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ASMBS Guidelines/statements

Considerations on the role of esophagogastroduodenoscopy in the pediatric metabolic and bariatric surgery patient

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This article is generated to provide guidance on the role of esophagogastroduodenoscopy (EGD) in pediatric patients with severe obesity before and after metabolic and bariatric surgery (MBS). This is the first paper that addresses screening with EGD for mucosal and anatomic upper gastrointestinal (GI) abnormalities in the pediatric population undergoing vertical sleeve gastrectomy (VSG) or Roux-en-Y gastric bypass (RYGB). The recommendations in this paper are based on pediatric peer-reviewed literature and expert opinion of the Pediatric Committee of the American Society of Metabolic and Bariatric Surgery (ASMBS).

Pediatric obesity is a significant public health problem with increased prevalence over the past several decades. *Pediatric obesity* is defined as a body mass index (BMI) $\geq 95^{th}$ percentile, and severe pediatric obesity (Class II obesity or higher), defined as a BMI $\geq$ 120% of the 95th percentile. [1,2] Recent reports estimate the prevalence of obesity among U.S. children and adolescents at 19.3% and 20.9%, respectively [3], with severe obesity increasing to 7.6% [3,4]. MBS has been shown to be safe and effective for long-term weight loss and resolution of numerous co-morbidities in adolescent patients [5,6]. The American Academy of Pediatrics (AAP) now recommends MBS as a treatment for pediatric patients with severe obesity [7].

Currently, RYGB and VSG constitute the most commonly performed MBS procedures in the US for adults and adolescents [5,8]. The ASMBS pediatric MBS guidelines consider both procedures to be safe and effective in the pediatric population [2], with reported weight loss of 28% and 26% in RYGB and VSG, respectively, in patients followed for 5 years [9–11]. Recent data show that the reduction in obesity-related co-morbidities, such as hypertension (HTN), dyslipidemia (DL), sleep apnea (SA), and type 2 diabetes (T2D) [12], is durable in 75%–85% of patients [11]. At this time, in children, VSG makes up over 80% of the MBS procedures [13]. This is important given the known risk of gastroesophageal reflux disease (GERD) following VSG in children and adults [14–18].

Esophagogastroduodenoscopy (EGD) is sometimes performed before MBS in pediatric centers with no clear consensus among centers. Data in adults examining the

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role of EGD in the adult MBS population suggest that preoperative EGD is beneficial for identifying asymptomatic gastrointestinal pathologies, leading to modification in surgical intervention [19,20]. This practice in the pediatric bariatric population has been lacking due to the paucity of pediatric studies addressing this question. Colman et al. retrospectively reviewed 134 pediatric patients who underwent MBS; 70% of the cohort underwent preoperative EGD, and 46% had either anatomic abnormality or mucosal disease requiring medical treatment [21]. Subsequent bariatric surgical management was not changed [21]. Additionally, a recent chart review of 40 pediatric patients, who underwent EGD prior to their MBS [22] reported an incidence of gastritis (18%), esophagitis (13%) and *Helicobacter pylori* (10%). Although these conditions needed medical treatment, none was associated with a change in surgical plan [22].

There is a need for standardized guidelines in centers where adolescent MBS is offered. The goal of this paper is to provide a review of the evidence and expert recommendations on the use of EGD, pre and post operatively, in pediatric patients with severe obesity who are undergoing MBS.

Grades of recommendations

The grading system used in this review is drawn from other guideline papers [23,24]. GRADE (Grading of Recommendations Assessment, Development and Evaluation) is based on expert opinion and available literature. As this review is the first ASMBS Pediatric Committee Guideline on this subject, some recommendations are based on recently published adult EGD guidelines and expert opinion. Grades reflect the consensus of the committee (Table 1).

Esophagogastroduodenoscopy prior to metabolic and bariatric surgery: indications and reasoning

The goal of an EGD prior to MBS is to evaluate for mucosal and anatomic abnormalities that may alter medical and/or surgical management, including esophagitis (e.g., GERD or eosinophilic disease), Barrett's esophagus, peptic ulcer disease, hiatal hernia, celiac disease, malignancy, and presence of *H. pylori*. The first recommendations regarding EGD in adult MBS patients are either individualized based on presence of symptoms (2015 ASMBS guidelines) [24], or routinely performed (2005 European Guidelines) [25]. In the 2020 International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) position statement, preoperative EGD was recommended in all adult patients with symptoms and considered in patients without symptoms due to a 23% chance of findings that result in altered management [26]. This recommendation was further supported in the 2021 ASMBS Adult EGD Position Statement [27].

In pediatric studies, routine EGD is considered a safe procedure with adverse events of bleeding in .3% and treatable hypoxia in 1.5% [28]. Change in surgical and medical management as a result of preoperative EGD has been described in 8% and 30%, respectively, in a meta-analysis studying adult bariatric patients [28–31]. Change in medical management, but not surgical management due to preop EGD findings was described in the 2 pediatric studies mentioned above [21,22].

Asymptomatic patients

In 6 studies involving adults with obesity and without GI symptoms seeking MBS, findings on EGD included hiatal hernia (17%) and erosive esophagitis (13.4%) [32–37]. There currently is no evidence that gastric pathology (e.g., gastritis, *H. pylori*) increases morbidity in VSG pediatric patients [38]. In asymptomatic pediatric patients, 46% had abnormalities in 1 retrospective study [21], and up to 27% with mucosal inflammation or *H. pylori* in the second retrospective study [22].

There is also a role for EGD in adult patients prior to RYGB as the stomach and duodenum are not easily evaluated after surgery. The ASMBS position regarding adults is that preoperative screening EGD in all patients "is justifiable and should be done at the surgeon's discretion"[27]. While there is little risk of pathology in the pediatric patient, evaluation after RYGB is difficult; therefore, preoperative EGD should be considered in this population.

Patients with upper gastrointestinal symptoms

GERD is more common in patients with obesity with 5%–24% of adolescents with obesity reporting GER symptoms [39]. Fortunately, sequela of long-standing gastroesophageal reflux (GER) (e.g., malignancy, Barrett's esophagus [BE]) [40] are relatively rare in youth (.12%) compared with adults (6%–12%) [41]. The concern that VSG could worsen GER

Table 1
GRADE system [23,24] to rate the quality of evidence of recommendations

Quality of evidence	Definition	Symbol
High quality	Further research unlikely to change recommendations	Ø Ø Ø Ø
Moderate quality	Further research may change the result of the recommendation	Ø Ø Ø
Low quality	Further research likely to change the result of recommendation	Ø Ø
Very low quality	Recommendation is uncertain	Ø

GRADE = Grading of Recommendations Assessment, Development and Evaluation.

Table 2
Consensus recommendations on the role of esophagogastroduodenoscopy in the pediatric metabolic and bariatric surgery patient

Recommendation	Grade
There is insufficient evidence to recommend for or against routine preoperative EGD in asymptomatic pediatric patients undergoing VSG; this decision should be based on the surgeon's discretion.	Ø Ø Ø
Pediatric patients undergoing RYGB as an initial procedure could be considered for preoperative EGD based on the ASMBS Adult EGD Position Statement, owing to the difficulty evaluating their gastrointestinal tract post operatively.	Ø Ø Ø
Routine preoperative EGD with biopsy is recommended in all pediatric patients with significant upper gastrointestinal symptoms.	Ø Ø Ø Ø
Pediatric patients should be screened annually for gastrointestinal symptoms by their pediatrician or primary care provider, and those with significant upper gastrointestinal symptoms should undergo timely endoscopic evaluation.	Ø Ø Ø Ø
Consider a baseline post-VSG screening EGD in all pediatric patients when transitioning to adult care because of the risk of poor follow-up and asymptomatic reflux.	Ø Ø
Preoperative and/or intraoperative EGD in pediatric patients with prior foregut or MBS could be considered.	Ø Ø Ø

EGD = esophagogastroduodenoscopy; VSG = vertical sleeve gastrectomy; RYGB = Roux-en-Y gastric bypass; ASMBS = American Society for Metabolic and Bariatric Surgery; MBS = metabolic and bariatric surgery.

symptoms, or even predispose patients to de novo GER after their VSG has been both accepted and challenged [14,17,39,42,43]. The Teen Longitudinal Assessment of Bariatric Surgery (Teen-LABS) study, as well as several adult studies, reported increased GER symptoms in VSG patients over time, but not in RYGB patients [15,16,18,44]. Interestingly, Colman et al. recently reported that preoperative EGD in adolescents undergoing VSG, even with findings of esophagitis, did not result in change in surgical management [21]. With debate ongoing, some surgeons may be hesitant to offer VSG to patients with a history of GER. While GER is not an absolute contraindication to VSG, a large meta-analysis and expert consensus warn of the possibility of worsening or de novo GER post VSG and advise thoughtful counseling of adult patients when deciding which procedure to offer [40,45].

The prevalence of preoperative gastric or duodenal peptic ulcer disease (PUD) found by EGD in adult MBS patients is approximately 5% in a large meta-analysis [29]. The incidence of preoperative PUD confirmed on EGD in the adolescent MBS population is not known; however, PUD in the general pediatric population is highly associated with *H. pylori* infection and may have an inverse relationship with obesity [29,46–48]. The presence of *H. pylori* has not been shown to increase the risk of anastomotic complications in bariatric procedures; and asymptomatic *H. pylori* can be diagnosed on the VSG specimen with the option of treating postoperatively [38].

Non-helicobacter PUD is more commonly seen in children aged <10 years, thus less likely to be seen in the adolescent bariatric population [46]. Gastric malignancy diagnosed by preoperative EGD prior to a bariatric procedure is exceedingly rare in adults (.4%) and gastric malignancy in the general pediatric population only represents .05% of all pediatric gastrointestinal malignancies making preoperative EGD for these diagnoses unnecessary [49].

Patients with prior upper gastrointestinal surgery

Preoperative EGD is useful for operative planning in patients with prior foregut surgery where anatomy can be altered, particularly in patients with prior fundoplication or MBS procedures. EGD can define anatomy, evaluate for mucosal inflammation, or identify strictures that may have resulted from prior procedures. Intraoperative EGD may be useful in patients with a history of prior gastric surgery to assist in defining anatomy and can be utilized for a leak test when necessary [24].

Alternatively, for the purpose of solely defining anatomy after prior foregut surgery, upper GI contrast study or computed tomography have been suggested. Findings suggest that both tests are unlikely to change management [50,51], and both expose pediatric patients to radiation. Thus, EGD should be used preoperatively at the discretion of the surgeon.

Recommendations

1. There is insufficient evidence to recommend for or against routine preoperative EGD in asymptomatic pediatric patients undergoing VSG, this decision should be based on the surgeon's discretion. Ø Ø Ø
2. Pediatric patients undergoing RYGB as an initial procedure, could be considered for preoperative EGD based on ASMBS adult Position Statement due to the difficulty evaluating their gastrointestinal tract post operatively. Ø Ø Ø
3. Routine preoperative EGD with biopsy is recommended in all pediatric patients with significant upper gastrointestinal symptoms. Ø Ø Ø Ø

Endoscopy after metabolic and bariatric surgery

Presently, there are no clear guidelines regarding indications for routine endoscopic surveillance post MBS in the pediatric population. Adult international guidelines recommend postoperative EGD following VSG at 1, 3, and 5 years and then routinely based on disease findings [26,52], ASMBS adult EGD Position Statement recommends considering EGD in all VSG patients 3 years after surgery and then every 5 years afterward if normal, regardless of symptoms [27].

Gastrointestinal symptoms which should prompt endoscopic evaluation post MBS include nausea, vomiting, dysphagia, chest pain, abdominal pain, regurgitation, excessive weight loss, and weight regain. EGD may demonstrate pathologies including but not limited to: GERD, marginal ulcers, *H. pylori*, fistulae, stenosis, pseudodiverticulum, hiatal hernia, kinking or torsion of the stomach, retained foreign bodies, bezoars, bleeding, or enlarged fundus [24]. Patients with abdominal pain following RYGB should undergo EGD to rule out ulcer disease, however marginal ulcers do not rule out internal hernias and can, in fact, be a result of Peterson's hernias. There is little indication for routine postoperative EGD in asymptomatic RYGB patients.

The long-term effect of altering anatomy at or near the gastroesophageal junction by VSG, particularly in the pediatric and adolescent population, is unknown. Long-term exposure to reflux suggests younger patients may have a higher risk of associated changes including dysplasia and or BE [53]. In the adult population, the risk of developing BE post VSG remains a concern, where up to 15%–17% of patients are at risk for BE [45,54–58]. Furthermore, it is imperative to consider that routine postoperative endoscopic surveillance has been proposed for the adult MBS population every 3–5 years [26,52]. Future studies in pediatric and adolescent patients exploring the necessity of routine postoperative surveillance for esophageal pathology are needed.

The low occurrence of BE and malignancy in children, as well as the necessity for general anesthesia, make routine postoperative endoscopy in asymptomatic patients post VSG somewhat less imperative. However, there remains a significant risk for children with asymptomatic GER post VSG that may go undiagnosed for years. The risk of BE is likely to increase with years of exposure and the risk of malignancy will increase in adulthood [59].

Recommendations

4. Pediatric patients should be screened annually for gastrointestinal symptoms by their pediatrician or primary care provider and those with significant upper gastrointestinal symptoms should undergo timely endoscopic evaluation. Ø Ø Ø Ø
5. Consider a baseline post-VSG screening EGD in all pediatric patients when transitioning to adult care due to the risk of poor follow-up and asymptomatic reflux. Ø Ø

Patients at time of Subsequent Metabolic & Bariatric Surgery

Patients undergoing a subsequent MBS procedure (conversion of VSG to RYGB or to duodenal switch) for inadequate weight loss or severe reflux symptoms

Patients who are undergoing revisional MBS often present with symptoms of weight gain, reflux, dysphagia, or vomiting. Endoscopy is often used prior to revisional surgery to diagnose and, when possible, treat the problem. If revisional surgery is performed for weight regain, then EGD can be used to assess for esophageal mucosal disease, presence of *H. pylori*, or other pathologies. Use of endoscopy can also be helpful in identifying prior staple line location and/or to perform a leak test, which allows for a safe surgical outcome [60,61].

Recommendation

6. Preoperative and/or intraoperative EGD in pediatric patients with prior foregut or MBS could be considered. Ø Ø Ø

Discussion

This paper is published to address the role of EGD in the pediatric population as a supplement the ASMBS Adult EGD Position Statement on EGD before and after MBS in adults. This work is by the ASMBS Pediatric Committee and based on review of the pediatric literature, international guidelines, ASMBS Adult EGD Position Statement, and the Committee's experience with MBS in the pediatric population. Consensus of the pediatric MBS experts on the committee was obtained for the 6 guidelines included in this statement, see Table 2. These guidelines are limited by the small number of pediatric papers related to this topic but act as a starting place to guide the use of diagnostic endoscopy in this pediatric patient population. We hope that more data will be available in the next 5 years to inform a revised, more robust recommendation regarding endoscopy in pediatric patients before and after MBS.

Disclosures

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