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Surgical management of refractory severe protein - calorie malnutrition following Mini Gastric Bypass – One Anastomosis Gastric Bypass: Shortening of biliopancreatic limb with gastrojejunal anastomosis preservation

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Abstract:

Objective: Mini Gastric Bypass – One Anastomosis Gastric Bypass (MGB-OAGB) is increasing in popularity around the globe for the surgical management of obesity and metabolic disorders. Altogether, controversy still exists, and there is no consensus regarding some key technical aspects such as the optimal length of the bypassed intestine. Moreover, surgical strategies for managing its failures and complications have not been properly defined. **Materials and Methods:** A case of a 46-year-old male with BMI of 66.8 kg/m2 who underwent MGB-OAGB with a biliopancreatic limb (BPL) to common limb (CL) ratio of 60% - 40% is presented. Fifteen months after surgery he developed signs and symptoms of protein - calorie malnutrition (PCM) refractory to medical management which ended up with excessive weight loss and anasarca. **Results:** Laparoscopic revisional surgery with shortening of the BPL and preservation of the gastrojejunal (GJ) anastomosis was considered the most appropriate approach for its simplicity and safety. Nutritional status and symptoms improved considerably after surgery. Conclusion:When total small bowel length is not routinely measured, exceeding the 200 cm limit of bypassed intestine carries a higher risk of malabsorption. Measuring the entire bowel length and leaving a CL of at least 400 cm reduces the incidence of PCM and its devastating consequences. If revisional surgery is necessary, a laparoscopic approach with shortening of the BPL and GJ anastomosis preservation seems to be a safe and effective option. anastomosis of the alimentary limb and distal to it, a new lateral jejunojejunostomy anastomosis. **Conclusion:** The therapeutic option with less recurrence is the resection and reanastomosis; more evidence is required to describe the effects of bariatric surgery on the digestive tract of patients with SLE.

Keywords:

- Mini Gastric Bypass (MGB)
- One Anastomosis Gastric Bypass (OAGB)
- Malnutrition
- Revisional surgery
- Laparoscopy

Introduction

Throughout time, laparoscopic MGB-OAGB has demonstrated to be a safe and effective procedure for the treatment of obesity and related comorbidities when performed by experienced surgeons (1). Proponents of this procedure argue it is a simpler and less technically demanding technique, with shorter operative times due to the presence of a single anastomosis (2). At the same time, it provides effective excess weight loss and resolution of obesity related comorbidities, with comparable outcomes with laparoscopic Roux-en-Y Gastric Bypass (LRYGB), considered the reference standard surgical procedure (3–8).

Since its first description in 2001 by Rutledge et al (2), interest in this procedure has been growing considerably, becoming actually the third bariatric/metabolic surgery most commonly performed worldwide, behind LSG and LRYGB (5). On the other hand, concern has been raised regarding potential under-registration of adverse outcomes, and detractors of this technique consider the actual number of patients requiring revisional surgery after MGB-OAGB being considerably greater than reported (9), with approximately half of these being due to PCM (10–12).

Case presentation

We present the case of a 46-year-old male who underwent laparoscopic MGB-OAGB in 2017 for super obesity with multiple associated co-morbidities (hypertension, dyslipidaemia, liver steatosis and obstructive sleep apnea). Maximum preoperative BMI was 66.8 Kg/m2 (183 kg – 168 cm). A laparoscopic approach with 6 trocars was performed, and a total of 620 cm of small bowel length were measured. A long and narrow gastric pouch starting below the crow´s foot

and calibrated with a 36 F bougie was created with linear staplers. Following a BPL to CL ratio of 60% - 40%, an end to side loop gastrojejunostomy was performed at 230 cm from the ileocecal valve in an ante-colic fashion, leaving a 390 cm BPL. The patient experienced an uneventful postoperative course, and at 6 months excess weight loss (EWL) was 69.7 %.

Nearly 12 months after surgery, the patient was hospitalized for severe sepsis secondary to urinary tract infection. Surprisingly, laboratory analysis also revealed mild hypoproteinemia (6.2 g/dl) and hypoalbuminemia (3.1 g/dl), which had not been detected previously. After a week of intravenous antibiotics, the patient experienced full clinical recovery, and was discharged with a high-protein diet and oral supplementation with whey protein. An objective of 90g of protein/day (1.3g/Kg/day) was set.

Fifteen months after surgery EWL was 96% with a weight of 72.2 kg. As serum values of protein and albumin continued to decrease (5.4 g/dl and 2.6 g/dl respectively), a new nutritional regime was tried with 150 g of protein/day (2.2 g/Kg/day). Supplementation with pancreatic enzymes (25000 IU/day) was also started for steatorrhea. Even though there was a slight clinical improvement during the following months, adherence to nutritional recommendations became extremely inconsistent. Moreover, dietary supplements became unaffordable for the patient during the outbreak of COVID-19 pandemic, and they were constantly interrupted.

On July 2020, almost three years after surgery, the patient was hospitalized for anasarca, oral intolerance and clinical deterioration. Signs and symptoms of PCM were present, with bilateral lower limb oedema, ascites, pleural effusion and severe diarrhoea with up to 18 depositions per day. Laboratory exams revealed progression of hypoproteinemia (5.2 g/dl) and hypoalbuminemia (2.3 g/dl). No other symptoms such as bile reflux were manifested, and a new upper GI tract endoscopy revealed a wide and permeable GJ anastomosis with no signs of gastritis or oesophagitis. After a multidisciplinary consensus, Total Parenteral Nutrition (TPN) was initiated to improve nutritional status. Surgical revision was unanimously considered the following step.

After 6 months of TPN and once clinical and nutritional status improved, the patient was considered in acceptable conditions to undergo surgical revision. Surgery was performed by the same team on June 2021.

It was the patient`s request to avoid the possibility of weight regain, so conversion to normal anatomy was not considered. Of the remaining options available, shortening of the BPL with preservation of the GJ anastomosis was decided for its simplicity and safety.

A laparoscopic approach was done with 4 trocars (two 5 mm and one 12 mm working ports, one 10 mm camera port). Total small bowel length was measured, being of 620 cm. After some easy adherence lysis, the loop GJ anastomosis was identified. The BPL and CL were sectioned at 1 cm and 20 cm respectively form the GJ anastomosis with linear staplers. Reconstruction of intestinal transit was done with a side to side enteroenterostomy with linear stapler. Closure of enterotomies was done with a running 2.0 monocryl suture. A new 120 cm BPL was then anastomosed to the remaining 20 cm segment that was left attached to the GJ anastomosis in a side to side fashion with linear stapler. Enterotomies were closed in the same way as mentioned before. A methylene blue test was performed with no evidence of anastomotic leak, and no drains were needed.

The patient had an uneventful postoperative course and was discharged on the following day. During the first 5 postoperative days, he was allowed liquid diet only. Diet progression was done afterwards with protein shakes and soft diet. Improvement of malabsorption was documented immediately, with a drastic reduction in bowel movement frequency, reaching one deposition per day. Follow up at 1 and 3 months after surgery revealed normalization of liver enzymes and normal values of albumin (4.3 g/dl) and total serum proteins (7.3 g/dl).

Discussion

Many modifications of the original MGB-OAGB technique have been reported since its first description, including the addition of anti-reflux mechanisms with replacement of the traditional end to side anastomosis for a side to side anastomosis (13), fixation of the GJ anastomosis to the antrum to prevent loop rotation (12) and tailoring the bypassed intestine length according to the patient´s preoperative BMI (14) or the total small bowel length (7). This last aspect is particularly important, since published evidence show that exceeding the 200 cm limit of bypassed intestine increases significantly the risk of malabsorption, excessive weight loss and malnutrition, with its devastating associated complications of liver dysfunction, psychological disturbances, sepsis and others (10,15). Nevertheless, distalization of the loop gastrojejunostomy has been described as an alternative for patients with higher BMI, assuming a higher risk of malabsorption (16,17).

Malabsorptive procedures such as MGB-OAGB (18) are

usually recommended for patients with super morbid obesity or severe metabolic disorders (12,17). However, precise patient selection remains the cornerstone of bariatric surgery, and before deciding the type of surgery, an extended preoperative evaluation including assessment of socioeconomic status should be done (15). Patients undergoing this kind of procedures are exposed to higher risks of nutrient deficiencies (6), and therefore they must be informed about the necessity of a strict follow up and the possibility of life long supplementation (18). For this reason, low socioeconomic status is added to the list of relative contraindications, including vegetarianism, short small bowel length, inflammatory bowel disease, liver cirrhosis, severe GERD and Barret´s oesophagus (19). All these patients should be carefully evaluated before being selected for MGB-OAGB.

Overall, surgical revision following MGB-OAGB has been reported to be between 2 and 5 %, with approximately half of these patients being due to PCM (10–12). Remaining complications requiring revision include chronic bile reflux, intractable marginal ulcers and inadequate weight loss (3). On the other hand, concern has been raised regarding potential under-registration of adverse outcomes, and detractors of this technique consider the actual number of patients requiring revisional surgery after MGB-OAGB being considerably greater than reported (9).

Protein calorie malnutrition after MGB-OAGB is an infrequent but potentially life-threatening condition that demands an aggressive management. Oral supplements, pancreatic enzymes and TPN are usually necessary to improve the nutritional status prior to surgery. Conversion to normal anatomy, RYGB, SG, gastroplasty and shortening of the BPL are considered all valid alternatives as long as they are performed by an experienced team (15,18).

Deciding the type of revisional procedure depends on various aspects, including the presence of concomitant symptoms, surgical team expertise and patient´s opinion. If only signs and symptoms of malnutrition are present, conversion to normal anatomy seems to be the safest option. However, patients must be clearly warned about the possibility of weight regain. On the other hand, if concomitant bile reflux or marginal ulceration exist, RYGB will be the most appropriate solution given that an isolated biliopancreatic limb is created, with diversion of secretions away from the GJ anastomosis. As to conversion to SG, this option is usually discouraged since there is a higher prevalence of leakage and because remnant gastric resection may condition future surgical alternatives (15). All things considered, when no bile reflux is present, shortening of the BPL with gastrojejunostomy preservation looks like the optimal alternative, avoiding the possibility of weight regain.

Following the latest published literature, we have applied some technical modifications to minimize the risk of malnutrition when performing MGB-OAGB. Our team has shifted from the concept of a BPL to CL ratio of 60% - 40% as proposed by Carbajo et al (13) towards a safer approach (12). This implies that every patient selected for MGB-OAGB undergoes complete small bowel measurement at the beginning of surgery. A CL of at least 350 – 400 cm must be left in order to continue with the procedure. If this requirement cannot be fulfilled, another technique should be chosen intraoperatively. Finally, a 150 – 200 cm BPL is anastomosed to the gastric pouch in an antecolic fashion.

Conclusions

Protein calorie malnutrition following bariatric surgery is an uncommon complication, with malabsorptive procedures being responsible for most of the cases. Revisional surgery is mandatory in patients who fail to respond to medical management, not only to improve quality of life but also to prevent mortality. Focus should be done in prevention, beginning with consistent patient selection and exclusion criteria. Intraoperatively, measurement of the total small bowel length, leaving a minimum of 350 - 400 cm CL a and respecting the 150 - 200 cm limit of bypassed intestine seems to be the most important recommendations.

Of the multiple options available, shortening of BPL with preservation of the GJ anastomosis seems feasible and safe. Nonetheless, every approach should be individualized based on patients' preferences, concomitant symptoms, and surgical team expertise.

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