Laparoscopic one-anastomosis gastric bypass: results of the first 310 patients

Mahmoud Zakaria, Ahmad Elhoofy

Faculty of Medicine, Ain Shams University, Cairo, Egypt

Correspondence to Ahmed Elhoofy, MD, Faculty of Medicine, Ain Shams University, Cairo, 3654556, Egypt. Mob: 01000029980; fax: 0236598788;
e-mail: ahmednabil_sur@hotmail.com

Received 26 December 2018
Accepted 13 January 2019

The Egyptian Journal of Surgery 2019, 38:406–410

Background
Laparoscopic one-anastomosis gastric bypass (LOAGB) is an effective, relatively low-risk procedure and can be reversed.
Patients and methods
Between June 2014 and September 2018, 310 morbidly obese patients have undergone LOAGB surgery.
Results
The mean operating room time was 69 min. Median postoperative length of stay was 2.1 days. The;Deg;BM;Deg;I has decreased from 49.3±9.9 to 38.8±9.7 kg/m^2, 33.7±4.7 and 28.8 kg/m^2 at 6, 12, and 24 months postoperatively, respectively. The percentage of excess weight loss is, respectively, 50±26, 62±25, and 72±18% at 6, 12, and 24 months postoperatively.. Major complications have occurred in a total of 11 (3.5%) patients. One patient has suffered from postoperative gastrojejunal anastomotic leakage. Five patients have suffered from massive postoperative bleeding. Two patients have intractable bile reflux after minigastric bypass. Omega loop gastric bypass was converted to Roux-en-Y gastric bypass in these two patients. One anastomotic stenosis needed dilatation over three sessions. One patient developed port site hernia 6 months postoperatively. This patient was explored and managed laparoscopically. One patient presented 15 months after minigastric bypass with perforated gastrojejunal anastomotic ulcer that was treated by omental patch repair. There were no postoperative mortalities.
Conclusion
LOAGB can be regarded as a simple, safe, effective, and reversible bariatric procedure.

Keywords:
bariatric surgery, biliary reflux, laparoscopy, minigastric bypass, morbid obesity, omega loop gastric bypass, one-anastomosis gastric bypass

Egyptian J Surgery 38:406–410

1110-1121

Introduction

Minigastric bypass (MGB) for morbid obesity was first described by Rutledge in 1997 and was reported in 2001 [1].

In 2002, Carbajo and Garcia Caballero in Spain initiated the OAGB variant of the MGB to prevent the potential gastroesophageal bile reflux [2].

According to the last International Federation for the Surgery of Obesity and Metabolic Disorders survey, OAGB accounts for ~1.8% of all bariatric procedures worldwide [3].

In May 2018, the International Federation for the Surgery of Obesity and Metabolic Disorders issued a position statement that OAGB is a recognized bariatric/metabolic procedure and should not be considered investigational anymore [4].

Patients and methods

A total of 310 morbidly obese patients (195 women and 115 men) who have undergone one-anastomosis gastric bypass for weight loss, between June 2014 and September 2018, were studied. The patients were eligible for operation if they were between 18 and 70 years old with a BMI of greater than or equal to 40 kg/m^2 or greater than or equal to 35 kg/m^2 with an obesity-related comorbidity, failed attempts at nonsurgical weight loss in the absence of mental illnesses due to psychoses, or substance abuse.

Procedure selection is a combined decision between the informed patients and the operating surgeon after

 DOI: 10.4103/ejs.ejs_218_18

explaining the rational use, complications, and the necessity of the procedure. Other surgical options like sleeve gastrectomy and adjustable gastric banding are discussed with the patients. Written consent is obtained from each patient.

The data were reviewed for age, sex, obesity-related comorbidities at baseline, preoperative and postoperative weight, and BMI, preoperative investigations, operative details, length of stay, early (<30 day) and late postoperative complications, and improvement or resolution of obesity-related comorbidities. Remission of diabetes mellitus (DM), hypertension (HTN), or obstructive sleep apnea (OSA) was considered when the patients were able to discontinue all the medications with normal hemoglobin A1c (DM), blood pressure (HTN), and polysomnography (OSA) and were considered to be improved with a discontinuation or decrease in the dose of one or more drugs, but not all. The diabetic patients on insulin were considered to be improved if they were able to discontinue the insulin. Weight loss was expressed as the percentage of excess body weight loss.

An extensive preoperative evaluation including history, physical examination, and blood investigations (liver function tests, kidney function tests, complete blood count, prothrombin time, serum cortisol level, thyroid function tests, fasting blood sugar, and HbA1c level) have been carried out. Gastroscopy, ECG, chest radiography, echocardiography, pulmonary functional tests, and abdominal ultrasound have been performed.

Preoperative evaluation showed that 79 (25.5%) patients had type 2 DM, 43 (17.1%) patients had HTN, and only nine (2.9%) patients had OSA.

Patients with BMI greater than or equal to 50 kg/m^2 are given a low-calorie, high-protein diet for at least 2 weeks before the operation to decrease liver steatosis and mesenteric fat infiltration. Prophylactic dose of low molecular weight heparin is administered subcutaneously 12 h preoperatively and then daily for 14 days postoperatively. Patients are admitted on the morning of the day of surgery. A third-generation cephalosporine is administered 1 h preoperatively. Elastic stockings are used perioperatively.

Surgical technique

Surgeries are performed under general anesthesia. The patients are placed in supine position with the table in reverse Trendelenburg position. Nasogastric tube is inserted.

The surgical technique of laparoscopic one-anastomosis gastric bypass (LOAGB) involves placement of five laparoscopic ports. The stomach is divided at the junction of the body and the antrum at the level of the crow's foot with a 45-mm Endo-GIA stapler to obtain the longest possible gastric pouch. A lesser curvature-based tube of the stomach is constructed with a 60-mm linear stapler using 3.5-mm blue cartridges around an orogastric tube of 36 Fr size. A jejunal loop, 200 cm distal to the ligament of Treitz, is then brought up antecolic and anastomosed to the stomach tube with a 45-mm Endo-GIA stapler (Ethicon Endo Surgery, Cincinnati, Ohio, USA). The common stapling defect is closed over the nasogastric tube with two layers of No 2-0 absorbable V-LocTM suture (Autosuture Division of Covidien, USA) in a running fashion. The anastomosis is then tested with methylene blue injected through the nasogastric tube. A tube drain is left in the vicinity of the gastrojejunostomy under the left lobe of the liver.

Early postoperative ambulation is strongly encouraged. A gastrogaffin study is performed during the first postoperative day. If it proved negative for any leak or stenosis, the patients are allowed to have clear liquid diet and are discharged as soon as the latter is well tolerated. The tube drain is removed before discharge.

The patients are continued on liquids for 14 days after the operation and on a soft diet for another 21 days. After that, solid food is progressively allowed according to the patient's tolerance with meticulous instructions about eating habits (patients were instructed to eat slowly, to take small bites, and to chew well).

A standard regimen of multivitamins, including vitamin B12, iron supplementation, and calcium, in addition to a 4-month course of proton pump inhibitors (omeprazole 40 mg) are prescribed to all patients. A consistent exercise program is emphasized. Follow-up appointments with the surgeon are scheduled at 10 days and 1, 3 6, 9, 12, 18, and 24 months postoperatively.

Operative morbidity is any complication that has contributed to a prolonged hospital stay or has led to additional procedures. Operative mortality is the death that has occurred during the surgical procedure, postoperative hospital stay or within 30 days following the primary operation.

Results

Between June 2014 to September 2018, 310 patients underwent LOAGB (195 women and 115 men). The mean initial BMI was 49.3±9.9 kg/m^2.

The mean operating room time was 69 min. Median postoperative length of stay was 2.1 days.

Only 11 (3.5%) patients have suffered from major complications. On the third postoperative day, a patient presented with sudden onset abdominal pain and abdominal distention. Pelviabdominal computed tomography (CT) scan showed gastrojejunal anastomotic leakage. This patient was explored at the same day and managed with closure of the site of leakage and good drainage. Leakage was controlled and the patient recovered smoothly. Five cases of massive postoperative bleeding, three of them presented with haematemesis and melena. They were managed conservatively. Another two patients have intractable bile reflux. Omega loop gastric bypass was converted to Roux-en-Y gastric bypass (RYGB) in these two patients. One patient has developed anastomotic stenosis that needed dilation over three sessions. One more patient presented 6 months after operation with abdominal pain and intestinal obstruction. Pelviabdominal CT scan showed port site hernia. This patient was explored and managed laparoscopically. Finally one female patient presented 15 months after LOAGB with acute abdomen. She was diagnosed by pelviabdominal CT scan as perforated gastrojejunal anastomotic ulcer and was treated by omental patch repair for the ulcer. None of the patients needed conversion to open surgery. Operative mortalities have not been recorded among the studied specimen.

Significant weight reduction has been observed after the procedure. Mean BMI has dropped to 38.8±9.7, 33.7±4.7, and 28.8 kg/m^2 at 6, 12, and 24 months postoperatively, respectively. The mean percentage of excess body weight loss is 50±26, 62±25, and 72±18% at 6, 12, and 24 months postoperatively, respectively.

Diabetic patients have had significant reduction in their mean fasting blood sugar and HbA1c from 130.8 mg/dl and 7.6% preoperatively to 89 mg/dl and 5.2%, respectively, at 6 months postoperatively. Sixty-five (82.3%) diabetic patients have reached the normal fasting blood sugar and HbA1c levels without any need to continue medical treatment. Twenty-seven (62.8%) patients with preoperative HTN have achieved the normal blood pressure level and stopped their medications by the end of the first postoperative year. Among 43 patients with preoperative HTN, complete resolution was seen in 27 (62.8%) patients by 1 year with complete discontinuation of medications. The mean blood pressure decreased from 147 mmHg preoperative to 125 mmHg 1 year postoperatively. A cure rate of 100% has been achieved in patients with OSA.

Discussion

Although RYGB has been performed for more than 30 years, it is still a technically demanding procedure with a learning curve of greater than 75 cases and its complication rate is 5–10% in highly experienced centers [5,6].

Laparoscopic minigastric bypass or omega loop gastric bypass has the advantage of being technically simple with a low morbidity rate, especially in super obese patients with a high operative risk [7]. Furthermore, OAGB is easy to revise and reverse and produces good results as a revision operation after failed primary restrictive bariatric surgery [8,9].

In the current series, 310 patients underwent laparoscopic OAGB. None of them required conversion to open surgery and their mean operative time was 69 min The mean postoperative hospital stay in this study was 2.1 days.

The BMI decreased from 49.3±9.9 to 38.8±9.7 kg/m^2, 33.7±4.7 and 28.8 kg/m^2 at 6, 12, and 24 months, respectively. The percentage excess weight loss was 50 ±26, 62±25, and 72±18% at 6, 12, and 24 months, respectively (Table 1).

In our series, one patient developed gastrojejunal anastomotic leakage. We reported also five patients presented with massive postoperative bleeding. Another two patients have shown intractable bile reflux which urged conversion of omega loop gastric bypass to RYGB. One anastomotic stenosis needed dilatation over three sessions. One of our patients suffered from intestinal obstruction 6 months after operation due to port site hernia and was managed laparoscopically. One female patient presented 15 months after LOAGB with perforated gastrojejunal anastomotic ulcer and was treated by omental patch repair for the ulcer.

The most notorious controversy concerning the disadvantage of LMGB was with postoperative esophagitis and gastritis caused by bile reflux [18]. In Rutledge's paper [1], only 0.6% (six) of the patients had reflux postoperatively as opposed to 62% of the patients preoperatively and Noun *et al.* [11] reported symptomatic biliary reflux in four patients (all revisional MGB) in their series of 1000 patients and these four patients were cured by stapling

Table 1 Percentage of excess body weight loss after laparoscopic one-anastomosis gastric bypass in other studies

References	LOAGB			
	%EBWL at 6 months	%EBWL at 1 year	%EBWL at 2 years	%EBWL at 5 years
Disse *et al.* [10]	76.3	89	–	–
Noun *et al.* [11]	–	69.9	–	–
Chevallier *et al.* [12]	55.5	67	77	71.5
Peraglie [13]	52	67	70	67
Musell *et al.* [14]	–	70	81	77
Kular *et al.* [15]	45	85	91	87
Peraglie [16]	–	57	–	
Piazza *et al.* [17]		65		
Carbajo *et al.* [18]	–	75	–	
Lee *et al.* [19]		86		
Rutledge [1]	51	68	–	
Wang *et al.* [20]	55	69.3	72	70
Rutledge and Walsh [7]	–	80	–	

%EBWL, percentage of excess body weight loss; LOAGB, laparoscopic one-anastomosis gastric bypass.

the afferent loop and by a laterolateral jejunojejunostomy. None of the 209 patients in the study by Carbajo *et al.* [18] had reflux symptoms postoperatively. Two of our LOAGB patients converted to RYGB due to severe biliary reflux during our study period.

There are no data to support a higher risk of gastric pouch cancer in LOAGB patients due to bile reflux [21]. It is indeed possible that increased incidence of gastric cancer reported by some authors in Billroth II gastrectomy patients was due to the fact that a large number of these surgeries were performed for ulcer disease and Helicobacter pylori, known to be a common causal link for both these conditions [22], was not discovered until 1984 [23].

Carbajo *et al.* [18] reported that LOAGB is quick to perform, safe, has minimal major perioperative complications, and very rapid recovery and recommencement of daily activities (mean: 3 days) and work activities (mean: 1 week). Nutritional deficits are infrequent after LOAGB.

Conclusion

LOAGB has good feasibility with a short operative time and low perioperative risk. Laparoscopic one-anastomosis gastric bypass is effective for the treatment of morbid obesity and obesity-related comorbidities.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Rutledge R. The mini-gastric bypass: experience with first 1,274 cases. Obes Surg 2001; 11:276–280.

2 Carbajo MA, Luque-de-Leon E, Jiminez JM, Ortiz-de-Solorzano J, Perez-Miranda M, Castro-Alija M. Laparoscopic one-anastomosis gastric bypass: technique, results, and long-term follow-up in 1200 patients. Obes Surg 2017; 27:1153–1167.

3 Angrisani L, Santonicola A, Iovino P, Vitielllo A, Zundel N, Buchwald H, Scopinaro N. Bariatric surgery and endoluminal procedures: IFSO worldwide survey 2014. Obes Surg 2017; 27:2279–2289.

4 Luca M, Tie T, Ooi G, Higa K, Himpens J, Carbajo M, *et al.* Mini gastric bypass-one anastomosis gastric bypass (MGB-OAGB)-IFSO position statement. Obesity Surgery 2018; 28:1188–1206.

5 Lee WJ, Yu PJ, Wang W, Chen TC, Wei PL, Huang MT. Laparoscopic Roux-en-Y versus mini-gastric bypass for the treatment of morbid obesity: a prospective randomized controlled clinical trial. Ann Surg 2005; 242:20–28.

6 Christou N, Efthimiou E. Five-year outcomes of laparoscopic adjustable gastric banding and laparoscopic Roux-en-Y gastric bypass in a comprehensive bariatric surgery program in Canada. Can J Surg 2009; 52:249–258.

7 Rutledge R, Walsh TR. Continued excellent results with the mini-gastric bypass: six-year study in 2,410 patients. J Obes Surg 2005; 15:1304–1308.

8 Lee WJ, Lee YC, Ser KH, Chen SC, Su YH. Revisional surgery for laparoscopic minigastric bypass. Surg Obes Relat Dis 2011; 7:486–491.

9 Weiner RA, Theodoridou S, Weiner S. Failure of laparoscopic sleeve gastrectomy – further procedure? Obes Facts 2011; 4:42–46.

10 Disse E, Pasquer A, Espalieu P, Poncet G, Gouillat C, Robert M. Greater weight loss with the omega loop bypass compared to the Roux-en-Y gastric bypass: a comparative study. J Obes Surg 2014; 24:841–846.

11 Noun R, Skaff J, Riachi E, Daher R, Abi Antoun N, Nasr M. One thousand consecutive mini-gastric bypass: short- and long-term outcome. J Obes surg 2012; 22:697–703.

12 Chevallier JM, Arman GA, Guenzi M, Rau C, Bruzzi M, Beaupel N, *et al.* One thousand single anastomosis (omega loop) gastric bypasses to treat morbid obesity in a 7-year period: outcomes show few complications and good efficacy. Obes Surg 2015; 25:951–958.

13 Peraglie C. Laparoscopic mini-gastric bypass in patients age 60 and older. Surg Endosc 2016; 30:38–43.

14 Musella M, Susa A, Greco F, De Luca M, Manno E, Di Stefano C, *et al.* The laparoscopic mini-gastric bypass: the Italian experience: outcomes from 974 consecutive cases in a multicenter review. Surg Endosc 2014; 28:156–163.

15 Kular KS, Manchanda N, Rutledge R. A 6-year experience with 1,054 mini-gastric bypasses-first study from Indian subcontinent. Obes Surg 2014; 24:1430–1435.

16 Peraglie C. Laparoscopic mini-gastric bypass (LMGB) in the super-super obese: outcomes in 16 patients. J Obes Surg 2008; 18:1126–1129.

17 Piazza L, Ferrara F, Leanza S, Coco D, Sarvà S, Bellia A, *et al.* A laparoscopic mini-gastric bypass: short-term single-institute experience. J Updates Surg 2011; 63:239–242.

18 Carbajo M, Caballero MG, Toledano M, Osorio D, García-Lanza C, Carmona J. One-anastomosis gastric bypass by laparoscopy: results of the first 209 patients. J Obes Surg 2005; 15:398–404.

19 Lee WJ, Wang W, Lee YC, Huang MT, Ser KH, Chen JC. Effect of laparoscopic mini-gastric bypass for type 2 diabetes mellitus: comparison of BMI$>$35 and $<$35 kg/m^2. J Gastrointest Surg 2008; 12:945–952.

20 Wang HH, Wei PL, Lee YC, Huang MT, Chiu CC, Lee WJ. Short-term results of laparoscopic mini-gastric bypass. J Obes Surg 2005; 15:648–654.

21 Mahawar K, Jennings N, Brown J, Gupta A, Balupuri S, Small P. 'Mini' gastric bypass: systematic review of a controversial procedure. J Obes Surg 2013; 23:1890–1898.

22 Hansson LE, Nyrén O, Hsing AW, Bergström R, Josefsson S, Chow WH, *et al.* The risk of stomach cancer in patients with gastric or duodenal ulcer disease. N Engl J Med 1996; 335:242–249.

23 Marshall BJ, Warren JR. Unidentified curved bacilli in the stomach of patients with gastritis and peptic ulceration. Lancet 1984; 1:1311–1315.