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# Short-term outcomes of the conversion of one anastomosis gastric bypass to Roux-en-Y gastric bypass in symptomatic reflux patients without revising the size of the gastric pouch

Mohammad Kermansaravi<sup>1,2</sup>, Aamir Abbas<sup>1</sup>, Mohadeseh Pishgahroudsari<sup>1</sup>, Abdolreza Pazouki<sup>1,2</sup>

<sup>1</sup>Minimally Invasive Surgery Research Center, Iran University of Medical Sciences, Tehran, Iran, <sup>2</sup>Center of Excellence of International Federation for Surgery of Obesity and Metabolic Disorders, Tehran, Iran

## Abstract

**Background:** Revising the size of the gastric pouch during the conversion of one anastomosis gastric bypass (OAGB)/mini-gastric bypass to Roux-en-Y gastric bypass (RYGB) is an important point. Even in patients undergoing RYGB, marginal ulcer is regarded as a known complication.

**Materials and Methods:** In our Centre of Excellence in Bariatric and Metabolic Surgery, 2492 patients underwent OAGB from February 2012 to January 2019. Twelve of 2492 patients were enrolled in this clinical case series because of persistent gastroesophageal reflux-like symptoms which underwent conversional RYGB. All patients regularly received proton-pump inhibitors (PPIs) for 6 months after the surgery. After this period, the cases with symptomatic reflux were invited to be visited in the clinic by a bariatric surgeon and a gastroenterologist and received 6 months of PPI therapy until their symptoms disappeared. Twelve refractory reflux cases underwent conversional RYGB after 1 year. An enteroenterostomy was created in all the patients 75 cm distal to the gastrojejunostomy without resizing the gastric pouch, and the jejunal loop was cut just before the gastrojejunostomy.

**Results:** Before conversional surgery, mean  $\pm$  standard deviation (SD) body mass index (BMI) and gastroesophageal reflux disease (GERD)-Q score were found to be  $26.45 \pm 2.34$  kg/m<sup>2</sup> and  $10.08 \pm 0.56$ , respectively. At 1 year after conversion, mean  $\pm$  SD BMI in the patients was  $28.12 \pm 4.71$ , and GERD-Q score was  $5.08 \pm 1.5$ .

**Conclusion:** It seems that resizing the gastric pouch is not necessary during the conversion of OAGB to RYGB.

**Keywords:** Bariatric surgery, conversion, gastroesophageal reflux disease, one anastomosis gastric bypass, pouch size, reflux, revision

**Address for correspondence:** Dr. Mohammad Kermansaravi, Rasool-e-Akram Hospital, Niyayesh Ave., Sattarkhan St., Tehran, Iran.

E-mail: [mkermansaravi@yahoo.com](mailto:mkermansaravi@yahoo.com), [kermansaravi.m@iums.ac.ir](mailto:kermansaravi.m@iums.ac.ir)

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## INTRODUCTION

One anastomosis gastric bypass (OAGB) reportedly yields similar results as traditional Roux-en-Y gastric bypass (RYGB) in terms of post-operative outcomes

and complications.<sup>[1]</sup> Bile reflux gastritis after OAGB is an important concern and predominant complication after this procedure.<sup>[2,3]</sup> The main concern about OAGB is the association between gastroesophageal reflux

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disease (GERD) and possible consequences such as oesophageal or gastric cancer.<sup>[2]</sup> Dismantling gastrojejunal anastomosis to alter the Roux and Y limbs can help with conversion to a standard RYGB for the treatment of reflux.<sup>[1,2,4]</sup> Despite the short learning curve and simplicity of OAGB compared to RYGB, the key technical steps of this procedure should be emphasised so as to minimise the complications such as reflux.<sup>[5,6]</sup> Non-healing ulcers may be treated by conversion to RYGB in nearly half of the patients.<sup>[7]</sup> Revising the size of the pouch during conversion to RYGB is an important issue. Even in patients undergoing RYGB, marginal ulcers are viewed as a well-known complication.<sup>[8]</sup>

**MATERIALS AND METHODS**

In our academic hospital as a Centre of Excellence for Bariatric and Metabolic Surgery, where this study was set, 2492 morbidly obese patients underwent OAGB from February 2012 to January 2019. This clinical case series presents 12 patients of these patients who had undergone OAGB. In OAGB, we made a long and narrow pouch over bougie 36 with one 60 mm stapler horizontally and five to six 60 mm staplers vertically and performed gastrojejunostomy with linear cartridges in 30 mm diameter, 150–200 cm after Treitz ligament. We did not repair any concurrent hiatal hernia. All patients prescribed proton-pump inhibitors (PPIs) for 6 months after surgery. After this time, the cases with symptomatic reflux were invited to be visited in the obesity clinic by a bariatric surgeon and a gastroenterologist and continued their PPI therapy (pantoprazole 40 mg every 12 h) for 6 more months, until the symptoms were resolved.

Twelve refractory reflux cases were evaluated by the GERD-Q questionnaire [Table 1], 6-item tools which are validated for GERD symptoms with 65% sensitivity and 71% specificity, and a score ranges between 0 and 18, which score 8 is a cut-off point for diagnosing GERD.<sup>[3,9]</sup> In addition, upper gastrointestinal (GI) endoscopy was done for assessing any pathological findings such as marginal

ulceration. These 12 patients underwent conversional RYGB after this time. An enteroenterostomy was created in all the patients 75 cm distal to the gastrojejunostomy without resizing the gastric pouch, and the jejunal loop was cut just before the gastrojejunostomy. Both jejunojejunal and Petersen’s defects were closed at the end of the surgery. The patients were discharged the next day after the surgery and had no complaints in the post-operation follow-up. In the 1-year post-operative follow-up, no severe GERD-like symptom was observed in any of the patients. Upper GI endoscopy with multiple biopsies was performed after the 1-year follow-up, which was free of bile in the oesophagus, no signs of oesophagitis and marginal ulceration. All the patients recovered and their GERD-Q score was under eight and received no PPIs after their conversion surgery. Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) 20.0 (IBM, Armonk, NY, USA) software. Data were first tested for normal distribution using the Kolmogorov–Smirnov test. The mean ± standard deviation (SD) or median (interquartile range [IQR]) was calculated for the quantitative variables and frequency (%) for the qualitative variables. The paired *t*-test was used to compare the differences between the pre- and post-operative body mass index (BMI). *P* < 0.05 was accepted as indicative of statistical significance.

**RESULTS**

The M/F ratio was 2/10. The mean age was 42.08 ± 10.83 years. The mean BMI before OAGB was 44.54 ± 3.32 and before conversion surgery 26.45 ± 2.34 kg/m<sup>2</sup> (*P* < 0.0001). In the first surgery, the median (IQR) of the biliopancreatic limb was 180 cm (150–200). There was no case of current smoking, alcohol and non-steroidal anti-inflammatory drug (NSAID) use or presence of oesophagitis/GERD before the first operation (OAGB). Furthermore, there was no case of pregnancy after the first operation.

The median (IQR) of the interval between the two operations was 2.5 (1, 5) years. The mean ± SD of BMI and

**Table 1: The GERDQ questionnaire**

Question	Frequency score (points) for symptom			
	0 day	1 day	2-3 days	4-7 days
1. How often did you have a burning feeling behind your breastbone (heartburn)?	0	1	2	3
2. How often did you have stomach contents (liquid or food) moving upwards to your throat or mouth (regurgitation)?	0	1	2	3
3. How often did you have a pain in the centre of the upper stomach?	3	2	1	0
4. How often did you have nausea?	3	2	1	0
5. How often did you have difficulty getting a good night’s sleep because of your heartburn and/or regurgitation?	0	1	2	3
6. How often did you take additional medication for your heartburn and/or regurgitation, other than what the physician told you to take?	0	1	2	3

GERD-Q score before and after the conversion surgery displayed in Table 2. As shown, 1 year after conversion, mean  $\pm$  SD GERD-Q score reduced to  $5.08 \pm 1.5$ . Upper GI endoscopy pathologic finding before the first operation and 1 year following after the conversion surgery is shown in Table 3. One year following conversion surgery, biopsy-proven GERD oesophagitis grade A was observed in one patient (8.3%), and none of the patients have grade B or C as per the upper endoscopy, also at this time small size and moderate hiatal hernia, both were present in 2 (16.7%) cases and large size in 1 (8.3%) in the endoscopy. All the patients were symptom free and had normal upper GI endoscopy results at the 1-year follow-up.

## DISCUSSION

The most primary surgical bariatric procedure is sleeve gastrectomy, followed by RYGB and OAGB.<sup>[10]</sup> OAGB is an accepted standard bariatric procedure with good efficacy, safety and low complication rate, which is currently performed worldwide.<sup>[11,12]</sup> Although OAGB is a conventional operation in patients with morbid obesity, it requires revision or conversion in some patients, and conversion to RYGB is one common form. In a multi-centre study by Johnson *et al.*<sup>[13]</sup> on 32 patients, complications such as bile reflux were observed in 20 and intractable marginal ulcer in five cases. As shown by Mahawar *et al.*,<sup>[7]</sup> more than 80% of cases under OAGB routinely use PPIs. In the present study, all the enrolled

patients were on initial high-dose PPI therapy, but their refractory course was an important issue. At the final evaluation, 1 year after conversional RYGB, the GERD-Q scores were less than eight, and the upper GI endoscopy with multiple biopsies after the 1-year follow-up of the second operation proved normal.

As shown by De Luca *et al.*,<sup>[14]</sup> OAGB is better considered as a primary procedure. For conversion to RYGB, a linear stapler is mainly used that varies in length from 30 to 60 mm.<sup>[14]</sup> In the present study, the length of the biliopancreatic limb was 150–200 cm at the time of the first operation, and was not changed in the second surgery. A 75 cm alimentary limb was created, and the gastric pouches were not resized. All the patients were fully recovered. In the present study, patients who currently smoked, consumed alcohol and used NSAIDs were excluded from the study. In the other studies,<sup>[14,15]</sup> however, some of the patients had these risk factors.

Pouch size reduction and creation the new gastrojejunostomy were reported by Godina *et al.*<sup>[16]</sup> as approximately 60–80 mL in an emergency case under conversional RYGB due to acute bleeding from a marginal ulcer. In a review, Seeras and Lopez<sup>[17]</sup> resulted that a large pouch size leads to a larger parietal cell mass in the pouch and results in further acid exposure. Pouch size is not only important for the initial outcome but also as reported by Uittenbogaart *et al.*<sup>[18]</sup> pouch dilatation is associated with weight loss failure after RYGB. Our study assessed only the cases without gastric pouch size reduction, such as Facchiano *et al.*<sup>[5]</sup> whereas the other studies, such as the one by Horgan *et al.*<sup>[19]</sup> reported pouch resizing, which demonstrates the importance of comparing outcomes, including reflux rate, according to the pouch size in future studies. We suggest that the pouch can be intact without resizing to decrease the time of revisional procedure and potential complications of resizing such as bleeding and leakage. In addition to the importance of pouch size in reflux after RYGB, there are controversial reports about the importance of pouch size for weight alterations after the operation in long-term follow-ups.<sup>[20-22]</sup> In our study, increased mean BMI 1 year after conversion to RYGB was observed, which could be

**Table 2: Basic characteristics, body mass index and gastroesophageal reflux disease-Q score before and following 1 year after conversion**

Variables	Value
Female (%)	10 (83.3)
Age years	42.08 $\pm$ 10.83
Interval to conversion (years)	2.5 (1-5)
BMI before OAGB	44.50 $\pm$ 3.32
BMI before conversion to RYGB (kg/m <sup>2</sup> ), mean $\pm$ SD	26.45 $\pm$ 2.34
BMI 1 year after conversion to RYGB (kg/m <sup>2</sup> ), mean $\pm$ SD	28.12 $\pm$ 4.71
GERD-Q score before conversion	10.08 $\pm$ 0.51
GERD-Q score 1 year after conversion	5.08 $\pm$ 1.5

BMI: Body mass index, OAGB: One anastomosis gastric bypass, RYGB: Roux-en-Y gastric bypass, GERD: Gastroesophageal reflux disease, SD: Standard deviation

**Table 3: Upper gastrointestinal endoscopy pathologic finding before and following 1 year after conversion**

	Before OAGB, n (%)	Before conversion to RYGB, n (%)	1 year after conversion, n (%)
Small size hiatal hernia	2 (16.7)	2 (16)	2 (16.7)
Moderate size hiatal hernia	2 (16.7)	2 (16.7)	2 (16.7)
Large size hiatal hernia	1 (8.3)	1 (16.7)	1 (8.3)
Grade A oesophagitis	3 (25)	1 (8.3)	1 (8.3)
Grade B oesophagitis	1 (8.3)	10 (83.3)	0
Grade C oesophagitis	0	1 (8.3)	0
Presence of bile in oesophagus	0	3 (25)	0

OAGB: One anastomosis gastric bypass, RYGB: Roux-en-Y gastric bypass

related to increased ability for digestion after the cessation of GERD-like symptoms.

One of the limitations of the present study was the number of cases that had undergone conversional surgery. Other limitations were the short-term follow-up of the cases and non-randomisation of patients.

It can be concluded that resizing of the pouch is not necessary in patients with symptomatic refractory GERD undergoing OAGB who requires conversional RYGB. For more accurate conclusion, clinical trials with longer follow-ups should be conducted to compare the outcomes in different pouch size groups.

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### Conflicts of interest

There are no conflicts of interest.

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