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Original article

# Is preoperative gastroscopy necessary before sleeve gastrectomy and Roux-en-Y gastric bypass?

Tuure Saarinen, M.D.<sup>a,b,\*</sup>, Ulla Kettunen, M.D.<sup>a,b</sup>, Kirsi H. Pietiläinen, M.D., Ph.D.,<sup>a,b</sup>,  
Anne Juuti, M.D., Ph.D.<sup>a</sup>

<sup>a</sup>Helsinki University Hospital, Abdominal Center, Helsinki, Finland

<sup>b</sup>Obesity Research Unit, Research Programs Unit, Diabetes and Obesity, University of Helsinki, Biomedicum Helsinki, Helsinki, Finland

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## Abstract

**Background:** Consensus on the necessity of esophagogastroduodenoscopy (EGD) before bariatric surgery is lacking. Recommendations and practices vary by country and unit. Several reports have expressed concerns on gastroesophageal reflux disease (GERD) and its consequences after sleeve gastrectomy (SG) and the risk of leaving a premalignant lesion in the excluded stomach after Roux-en-Y gastric bypass (RYGB).

**Objectives:** We explored the number and types of clinically significant findings in preoperative EGDs and how they associate with preexisting GERD-symptoms (SG) and premalignant lesions (RYGB). We also studied how many reoperations were performed due to postoperative GERD in SG-patients.

**Setting:** University hospital.

**Methods:** We investigated preoperative EGD-findings and gastrointestinal symptoms before bariatric surgery in all patients with a primary bariatric operation in our unit between December 2007 and May 2016.

**Results:** We performed 1474 operations: 1047 (71.0%) RYGB, 407 (27.6%) SG, and 20 (1.4%) others. One thousand two hundred seventy-five (86.5%) preoperative EGD reports were analyzed: 647 (50.7%) EGDs were completely normal. Altogether, 294 patients (23.0% of total) had a clinically significant finding that was relevant for SG (hiatal hernia, esophagitis, Barrett's esophagus, esophageal dysplasia), 144 (49.0%) of whom reported gastrointestinal symptoms. Twenty patients (1.6%) had a significant finding relevant for RYGB (peptic ulcer, atrophic gastritis, gastrointestinal stromal tumor), and 6 (30%) reported gastrointestinal symptoms. Thirteen (3.2%) SGs were converted into RYGB due to GERD.

**Conclusions:** Preoperative EGD is indicated before SG but not before RYGB for asymptomatic patients without a risk for gastric pathology. (Surg Obes Relat Dis 2018;■:00–00.) © 2018 American Society for Metabolic and Bariatric Surgery. All rights reserved.

**Keywords:** Q3 XXX; XXX; XXX

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\*Correspondence: Tuure Saarinen, M.D., Abdominal Center, Helsinki University Hospital, Haartmaninkatu 4, 00029 Helsinki Finland.

E-mail: [tuure.saarinen@hus.fi](mailto:tuure.saarinen@hus.fi)

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Obesity is a vastly growing worldwide epidemic, and its severe (body mass index [BMI] >35) and morbid (BMI >40) forms especially have been increasing in the recent years [1,2]. Surgical treatment has been shown to be the most effective treatment not only for severe obesity but also for its complications, such as type 2 diabetes (T2D)—the reason why it is often called metabolic surgery [3]. In 2014, 579,517 bariatric operations were performed in the world [4]. The most commonly performed bariatric

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procedure was sleeve gastrectomy (SG) followed by Roux-en-Y gastric bypass (RYGB; 45.9% and 39.6% of operations, respectively) [4]. In general, SG and RYGB have proven to be effective in terms of weight reduction [5]. However, differences exist regarding effect on co-morbidities, especially T2D [6].

Each bariatric procedure has to be tailored individually according to the patient's overall health status and preexisting diseases. The findings from preoperative evaluation need to be taken into consideration when planning the surgery. Preoperative esophagogastroduodenoscopy (EGD) is the best tool for assessing the upper gastrointestinal (GI) status [7]. EGD assessment before RYGB stems from a fear of leaving a potential malignancy or a severe lesion in need of surveillance in the excluded portion of the GI tract. On the other hand, several reports have shown difficult gastroesophageal reflux disease (GERD) after SG, both de novo and worsening of preexisting disease, which in either case may lead to Barrett's esophagus or need for reoperation [8,9]. Thus, in theory, both RYGB and SG have reasons for which a routine preoperative EGD may be warranted.

Guidelines as well as clinical practices regarding routine preoperative EGD vary markedly. The European Association for Endoscopic Surgery recommends routine EGD or radiologic evaluation with a barium meal before bariatric surgery, whereas the Society of American Gastrointestinal and Endoscopic Surgeons recommends EGD when suspicion of gastric pathology exists [10,11]. A recent survey of British Obesity & Metabolic Surgery Society Members showed that in the United Kingdom, 10% of bariatric units consider preoperative EGD completely unnecessary, whereas 31% include EGD in their routine preoperative assessment [12].

In the present study, our aim was to assess the need for EGD before RYGB and SG based on a large retrospective cohort of bariatric operations in the Helsinki University Hospital area. We set out to explore how many significant findings were present in all preoperative EGD reports of our unit between December 2007 and May 2016, with a special emphasis on preoperative EGD findings and self-reported preoperative symptoms related to GERD and findings that require endoscopic follow-up especially due to potentially premalignant conditions. We also focused on studying how many reoperations were performed due to postoperative GERD in SG patients.

## Methods

### Patients

We investigated the number and severity of macroscopic and microscopic findings in preoperative EGD reports as well as self-reported GI symptoms before bariatric surgery from medical records of all patients who underwent a primary bariatric operation between December 2007 and

May 2016 (n = 1474) in Helsinki University Hospital. Reoperation data after SG were collected from the same period. We also obtained demographic data, including age, BMI, and obesity-related co-morbidities, including T2D, hypertension, dyslipidemia, sleep apnea, arthrosis, and psychiatric disorders from our institutions' bariatric registry (BCB quality registry). EGD findings that needed to be taken into consideration in preoperative planning were classified as clinically significant. All findings that are related to GERD were considered significant regarding SG. These include esophagitis, Barrett's esophagus, esophageal dysplasia, and hiatal hernia. All findings that require either endoscopic follow-up or surgical resection were considered significant regarding RYGB. These included atrophic gastritis requiring endoscopic follow-up (atrophic pancreatitis and atrophic gastritis in the body of the stomach with age <40 yr), peptic ulcers, and gastric neoplasms. The surgical ethics committee of our institution approved the study.

### Statistical analyses

We used parametric tests with this large data set to analyze the statistical significance of the EGD findings. Comparisons of means between groups of significant versus normal/nonsignificant EGD findings as well as the availability of EGD report versus the whole sample were analyzed with independent samples *t* tests. Dependence of categorical variables with significant EGD findings and availability of EGD report were analyzed with  $\chi^2$  tests. We used binary logistic regression models to determine whether significant EGD findings were associated with any of the co-morbidities, psychiatric diseases, age, sex, or BMI.  $P < .05$  was considered statistically significant. Values are given as mean/median (standard deviation). Statistical analysis was done using IBM SPSS Statistics 22 software (Armonk, NY).

## Results

During December 2007 and May 2016, we performed 1474 primary bariatric operations: 1047 (71.0%) RYGB, 407 (27.6%) SG, and 20 (1.4%) others including mini-gastric bypass, duodenal switch, and gastric balloon. One thousand two hundred seventy-five (86.5%) preoperative EGDs were performed with an available report. For 36 patients (2.4%), the EGD was performed outside our district and the full EGD report was not available, and 163 (11.1%) patients were operated without a preoperative EGD. This was due to our unit's guideline of 2013 to 2016, in which patients aged <60 years without gastrointestinal symptoms or risk factors for neoplasms would not need a preoperative EGD. Demographic characteristics and co-morbidities of the patients are given in Table 1. Age and BMI were both slightly but significantly higher in patients whose

Table 1  
Patient demographic characteristics and co-morbidities

	Panel A			Panel B		
	All patients	EGD performed and report available	<i>P</i> value (EGD performed versus not performed)	Significant EGD finding	Normal or nonsignificant EGD finding	<i>P</i> value (significant versus normal or nonsignificant EGD finding)
Total	1474	1275 (86.5%)		319 (25.0%)	956 (75.0%)	
Women	1075 (72.9%)	926 (72.6%)	.51*	244 (76.5%)	682 (71.3%)	.074*
Age, yr (SD)	48.1 (9.2)	48.5 (9.1)	<.001 <sup>†</sup>	48.4 (8.7)	48.5 (9.2)	.90 <sup>†</sup>
BMI, kg/m <sup>2</sup> (SD)	45.8 (6.9)	46.1 (7.0)	<.001 <sup>†</sup>	45.6 (7.1)	46.2 (7.0)	.24 <sup>†</sup>
No co-morbidities	317 (21.5%)	220 (17.3%)	<.001*	60 (18.8%)	160 (16.7%)	.40*
Type 2 diabetes	572 (38.8%)	528 (41.4%)	<.001*	121 (37.9%)	407 (42.6%)	.15*
Hypertension	708 (48.0%)	682 (53.5%)	<.001*	148 (46.4%)	534 (55.9%)	.003*
Dyslipidemia	360 (24.4%)	347 (27.2%)	<.001*	83 (26.0%)	264 (27.6%)	.58*
Arthrosis	648 (44.0%)	616 (48.3%)	<.001*	150 (47.0%)	466 (48.7%)	.59*
Asthma	193 (13.1%)	185 (14.5%)	<.001*	48 (15.0%)	137 (14.3%)	.75*
Psychiatric disease	315 (21.4%)	300 (23.5%)	<.001*	77 (23.3%)	223 (24.1%)	.77*

EGD = esophagogastroduodenoscopy; SD = standard deviation; BMI = body mass index.

Panel A tests the patient characteristics between all patients and those with an available esophagogastroduodenoscopy (EGD). Panel B tests the patient characteristics between those with or without a significant EGD finding. The significant EGD findings include esophagitis, Barrett's esophagus, esophageal dysplasia, hiatal hernia, atrophic gastritis, gastrointestinal stromal tumor, and peptic ulcer. Statistically significant *P* values are given in bold.

\**P* value,  $\chi^2$ .

<sup>†</sup>*P* value, independent samples *t* test.

preoperative EGD report was available than in the whole cohort. The proportion of all co-morbidities was significantly higher in patients with a preoperative EGD.

Next, we calculated the number of normal and abnormal EGDs. Out of the 1275 preoperative EGDs performed, 647 (50.7%) EGDs were completely normal (Table 2). An abnormal finding was present in 628 (49.3%) patients, and in 319 (24.6% of total) it was clinically significant. No malignancies were found in preoperative EGDs. A great majority (92%) of the clinically significant findings (294 patients, 23.0% of total) were relevant if the chosen operation would be SG (hiatal hernia, esophagitis, Barrett's esophagus, esophageal dysplasia; Table 2). Approximately half of these patients (144 patients, 49.0%) reported GI

symptoms including reflux, regurgitation, dyspepsia, nausea, and bloating before bariatric surgery, whereas 105 patients (35.7%) did not have any symptoms. For the rest (45 patients), the medical records did not reveal whether they had reflux symptoms before bariatric surgery. Only a small proportion of patients with preoperative EGD (20 patients, 1.6%) had significant findings that would have been relevant if the chosen operation is RYGB (peptic ulcer, atrophic gastritis, GI stromal tumor). Six (30%) reported GI symptoms before bariatric surgery (Table 2). All patients with a peptic ulcer were taking nonsteroidal anti-inflammatory drugs (NSAIDs). All patients except 1 with an atrophic gastritis requiring endoscopic follow-up had a predisposing factor (> 60 yr old, *Helicobacter pylori*

Table 2

Clinically significant findings in preoperative esophagogastroduodenoscopies (EGD) and gastrointestinal symptoms (including reflux, regurgitation, dyspepsia, nausea, and bloating) before bariatric surgery

	n (%)	Gastrointestinal symptoms before surgery		
		No	Yes	Not reported
All performed EGDs	1275			
Significant finding in EGD	314 (24.6)			
Findings significant for SG	294 (23.0)	105 (35.7)	144 (49.0)	45 (15.3)
Hiatal hernia	197(15.5)	66 (33.5)	100 (50.8)	31 (15.7)
Esophagitis	88 (6.9)	34 (38.6)	42 (47.7)	12 (13.6)
Barrett's esophagus	47 (3.7)	19 (40.4)	22 (46.8)	6 (12.8)
Esophagusdysplasia	3 (.2)	2 (66.7)	1 (33.3)	0
Findings significant for RYGB	20 (1.6)	14 (70)	6 (30)	0
Peptic ulcer	12(.9)	8 (66.7)	4 (33.3)	0
Atrophic gastritis	7 (.5)	6 (85.7)	1 (14.2)	0
GIST	1 (.1)	0	1 (100)	0

SG = Sleeve gastrectomy; RYGB = Roux-en-Y gastric bypass; GIST = gastrointestinal stromal tumor.

positive, or smokers). *H. pylori* staining was performed for all EGD samples, and positive samples were found in 108 patients (8.5% of EGD reports).

Next, we assessed whether any of the clinical characteristics or metabolic co-morbidities were associated with the significant EGD findings. We found that the only statistically significant association was with hypertension and normal/nonsignificant EGD findings (Table 1). Lack of hypertension was also found to predict any significant EGD finding ( $P = .007$ ) in binary logistic regression models. Other variables (presence or absence of diabetes, dyslipidemia, sleep apnea, asthma, psychiatric disease, age, sex, or BMI) were not statistically significantly associated with clinically significant or nonsignificant EGD findings.

During the study period, 53 patients underwent SG despite a clinically significant preoperative EGD finding regarding SG. None required reoperation before May 2016 (median follow-up 4.18 yr, standard deviation 2.8). Ten patients (18.9%, 5 with hiatal hernia, 3 with esophagitis, and 2 with Barrett's esophagus) have had several additional visits due to reflux symptoms during the follow-up.

During our study period, 26 (6.4%) patients underwent a reoperation after SG. Four were originally planned for a 2-stage procedure due to high preoperative BMI, with SG later followed by single-anastomosis duodenoileal bypass. Thirteen (3.2%) patients were converted to RYGB after SG due to difficult reflux symptoms. None had a clinically significant EGD finding preoperatively. Of these 13 patients, 10 reported no reflux symptoms after the conversion to RYGB, and 3 continued to experience nausea and epigastric pain after the conversion to RYGB. Eight other patients were converted from SG to RYGB due to insufficient weight loss without reflux symptoms. One patient was converted to RYGB because of sleeve stenosis caused by spiral stapling.

## Discussion

Our study shows a fairly high number (23.0%) of EGD findings that have to be taken into consideration when planning a SG. Moreover, nearly half the patients with a significant EGD finding were asymptomatic. On the other hand, EGD findings regarded as a contraindication for a RYGB were quite rare (1.6%), and all but 1 patient were either symptomatic or their risk for peptic ulcer or gastric malignancy could be identified by age, smoking, *H. pylori* infection, or NSAID usage. This implies that EGD seems to be needed before SG but not before RYGB in asymptomatic, low-risk patients.

The main indication for a preoperative EGD before SG is the theory that SG accelerates the natural course of a preexisting GERD on esophageal mucosa, which may eventually lead to intolerable reflux symptoms, Barrett's esophagus, or even cancer in the long term. Several reports have stated an increased risk of Barrett's esophagus and

increased GERD after SG [13,14]. To our knowledge 3 cases of esophageal adenocarcinoma have been reported after SG [15]. According to the International Sleeve Gastrectomy Expert Panel Consensus Statement severe esophagitis and Barrett's esophagus are contraindications for SG. The panel also stated that aggressive identification of hiatal hernia is appropriate and should be repaired when present [16]. Hiatal hernia has also been considered a relative contraindication for SG [9]. Esophagitis, Barrett's esophagus, and hiatal hernia are very often asymptomatic—in 40.3% of the patients in a previous study [17] and in 49.0% of patients in the present one. When we started doing SG in 2007, there was no published data or personal experience of GERD after SG. Therefore, we have previously performed SG for 53 patients with an EGD finding that can now be considered a relative contraindication. During the follow-up these patients have not undergone a reoperation, but many have experienced more reflux symptoms after SG. Because there has been increasing evidence of GERD after SG in the literature as well as in our own experience, we currently avoid SG in patients with endoscopic sign of GERD when RYGB is feasible.

Reflux has been shown as the most common indication for reoperation after SG, and it is often associated with hiatal hernia [18]. A previous study from a high-volume bariatric center reported 1.2% conversions from SG to RYGB, and 62.5% were due to postoperative GERD with or without insufficient weight loss [18]. During the follow-up, we performed 13 (3.2%) reoperations after SG due to difficult postoperative reflux, with 76.9% total recovery from any reflux-related symptoms. A previous report showed a 97% improvement of reflux symptoms [18].

Whether a routine preoperative EGD is necessary before RYGB is controversial. It has been shown that findings such as peptic ulcer disease, atrophic gastritis, gastric neoplasms, and other premalignant conditions that make RYGB contraindicated are quite rare and nearly always present with a predisposing factor [19]. However, as in our study, these findings are often asymptomatic [17]. A recent systematic review concluded that it appears reasonable to forgo routine preoperative EGD before gastric bypass in the absence of a clear clinical indication. Yet, they also stated that concerns remain regarding RYGB and future inaccessibility of the excluded stomach [7]. Risk factors for gastric neoplasms include atrophic gastritis, *H. pylori* infection, previous gastric resection, gastric polyps, familial history of gastric cancer, and smoking [20]. Risk factors for peptic ulcer disease, include usage of NSAIDs, smoking, age > 50 years, *H. pylori* infection, and chronic kidney, heart, or lung disease [21]. In our series, we did not find any malignancies in preoperative EGDs. In our series, only patients who underwent a bariatric operation were included in the retrospective analysis; it is possible that some patients were diagnosed with a malignant finding in EGD before they were referred to our unit. If we had performed an EGD

before RYGB only on patients with a GI symptom or a risk factor for peptic ulcer disease, atrophic gastritis, or gastric neoplasm, we would have missed one finding of atrophic gastritis.

According to a review of esophagogastric cancers after bariatric procedures in 2013, 28 articles with 33 cases were published [22]. The review included 8 cancer cases in the excluded stomach after gastric bypass. Preoperative endoscopic findings were reported for only 1 case with gastric intestinal metaplasia before RYGB. The authors hypothesized that the risk for cancer in the excluded stomach might be the result of constant exposure of pancreaticobiliary fluids in the excluded stomach and not a consequence of existing gastric pathology at the time of bariatric surgery [22].

*H. pylori* is often encountered in EGD biopsies, but because *H. pylori* can also be tested from fecal samples and with a <sup>13</sup>C urease breathing test, we do not think that EGD is needed for diagnosing *H. pylori* infection. However, we must keep in mind that *H. pylori* is a major carcinogen, and therefore all patients with a positive *H. pylori* screening test should undergo an EGD. Celiac disease can be screened with serum transglutaminase antibodies and serum pepsinogen I can be used to screen for peptic ulcer disease. Thus, these diseases do not require EGD for diagnosis.

Our study has several advantages but also some limitations. Our large population comprises all patients that have undergone a primary bariatric operation during a nearly 10-year long period and our records cover over 97% of preoperative EGD reports. Our study is limited due to some heterogeneity in reporting the EGD findings because preoperative EGD was performed in several endoscopy units. Also, we did not use a structured symptom questionnaire.

## Conclusions

Based on our study with a large, comprehensive cohort, we conclude that a preoperative EGD is indicated before SG, but it is not necessary before RYGB for asymptomatic patients without any risk factors for gastric pathology (family history of gastric cancer; *H. pylori* infection; usage of NSAIDs; smoking, age > 50 yr; chronic kidney, heart, or lung disease).

## Disclosures

*The authors have no commercial associations that might be a conflict of interest in relation to this article.*

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