Original Article

Perforated marginal ulcer management after Roux-en-Y gastric bypass and one-anastomosis gastric bypass: A tertiary center experience

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ABSTRACT

Introduction: Marginal ulcers after gastric bypass develops at the margins of gastrojejunostomy, mainly on the jejunal side. Potential risk factors include NSAIDs, Helicobacter pylori infection, smoking, and alcohol. We aim to share experience in our center in the management of perforated marginal ulcers after Roux-en-Y gastric bypass (RYGB) and one-anastomosis gastric bypass (OAGB).

Patients and Methods: Between June 2021 and June 2024, data of all patients who had perforated marginal ulcers after OAGB or RYGB performed at Ain Shams University, Bariatric Surgery Department were collected. We included morbidly obese patients above 18 years old with perforated marginal ulcers after primary OAGB or RYGB.

Results: In this study, 378 patients were included. Of them, 252 patients had OAGB with a mean age of 39.1±6.8. The remaining 126 patients had RYGB with a mean age of 39.9±4.6. The overall incidence of perforated marginal ulcer is 4.4%. The incidence of perforated marginal ulcer after OAGB is 3.1%, while that after RYGB is 7.1%. Eight patients had perforated marginal ulcers after OAGB. Of them, five patients had revision to RYGB. Three patients were managed surgically with exploration and omental patch repair. Nine patients had perforated marginal ulcers after RYGB. Six patients were managed surgically with exploration and omental patch repair. Three patients were managed by revision of gastrojejunostomy.

Conclusion: The overall incidence of perforated marginal ulcer is 4.4%. The incidence of marginal ulcer after OAGB is 3.1%, while that after RYGB is 7.1%. Management options after diagnosis of perforated marginal ulcer are sufficient, but few prophylactic measures exist.

Key Words: Bariatric surgeries, marginal ulcer, obesity, one-anastomosis gastric bypass, Roux-en-Y gastric bypass.

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INTRODUCTION

Although bariatric surgeries are long-term effective management of obesity, postoperative complications exist, one of which is marginal ulcers. Marginal ulcers develop at the margins of gastrojejunostomy, mainly on the jejunal side. In their systematic review of 32 studies involving 8868 patients, Lee *et al*.[1] reported an overall incidence of marginal ulcer of 22.59% after one-anastomosis gastric bypass (OAGB). Only 11 (0.1%) patients died.

In another study involving 3645 patients, Bhandari and Mathur[2] followed patients who had OAGB for 1 year. Five patients had marginal ulcers with an incidence less than 0.01% which is lower than a high incidence, which was proved in multiple studies. The incidence of Roux-en-Y gastric bypass (RYGB) was examined in literature, too. In a recent review by Salame and colleagues, the authors argued that the incidence of marginal ulcer after RYGB is 4.6%.

Potential risk factors include NSAIDs, Helicobacter pylori infection, smoking, and alcohol[3]. The most common site of marginal ulcer, according to Bacoeur-Ouzillou *et al*.[4], is gastrojejunal anastomosis (71.4%), followed by the jejunal limb adjacent to the anastomosis (12.5%). Also, Azagury *et al*.[5] reported that 50% of marginal ulcers occurred at the gastrojejunal anastomosis site.

In this study, we aimed to share experiences in our center in the management of perforated marginal ulcers after RYGB and OAGB.

PATIENTS AND METHODS:

Study setting

Between June 2021 and June 2024, data of all patients who had perforated marginal ulcers after OAGB or RYGB performed at Ain Shams University, Bariatric Surgery Department were collected.

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Eligibility criteria

We included morbidly obese patients above 18 years old with perforated marginal ulcers after primary OAGB or RYGB.

Postoperatively, data collected included demographics such as age and sex, BMI, comorbidities, hospital stay, mortality, and postoperative complications. Marginal ulcer, or stomal ulcer, is defined as an ulcer that develops at the margins of a gastrojejunostomy, mainly on the jejunal side.

Statistical analysis

Data entry was done through a Microsoft Excel spreadsheet. All continuous variables were expressed as mean±SD. Normality assumptions were checked first through the Kolmogorov-Smirnov test. Frequency data were summarized as percentages. For continuous variables, Student t test was used. Comparison of categorical data was done through the χ^2 test or Fisher exact test. Statistical analysis was done using IBM SPSS statistics for windows, Version 26.0. Armonk, NY: IBM Corp.

Surgical technique and perioperative management

Roux-en-Y gastric bypass

Gastric pouch creation began 4-6 cm below the esophagogastric junction. Using the same linear stapler, a 3-cm gastrojejunostomy and a jejunojejunostomy were created using blue reloads. The alimentary and biliopancreatic limbs were equally created to be 100 cm. Closure of the stapling defects was done in two layers. All mesenteric defects were closed.

One-anastomosis gastric bypass

A long gastric pouch was created at the level of the crow's foot on the lesser curvature. Gold and blue reloads were used for this procedure. The gastrojejunostomy was constructed with blue reloads 200 cm from the Treitz ligament, and the stapling was then closed. The methylene blue leak test was carried out during surgery. Insertion of tube drain was done in the left subphrenic area.

Postoperative care

Three-dimensional computed tomography virtual gastroscopy was done for all patients on third day postoperative. All bariatric patients enrolled in the study received 3-12 months of postoperative prophylactic proton pump inhibitors (PPI) therapy after the primary operation.

RESULTS:

In this study, 378 patients fulfilled the eligibility criteria. Of them, 252 patients had OAGB with a mean age of 39.1±6.8. The remaining 126 patients had RYGB with a mean age of 39.9±4.6. Characteristics of included patients are shown in (Table 1).

Seventeen patients presented with perforated marginal ulcers after OAGB and RYGB. The mean presentation time was 16 months after the surgery. All patients underwent computed tomography pelviabdominal for diagnosis of perforated marginal ulcer, but not all the patients underwent upper gastrointestinal endoscopy.

Eight patients had perforated marginal ulcers after OAGB. Of them, five patients had revision to RYGB. Three patients were managed surgically with exploration and omental patch repair. Nine patients had perforated marginal ulcers after RYGB. Six patients were managed surgically with exploration and omental patch repair. Three patients were managed by revision of gastrojejunostomy (Table 2).

All patients were given prophylactic PPI therapy for 12 months. No recurrence of marginal ulcer during postoperative follow-up.

Table 1: Baseline characteristics of included patients

Baseline data	OAGB (*N*=252)	RYGB (*N*=126)	*P* value
Age (mean±SD)	39.1±6.8	39.9±4.6	0.16
Sex			0.50
Male	68	30	
Female	184	96	
Preoperative BMI (mean±SD)	45.5±5.9	44.5±5	0.07
Comorbidities			0.91
No	65	36	
DM	68	29	
HTN	52	26	
DM and HTN	34	15	
Sleep apnea	15	10	
DM, HTN, and dyslipidemia	18	10	

DM, diabetes mellitus; HTN, hypertension; OAGB, one-anastomosis gastric bypass; RYGB, Roux-en-Y gastric bypass.

Table 2: Management done for perforated marginal ulcer according to surgery type

	OAGB	RYGB
Perforated marginal ulcer	8	9
Omental patch repair	3	6
Revision of gastrojejunostomy	0	3
Revision of OAGB to RYGB	5	0

OAGB, one-anastomosis gastric bypass; RYGB, Roux-en-Y gastric bypass.

DISCUSSION

Marginal ulcer is not uncommon complication after RYGB and OAGB. However, the incidence of marginal ulcers after each surgery is variable across studies, given most of the studies are case series and retrospective studies with inadequate sample size[4].

In our study, we included 17 patients who had perforated marginal ulcers after OAGB or RYGB was performed at our center; from 378 patients them, 252 patients had undergone OAGB, and 126 patients had undergone RYGB. The overall incidence of perforated marginal ulcers was 4.4%. Incidence of perforated marginal ulcer after OAGB was 3.1% while that after RYGB was 7.1%. Our suggestion for high incidence after RYGB because RYGB lacks the buffering alkaline afferent limb that counteracts the gastric acid effect on the jejunal mucosa.

In a survey done by Mahawar and colleagues, 86 surgeons were asked about the incidence of marginal ulcers after OAGB and their management of complications after OAGB. The incidence rate of marginal ulcers was 2.24%, which was comparable with our findings. Authors reported that only 82.4% of surgeons prescribed PPI prophylaxis with varying dosage and duration. No reported mortality in this study[6].

Additionally, 68 patients were retrospectively evaluated by surveillance endoscopy at 1 year. The incidence rate of the marginal ulcers was 9.5%, with no mortality reported[7]. The recommendations for enhanced recovery after surgery society include PPI prophylaxis for not less than 30 days post RYGB[8].

Regarding marginal ulcers after RYGB, a prospective study involved 35 075 patients who had RYGB. The incidence of RYGB was 6.28%, which was comparable to our findings. The authors also reported that the incidence of surgical intervention for the management of marginal ulcers increases with increasing number of years since diagnosis of marginal ulcer[9].

The management plans for perforated marginal ulcers in the current study were dependent on the type of operation. Patients who underwent OAGB were treated either by exploration and omental patch repair or revision of OAGB to RYGB. Patients who underwent RYGB were treated either by exploration and omental patch repair or by revision of gastrojejunostomy.

In a recent systematic review done by Martinino and colleagues, 610 patients presented with perforated marginal ulcers. Most (98%) of patients had RYGB. Contrary to enhanced recovery after surgery society recommendations, 15% of patients received prophylactic PPI. The 1-month mortality rate was 0.97%. Contrary to the present study, the most commonly used management plan was laparoscopic repair of the perforation using an omental patch (59%); 18% of patients underwent open surgery, and nonsurgical management in 20%[10].

In a retrospective query conducted by Aviran and colleagues identifying patients after OAGB admitted with delayed marginal ulcer perforation between January 2017 and January 2020, seven patients were identified. Laparoscopic primary repair with omentopexy was done in four patients, conservative management in two patients, one eventually requiring conversion to RYGB. One patient underwent exploratory laparotomy with pouch gastrostomy and jejunostomy. Contrary to the current study, most patients (five patients out of eight) had revision to RYGB[11].

Bacoeur-Ouzillou *et al*.[4] analyzed the management of marginal ulcers at a tertiary bariatric center and found that the surgical management was significantly higher for patients with an OAGB (84 vs. 35% for RYGB); the most operation done was a conversion of OAGB to RYGB, this result was similar to the present study.

In a study conducted on cases with perforated marginal ulcers after RYGB, 16 patients needed surgical management, most of them (14 patients) required abdominal washout with omental patch repair, and two patients underwent gastrojejunostomy revision[12].

Crawford and colleagues conducted a retrospective analysis to assess the outcomes of the cases with perforated marginal at Midwestern United States high-volume bariatric centers. They compared two

techniques: suturing of the ulcer with or without an omental patch and revision of gastrojejunostomy. Seventy-two patients underwent suturing of the ulcer with or without an omental patch, while 72 patients underwent revision of gastrojejunostomy. They assessed the length of hospital stay, leaks, readmissions, and reoperations. They concluded that patients with perforated marginal ulcers after RYGB can be effectively treated by gastrojejunostomy revision with a lower incidence of ulcer recurrence compared to suturing of the ulcer with or without an omental patch[13].

Our study was limited to cases of recurrent marginal ulcers, assessment of potential risk factors for marginal ulcers, upper gastrointestinal endoscopy for patients, and any prophylactic measures used to prevent marginal ulcers. In our center, PPI was usually used for 3–12 months postoperatively.

CONFLICT OF INTEREST

There are no conflicts of interest.

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