6]. Super super morbid obesity is the term used for BMI greater than 60 kg/m² [7]. Among surgical techniques practiced in France, vertical banded gastroplasty is the most widely used, but it is not especially effective in the super super obese [8]. Gastric bypass or duodenal switch are more effective in these patients [9], but also tend to cause more perioperative complications [4, 9] that are related to technical difficulties associated with weight and frequent comorbid conditions, such as diabetes, hypertension, and sleep apnea [3, 4]. Another technique used in bariatric surgery is longitudinal or “sleeve” gastrectomy (figure 1) [10-12]. Three studies of super super obese patients, whose perioperative risks are high, have examined this procedure in an effort to reduce morbidity and mortality below the levels seen with gastric bypass [11-13].

Methods

Four patients were referred to us between March 2004 and January 2005 for surgical treatment of super super morbid obesity (BMI > 60 kg/m²). They met the ANAES criteria for bariatric surgery [3]. A multidisciplinary team including a surgeon, endocrinologist, psychologist, psychiatrist, anesthetist, nutritionist, and nurse evaluated each case. All four patients (table I) had a metabolic, hormonal, and cardiopulmonary workup and received detailed information about the surgical technique, its advantages, and its known complications [3]. After laparoscopic sleeve (longitudinal) gastrectomy, the same multidisciplinary team continued to follow the patients and recorded perioperative complications, course of weight loss, and co-morbidity.

Sleeve (longitudinal) gastrectomy

One surgeon (JMC) performed all four operations (figures 1, 2). After general anesthesia and endotracheal intubation, patients were placed in the lithotomy position with the surgeon standing between the patient's legs (French position). A CO₂ pneumoperitoneum was induced and maintained at a pressure of 16 mmHg. The procedure required 6 trocars. The gastrocolic ligament was divided along the stomach at a distance of 7 cm from the pylorus. The greater curvature of the stomach was dissected up to the angle of Hiss with electrocautery (Ligasure®, Tyco®, France). A 36-french Faucher orogastric tube was placed in the stomach, along the lesser curvature. The stomach was sectioned, first perpendicular to the Faucher tube at 7 cm from the pylorus and then along the length of the tube to the left pillar of the diaphragm, with linear laparoscopic staples, used to both section the stomach and staple the sectioned edges at the same time (USS EndoGIA®-Tyco®, France or Endopath®-Ethicon Endo-Surgery®, France) (figure 2). The staples were secured with reinforced sutures (Seamguard Bioabsorbable®, Gore®, France). The stomach that remained thus consisted of a tube the length of the lesser curvature (figures 1, 2) and the pyloric antrum. The resected portion of the stomach was placed in a removal pouch and extracted from the peritoneal cavity. A polyethylene blue test was used to check for leaks in the remaining gastric cavity, and a drain was placed along the suture line. The surgery ended...
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Results

The mean preoperative weight of the 4 patients was 173 kg (range: 147-190 kg), and the mean BMI 65 kg/m² (range: 61-67 kg/m²).

Surgery and Hospitalization

All four patients had a laparoscopic longitudinal gastrectomy, which took an average of 175 minutes (150-210 minutes) to perform. The mean duration of hospitalization was 13 (8-28) days. The postoperative course was simple for three of four patients who had no postoperative complications. On day 8, patient no. 2 had pain on the left side, related to a left subdiaphragmatic abscess, which was treated with laparoscopic drainage. She was hospitalized for 28 days (table I).

BMI and weight loss over time

The mean postoperative follow-up was 6 months (range: 2-12 months). Mean weight loss at 6 months was 40 kg (range: 20-60 kg). Mean decrease in BMI at 6 months was 16.3 kg/m² (range: 6.2-23 kg/m²) and mean excess weight loss was 32% (range: 15-47%).

Comorbidity

Questioning the patients revealed a subjective decrease in joint pain and exertional dyspnea (with improved mobility) as well as fewer episodes of daytime somnolence. Improved glycemic control was observed in patient number one; her glycosylated hemoglobin (HbA1c) fell from 10.0% to 7.7% in one year, while she also reduced her antidiabetic medications. Blood pressure control improved in two hypertensive patients (n. 1 and n. 4): systolic pressure fell by 30 mm Hg. Hypertriglyceridemia in patient no. 1 improved somewhat, falling from 3.56 to 1.8 mM. Tests revealed no vitamin deficiency, ferritinemia, or anemia during follow-up.

Discussion

Perioperative risks (morbidity and mortality) are high in super super obese patients and multidisciplinary teams must carefully assess the risk/benefit ratio of bariatric surgery. The least risky but also least effective surgical technique for the super super obese is vertical banded gastroplasty [14]. Conversely, the most effective techniques, which are also the riskiest, are gastric bypass and duodenal switch. A “Magenstrasse and Mill” longitudinal gastroplasty, conserving the entire stomach (no gastric resection), has been proposed and has lower morbidity and mortality [15]. This intervention only divides the stomach into two compartments and should be distinguished from the sleeve gastrectomy described here, which involves resecting three

**Figure 2**

Intraoperative view

1 : tubulized stomach; 2 : resected stomach; 3 : stomach section and stapling of edges of the section with automatic forceps (USS Endo GIA®-Tyco®, Pleasure, France) furnished with Seaguard Bioabsorbable® reinforced sutures (Gore®, Paris, France); 4 : edge of stapled section.

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<th>Patients’ characteristics, comorbidity and surgical follow-up</th>
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<td>Characteristics</td>
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* : Hypertriglyceridemia; ** : 2 months; *** : 2 months

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quartiers of the stomach, including the fundus. Our preliminary results show that 6 months after surgery, sleeve gastrectomy can be as effective as gastric bypass in terms of weight loss in the super super obese population and presented fewer perioperative risks [11, 13]. The frequency of complications in the super super obese may reach 23% after gastric bypass [1] and 38% after duodenal switch [9]. The death rate in this group has been assessed at 2.7% after gastric bypass [1] and 6.25% after duodenal switch [9].

Among our four patients, we observed a single postoperative complication, a subdiaphragmatic abscess treated by laparoscopic drainage. Only five studies of sleeve gastrectomy have been published; they include 91 patients with a mean maximum follow-up of 17 months [10, 11, 12, 15, 16]. Only two studies [10, 12], which included 20 patients, used reinforced sutures (Seamguard Bioabsorbable®, Gore®, France), as we did, and they reported no postoperative morbidity or mortality. Almogy et al performed this operation on 21 patients without reinforced sutures and observed only one intraabdominal deep-abscess complication [11]. Other postoperative complications in that study were atrial fibrillation (1), aspiration pneumonia (1), liver failure with cirrhosis (1), and myocardial infarction (1) [11]. Adding our four patients to the 91 already reported in the literature brings the number of intraabdominal abscesses to only three (3.3%), related to leaks in the suture line.

The substantial rapid weight loss we observed is similar to that reported by other authors [10, 11, 13]. The effect is known to attenuate 18 months after surgery [11]. We also observed a slowing in weight loss in the one patient after a year of follow-up. Longitudinal gastrectomy may be a definitive treatment that permits a mean excess weight loss of 46-50% at 1 year [13, 16]. Nonetheless, we must await the long-term results before knowing if it is a temporary or definitive treatment for super super morbid obesity. If weight loss is insufficient, this technique can later be followed by malabsorption bariatric surgery, such as gastric bypass [13] (Figure 3) or duodenal switch [10]. The weight loss that follows from the first surgery makes the second surgery easier. Such weight loss should also reduce comorbidity, further helping to reduce the risk of perioperative complications. It is generally agreed that bariatric surgery works by restricting food intake or by imposing malabsorption, but other mechanisms, not yet elucidated, have also been suggested. Rubino and Gagner [17] noted that three weeks following gastric bypass, blood glucose and insulin-resistance had both fallen and were independent of weight loss. The mechanisms responsible for reducing appetite are poorly understood. But much interest has focused on the role of the hormone ghrelin [18], secreted in the fundus, most of which is resected in sleeve gastrectomy. Ghrelin, composed of 28 amino acids, is produced under the influence of cholinergic stimulation and has receptors in the pituitary gland and hypothalamus. Experimentally, injection of this hormone increases food intake and weight gain. In humans, serum ghrelin concentrations are elevated in anorexia nervosa, certain cancers, Prader Willi syndrome, and in patients on low-calorie diets [18]. Food intake and gastrectomy reduce serum concentrations [18], which are very low in patients with gastric bypass [19]. The lack of contact between food and the stomach mucous membrane that produces ghrelin may inhibit secretion [20]. Accordingly, resection of the ghrelin-producing area may explain weight loss in sleeve gastrectomy. This has been corrected experimentally by exogenous ghrelin administration [21]. Two studies, one by our group, have shown an early, lasting drop in ghrelin concentrations over a one-year period [22, 23]. Accordingly, the unique nature of longitudinal “sleeve” gastrectomy may relate especially to its reduction in perioperative complications. Details of the hormone mechanisms leading to substantial and rapid weight loss require more study.

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Conflict of interest: none
References