Review Article

Post-operative gastroesophageal reflux disease after one anastomosis gastric bypass, a narrative review of the literature

Rafael C. Katayama[1], Fernando A. M. Herbella[1], Marco G. Patti[2], Carlos Haruo Arasaki[1], Ana Clara de Grande[1]

[1]Department of Surgery, Escola Paulista de Medicina, Federal University of Sao Paulo, Sao Paulo, Brazil; [2]Department of Surgery, University of Virginia, Charlottesville, VA, USA

Contributions: (I) Conception and design: All authors; (II) Administrative support: RC Katayama, FAM Herbella, MG Patti; (III) Provision of study materials or patients: RC Katayama, FAM Herbella, MG Patti, CH Arasaki; (IV) Collection and assembly of data: RC Katayama, AC de Grande; (V) Data analysis and interpretation: RC Katayama, FAM Herbella; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Rafael C. Katayama, MD. Department of Surgery, Escola Paulista de Medicina, Federal University of Sao Paulo, Rua Tabapuã 1123 Cj. 214, Sao Paulo CEP 05639040, Brazil. Email: rafaelcaue@hotmail.com.

Background and Objective: Gastroesophageal reflux disease (GERD) after one anastomosis gastric bypass (OAGB) is a controversial topic. Most studies were not able to precisely demonstrate the presence of bile reflux and its consequences after OAGB. However, historical experience with the Billroth II anastomosis suggests that bile reflux after OAGB may be a problem, with the concern that GERD after OAGB might cause the development of Barrett's esophagus and esophageal cancer. This is a narrative review of the literature aiming to bring an overview on the stage of the art of OAGB and to support the reasonable concern about GERD after the procedure and the need for more studies in the field.

Methods: A research on PubMed, Medline, and Google Scholar was performed. The key words combined were "Gastroesophageal reflux", "One Anastomosis Gastric Bypass", "Barrett's esophagus", "Gastric cancer", "Esophageal cancer", and "Bile reflux". Articles written in English were eligible, the year of publication and the type of the study was not limited.

Key Content and Findings: Despite there is not strong evidence that OAGB can favor GERD it is important to look back on what we have seem with gastrectomy, Billroth II anastomosis, and the consequences of long-term bile reflux. However, OAGB is clearly a different procedure, as well as patients living with obesity do not have necessary the same characteristics than those who were submitted to a gastrectomy.

Conclusions: Bile reflux after OAGB is a concern to experienced surgeons. More studies with better methodology and long-term follow up are necessary to bring light to this controversial topic. Until them, surgeons must be very rigorous in the patient's follow-up.

Keywords: Gastroesophageal reflux; one anastomosis gastric bypass (OAGB); gastric cancer; bile reflux; Barrett's esophagus

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Introduction

One anastomosis gastric bypass (OAGB) is a relatively new procedure, as Robert Rutledge proposed his technique in 1997 (1,2). However, it was after his first publication, with 1,274 OAGB procedures performed with excellent weight loss, obesity related diseases improvement, and with a low rate of complications, that OAGB had been most widely adopted (2,3). Throughout history, the procedure has had

Table 1 Research methods, narrative review

Items	Specification
Date of search	November 2022–March 2023
Databases and other sources searched	PubMed, Medline, Google Scholar
Search terms used	"Gastroesophageal reflux", "One Anastomosis Gastric Bypass", "Barrett's esophagus", "Gastric cancer", "Esophageal cancer", and "Bile reflux"
Timeframe	Year of publication was not limited
Inclusion criteria	Studies published in English were included. No limitation in the type of article
Selection process	A single researcher, with expertise in one anastomosis gastric bypass and gastroesophageal reflux disease performed the studies selection

some names that made supporters feel uncomfortable because they did not adequately represent the procedure. Until a panel of experts decided to unify the nomenclature and, OAGB, was adopted as official (4). OAGB popularity has increased through the years as a simpler procedure compared to the gold standard Roux-en-Y gastric bypass (RYGB), with similar efficacy and complication rates (3-7). On the other hand, some skeptic surgeons are concerned about the possibility that bile and acid reflux might cause the development of gastroesophageal reflux disease (GERD) and its sequelae such as Barrett's esophagus and esophageal cancer (3,8-10). Nonetheless, it is well known that the Billroth II anastomosis, because of bile reflux, may promote gastric and esophageal carcinogenesis (11-13). For this reason, surgeons tried to improve the technique, and various anatomical changes were proposed in the limb and gastric pouch length, gastrojejunal anastomosis diameter, shape, and position. Nevertheless, there is no support in the literature to support those modifications.

This narrative review aims to bring an overview on the stage of the art of OAGB and to support the reasonable concern about GERD after the procedure, and the need for more studies in the field. We present this article in accordance with the Narrative Review reporting checklist (available at https://aoe.amegroups.com/article/view/10.21037/aoe-23-11/rc).

Methods

Research on PubMed, Medline, and Google Scholar was performed. The key words combined were "Gastroesophageal reflux", "One Anastomosis Gastric Bypass", "Barrett's esophagus", "Gastric cancer", "Esophageal cancer", and "Bile reflux". Articles written in English were eligible, the year of publication and study type was not limited. All the articles were selected by a single researcher with expertise in OAGB and GERD (*Table 1*).

Bile reflux and Billroth II anastomosis

In the past, Billroth II anastomosis was widely performed after gastrectomy for duodenal and gastric ulcer complications or gastric cancer (14). Most of the studies have described the presence of duodenal-gastric esophageal bile reflux after this procedure (13-15). Bile reflux can be asymptomatic, promote cellular damage without clinical repercussion, or be associated to abdominal pain, vomiting, heartburn, and weight loss, decreasing the quality of life (16). Moreover, Roux-en-Y anastomosis became more popular to prevent bile reflux as the studies demonstrated a much lower GERD rate with this procedure compared to Billroth II (13,15).

Considering those facts, the main concern is related to the higher grades of gastric remnant inflammation after Billroth II anastomosis, which could finally culminate in gastric remnant cancer (13,15,17). The bile may cause cellular damage in the gastric mucosa accentuating the depletion of mucin, enlarging the nuclear epithelium, besides the edema and vascular congestion (18,19). Those inflammatory changes, if continuous, can evolve over time to varying degrees of dysplasia and ultimately to gastric remnant cancer in a medium time of 20 years (11).

Another important problem is whether bile reflux could reach the esophagus and promote esophageal inflammation culminating in a Barrett's esophagus as we can see in some patients with severe GERD (20,21).

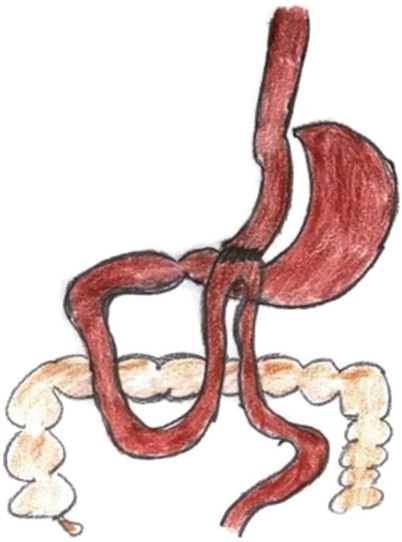

Figure 1 Schematic one anastomosis gastric bypass. Tubular, long, and narrow pouch. Long limb length.

OAGB *vs.* Billroth II and the stage of the art

Looking back to the history, it seems unreasonable to develop a new bariatric procedure involving an anastomosis like the old Billroth II. However, it is important to point out that OAGB is very different to those past procedures. Patients who undergone to gastrectomy secondary to gastric cancer or gastric/duodenal ulcers complications have different characteristics from the population with obesity free from those diseases. Patients with those conditions had hyperchlorhydria, chronic *Helicobacter pylori* infection, different alimentary habits, genetic mutations, and failure of the natural anti-reflux barrier (18,20,22). Those preliminary conditions cannot be attributed to all patients living with obesity treated by OAGB.

In addition, OAGB is a different procedure. The gastric pouch is tubular, long, and narrow and the limb length is much longer (2 m) (*Figure 1*) than those commonly used in the Billroth II procedure (20–30 cm) (23), what invalidate the direct correlation between them. It is possible that bile can be partially absorbed in the small bowel in the path between the duodenum and the gastric pouch. Moreover, a straight gastrojejunal anastomosis (2 cm) should avoid the excessive intake of bile inside the gastric pouch and the long tube should prevent bile to get through the esophagus.

Previous studies are controversial and inconclusive around this topic. Perhaps it is related to most retrospective studies with a lack of precise methodology to evaluate GERD. Surgeons who performed OAGB reported low rates of *de novo* GERD, evaluated by the presence of bile in the gastric pouch or esophagus during upper digestive endoscopy (UDE) performed in patients with GERD symptoms, while others applied isolated GERD questionnaires to diagnosis bile reflux (6,7). Szymański *et al.* performed UDE in 2 years follow-up in asymptomatic patients who undergone to OAGB, and he could demonstrate that 68% had various histopathological esophageal changes, with few cases (4/50) of Barrett's esophagus (24). Similarly, Saarinen *et al.* conducted a study performing UDE and scintigraphy in 40 patients 6 months after OAGB, and they had found high percentage of bile in the gastric pouch, also 2.6% of bile in the esophagus (25). There is only one randomized prospective study, comparing OAGB and RYGB, combining 3 different methods to evaluate GERD after OAGB. They provide UDE, gastric and esophageal biopsies, and quality of life questionnaire before and after 6 months from the procedure and did not find differences between the groups along the time (3). The critic is that 6 months should be not enough to bile reflux development. Interestingly, Musella *et al.* compared patients who undergone OAGB and sleeve gastrectomy (SG), and he could find, in a 1-year follow-up, higher percentage of esophagitis in the SG group (26). Furthermore, Kassir *et al.* reported low incidence of OAGB conversion to RYGB owing to resistant GERD medical treatment (27). Bringing more data to supporters, Kermansaravi *et al.* published a systematic review, reporting OAGB as a revisional procedure after primary restrictive bariatric operation. The results showed that 82% of the patients with GERD improved or had remission following OAGB (28). Summing up these findings, it is essential to follow up with UDE patients who undergone OAGB since there is a lack of certainty around the topic. Moreover, it should be done an accurate work up before the surgery and avoid OAGB in patients with GERD.

Another point is that gastric remanent or esophagus cancer after OAGB are rare. There are 2 case reports. Runkel *et al.* published in 2019, presenting a patient who developed cancer in the esophageal gastric junction 2 years after OAGB. Nevertheless, this patient had GERD before the surgery with Los Angeles grade C esophagitis whether previous biopsy is not reported (29). The second case report was published by Aggarwal *et al.* The patient developed adenocarcinoma 2 years after OAGB, however, he did not have a preoperative UDE and was a known smoker (30).

Finally, according to Kermansaravi *et al.* there was a straight correlation between hiatus hernia and GERD symptoms after OAGB (31). Therefore, it should be important to search for hiatus enlargement when performing OAGB and close it if necessary.

There are limitations inherent to a narrative overview of the literature. Actually, the studies that were published has a lack of methodology on GERD diagnosis. Moreover, it is well known that the consequences of bile reflux are time dependent. OAGB is a quite new procedure with few years of development and longer follow up is essential.

Conclusions

Despite there is not strong evidence that OAGB can favor GERD it is important to look back on what we have seem with gastrectomy, Billroth II anastomosis, and the consequences of long-term bile reflux. However, OAGB is clearly a different procedure, as well as patients living with obesity do not have necessary the same characteristics than those who were submitted to a gastrectomy. It is necessary more studies with better methodology and long-term follow-up to bring light to this controversial topic. Until them, surgeons must be very rigorous in the patient's follow-up.

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Footnote

Reporting Checklist: The authors have completed the Narrative Review reporting checklist. Available at https://aoe.amegroups.com/article/view/10.21037/aoe-23-11/rc

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://aoe.amegroups.com/article/view/10.21037/aoe-23-11/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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