Surg Endosc (2015) 29:1007–1017
DOI 10.1007/s00464-015-4111-3

GUIDELINE

The role of endoscopy in the bariatric surgery patient

ASGE STANDARDS OF PRACTICE COMMITTEE

Published online: 28 February 2015

This is one of a series of statements discussing the use of GI endoscopy in common clinical situations. The Standards of Practice Committee of the American Society for Gastrointestinal Endoscopy (ASGE) prepared this text in conjunction with representatives from the Society of Gastrointestinal and Endoscopic Surgeons (SAGES) and the American Society for Metabolic and Bariatric Surgery (ASMBS). In preparing this document, MEDLINE and PubMed databases were used to search for publications between January 1980 and December 2013 pertaining to this topic by using the key words "bariatric surgery" and "endoscopy." The search was supplemented by accessing the "related articles" feature of PubMed with articles identified on MEDLINE and PubMed as the references. Additional references were obtained from the bibliographies of the identified articles and from recommendations of expert consultants. When few or no data were available from well-designed prospective trials, emphasis was given to results from large series and reports from recognized experts. Weaker recommendations are indicated by phrases such as "We suggest…," whereas stronger recommendations are stated as "We recommend…." The strength of individual recommendations was based on both the aggregate evidence quality (Table 1) [1] and an assessment of the anticipated benefits and harms.

ASGE position statements for appropriate use of endoscopy are based on a critical review of the available data and expert consensus at the time that the documents are drafted. Further controlled clinical studies may be needed to clarify aspects of this document. This document may be revised as necessary to account for changes in technology, new data, or other aspects of clinical practice and is solely intended to be an educational device to provide information that may assist endoscopists in providing care to patients. This document is not a rule and should not be construed as establishing a legal standard of care or as encouraging, advocating, requiring, or discouraging any particular treatment. Clinical decisions in any particular case involve a complex analysis of the patient's condition and available courses of action. Therefore, clinical considerations may lead an endoscopist to take a course of action that varies from the recommendations and suggestions proposed in this document.

INTRODUCTION

This document is an update of the 2008 publication entitled "The Role of Endoscopy in the Bariatric Surgery Patient."[2] The purpose of this document is to update endoscopists on the utility of endoscopy in the management of patients considering bariatric surgery and those who have undergone a bariatric procedure. A recent ASGE technology publication discussed current bariatric endoluminal techniques [3]. Body mass index (BMI) is calculated as weight/height^2 (kg/m^2) and is commonly used to classify adults as overweight (BMI 25.0-29.9) and obese (BMI $\geq$30.0). In 2010, 68% of adults older than 20 years of in the United States were overweight or obese, 36% were frankly obese, and 6% had a BMI $\geq$40 [4]. By 2030, 40% of the United States population is expected to be obese [5]. Obesity is associated with an increased risk of morbidity and mortality [6–11]. In recognition of these risks and the evidence of risk reduction associated with weight loss [12–14], bariatric surgery is endorsed as an appropriate therapy in carefully selected individuals with severe obesity (BMI $\geq$40 or those with a BMI $\geq$30 and serious comorbid conditions) when dietary, behavioral, and pharmacotherapy interventions have failed [15, 16].

Table 1 GRADE system[1] for rating the quality of evidence for guidelines

Quality of evidence	Definition	Symbol
High quality	Further research is very unlikely to change our confidence in the estimate of effect	⊕⊕⊕⊕
Moderate quality	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate	⊕⊕⊕◯
Low quality	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate	⊕⊕◯◯
Very low quality	Any estimate of effect is very uncertain	⊕◯◯◯

Adapted from Guyatt et al.[1]

Table 2 Mechanism of weight loss for common obesity surgeries

Procedure	Mechanism
Laparoscopic adjustable gastric band	Restrictive
Vertical banded gastroplasty	Restrictive
Sleeve gastrectomy	Restrictive; hormonal alteration
Sleeve gastrectomy with duodenal switch/ biliopancreatic diversion	Restrictive/maldigestive; hormonal alteration
Roux-en-Y gastrojejunal bypass	Restrictive/maldigestive; hormonal alteration

Bariatric surgery in appropriately selected patients results in a significant and durable weight loss and an improvement in weight-related comorbidities. Bariatric procedures cause weight loss via gastric volume restriction or malabsorption or through a combination of the 2 and their associated hormonal changes (Table 2, Figs. 1, 2, 3). For the purposes of this document, surgical descriptors such as restrictive and malabsorptive are used; however, these terms may be overly simplistic and likely do not encompass the complete physiological effects of bariatric surgery. Behavioral modification, learned through counseling and education, is also an important component for the long-term success of any weight loss intervention. This is 1 important reason why surgical and endoscopic weight loss procedures should be offered only as components of a multidisciplinary weight management team approach. Historically, the most commonly used restrictive bariatric surgical procedure was the laparoscopic adjustable gastric band (LAGB); however, in the modern era, sleeve gastrectomy (SG) has supplanted LAGB in this regard. Vertical banded gastroplasty (VBG) was popular in the early to mid-1980s, but it is no longer routinely used. SG is an effective restrictive-type bariatric operation, which is also associated with gut peptide alterations, and when converted

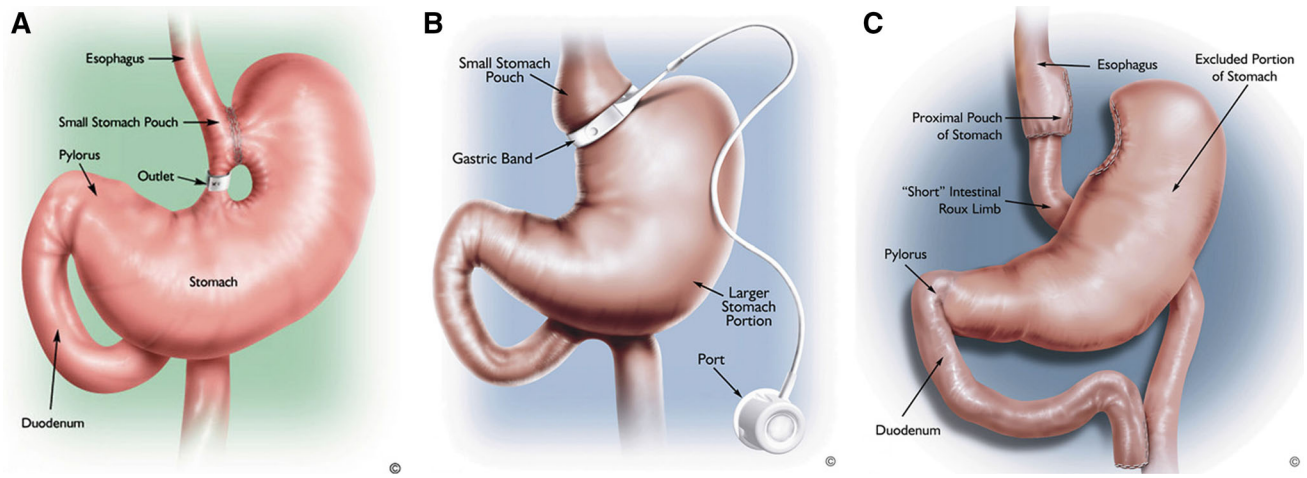

Fig. 1 Illustrations of various weight loss operations. **A,** Vertical banded gastroplasty. **B,** Laparoscopic adjustable gastric band. **C,** Roux-en-Y gastrojejunal bypass (courtesy Ethicon Endo-Surgery, Inc)

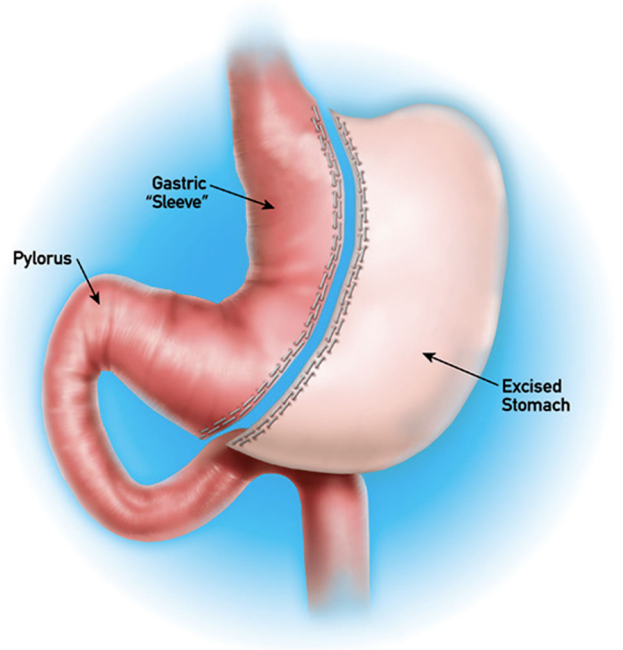

Fig. 2 Illustration of sleeve gastrectomy (courtesy of Ethicon Endo-Surgery, Inc)

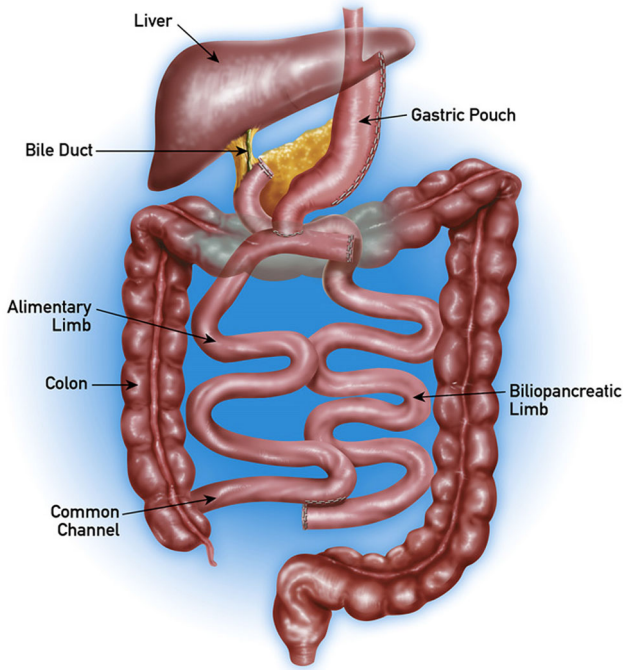

Fig. 3 Illustration of duodenal switch/biliopancreatic diversion (courtesy Ethicon Endo-Surgery, Inc)

to duodenal switch and biliopancreatic diversion, the result becomes both restrictive and malabsorptive. The Roux-en-Y gastrojejunal bypass (RYGB) is also both restrictive and malabsorptive. A thorough discussion of hormonal changes induced by these various weight loss interventions is beyond the scope of this document. It is useful, however, to understand the anatomic alterations created by these operations as they pertain to the mechanisms for weight loss, expected adverse events, and considerations for endoscopic evaluation. Feitoza and Baron [17] published a review of endoscopy in patients with postsurgical anatomy, including information on the equipment needed for successful completion of diagnostic and therapeutic procedures and tips on accessing distant or excluded portions of the GI tract in patients who have undergone RYGB. A central tenet surrounding the practice of endoscopy in patients before or after bariatric surgery is the need for close consultation or coordination with the surgeon/surgical team by the endoscopist if the endoscopist is not part of the bariatric surgery team.

PREOPERATIVE ENDOSCOPIC EVALUATION OF THE BARIATRIC SURGERY PATIENT

Preoperative endoscopy with EGD can identify patients with asymptomatic anatomic findings that may alter surgical planning. Patients with symptoms of GERD, such as heart-burn, regurgitation, dysphagia, or any postprandial symptoms that suggest a foregut pathology and/or who chronically use antisecretory medications, should have an upper GI endoscopic evaluation before bariatric surgery [18]. Multiple published studies have demonstrated that routine EGD before surgery can identify a variety of conditions including hiatal hernia, esophagitis, ulcers, and tumors [19, 20]. Although the majority of patients with abnormalities in these studies were asymptomatic, endoscopic findings resulted in an alteration of the surgical approach or delay in surgery ranging from less than 1% to 9% of patients [19–22]. A barium contrast study may be a useful alternative as it can provide information complementary to endoscopy [23]. The presence of a hiatal hernia and endoscopic signs of reflux esophagitis represent a relative contraindication to SG because of an increased risk of the development of de novo GERD-type symptoms and esophageal mucosa injury after SG. Surgeons advocate hiatal hernia reduction and crural closure in patients with hiatal hernia undergoing any weight loss operation [24]. It is useful for surgeons planning weight loss interventions to know the measured size of any hiatal hernia, reported in centimeters, both as the length of the hernia and the gap between the diaphragmatic crura, with the latter measurement obtained via intraoperative endoscopy.

Helicobacter pylori infection is present in 23% to 70% of patients scheduled for bariatric surgery [25, 26]. There are conflicting data for preoperative testing and treatment of *H pylori* with respect to related surgical outcomes, and

additional studies are needed. A retrospective study of 260 patients who underwent RYGB found *H pylori* infection at more than twice the rate among the 7% of patients in whom marginal ulcers subsequently developed (32% vs 12%, $P = .02$) [27]. Another retrospective study of 183 patients evaluating the benefits of preoperative screening and treatment of *H pylori* demonstrated a higher incidence of postoperative perforations in the unscreened/untreated group (5% vs 0%; $P = .09$) [28]. However, a study of 422 patients who underwent laparoscopic RYGB demonstrated that the presence of *H pylori* was not associated with an increased risk of marginal ulcers or pouch gastritis [29]. Another study involving 682 patients undergoing laparoscopic SG failed to demonstrate an association between *H pylori* status and postoperative adverse events [30]. Therefore, testing and eradication of *H pylori* before bariatric surgery should be individualized.

POSTOPERATIVE ENDOSCOPIC EVALUATION OF THE BARIATRIC SURGERY PATIENT

General principles

When considering endoscopy in the post–bariatric surgery patient, the endoscopist should review pertinent operative notes and previous imaging studies (both preoperative and postoperative) and must understand the expected anatomy, including the presence of altered gastric anatomy and the extent of resection and length of surgically created intestinal limbs. Direct communication with the bariatric surgeon is advisable. The choice of endoscope will depend on the indication for endoscopy and the need for intubation of the excluded limb or for therapeutic intervention. In patients who are in the early (<4 weeks) postoperative period, air insufflation may have potentially detrimental effects in the presence of leaks or tenuous anastomoses. Carbon dioxide insufflation may be useful as its rapid absorption may prevent persistent distention of excluded portions of the GI tract. If there is suspicion of a leak, the endoscopist should consider water-soluble contrast radiography as an initial diagnostic test.

The expected endoscopic findings after RYGB include a normal esophagus and gastroesophageal junction. Generally, surgeons strive to create a small gastric pouch, often too small to permit safe retroflexion; this maneuver is not recommended in this setting. Pouch length and width, stoma size, and the presence of visible suture material are information that bariatric surgeons often find useful and should routinely be included in endoscopy reports. Special care should be taken to examine the gastric pouch, the suture line, and the jejunal mucosa for fistulae and ulcerations. The anastomosis is generally 14 to 16 mm in diameter. Beyond the anastomosis, a blind limb is often visible alongside the efferent jejunal limb. The length of this blind afferent limb segment is also important to document, as excessively long blind pouch limbs at the gastrojejunostomy may be a cause of postprandial pain. The jejunojejunal anastomosis sometimes can be reached with an upper endoscope, depending on the length of the Roux limb. The distal or excluded stomach usually cannot be visualized without using a deep enteroscopy technique such as balloon-assisted enteroscopy. When gastrogastric fistulization has occurred, the gastric remnant sometimes may be amenable to inspection through the fistula.

VBG produces a gastric pouch similar in appearance to RYGB, although typically it is longer. The banded stoma is generally 10 to 12 mm in diameter, and once traversed, the distal stomach and duodenum can be visualized. Retroflexion provides a view of the excluded proximal stomach. Dilation of the stoma is contraindicated as it is encircled with prosthetic mesh or other inflexible material. This is also true for other "banded" bariatric procedures (banded sleeve and bypass) in which there is a contraindication to dilation.

LAGB produces a variable amount of extrinsic circumferential compression on the proximal stomach that is evident on upper endoscopy. The endoscopist should assess for pouch dilation or band slippage as well as the presence of band erosion through the gastric wall [31]. If any portion of the band itself can be seen endoscopically, usually as a white glistening material, erosion has occurred, and the bariatric surgeon should be consulted. Dilation of the banded area is contraindicated.

In SG, a long staple line is encountered in place of the greater curvature of the stomach. Careful inspection of the entire staple line is recommended in all cases, and retroflexion is relatively contraindicated.

Indications for endoscopy in the post–bariatric surgery patient

Symptoms. Nausea, vomiting, and abdominal pain are among the most commonly encountered symptoms after bariatric surgery. Symptoms are frequently associated with dietary nonadherence with regard to volume and type of foods eaten, rapid ingestion, or inadequate chewing. Patients with persistent symptoms despite counseling and behavior modification should be evaluated with a careful social (especially smoking) and dietary history in conjunction with upper endoscopy, as these symptoms may indicate the development of marginal ulcers, gastrogastric fistulae, postsurgical GERD, hiatal hernia, erosion of the device, and partial or complete anastomotic obstruction. If there is a suspicion of leaks or fistulae, water-soluble contrast radiography is sometimes a more appropriate

initial test to consider than endoscopy [32]. Patient history may be helpful in differentiating the etiology of pain and guiding the type of investigation. Nausea, vomiting, abdominal distention, and bloating alone or in conjunction with abdominal pain can suggest an obstructive cause such as stricture, internal hernia, and bezoar, but may also be symptoms of dumping syndrome or gastric dysmotility. Finally, dysphagia can result from esophageal dysmotility, a fully expanded band, or gastrojejunal anastomotic stenosis. In 1 study, 62% of patients presenting with persistent nausea and vomiting and 30% of those presenting with abdominal pain or dyspepsia after RYGB had significant findings on upper endoscopy including marginal ulcers, stomal stenosis, and staple line dehiscence [33].

GERD

Obesity itself is a risk factor for GERD, which is present in 30% to 60% of patients undergoing bariatric surgery [34–37]. The effects of bariatric interventions on GERD appear to be variable. Gastric banding and RYGB have been shown in multiple series to reduce GERD symptoms at rates that approach or exceed 90% [35–37]. Other studies have reported that some patients experience increased symptoms after surgery [38, 39], and in 1 study, endoscopic evidence of reflux esophagitis was present in as many as 56% of patients after LAGB placement [40]. Postoperative GERD may be related to gastrojejunal anastomotic stenosis. Reflux symptoms may be worsened in patients who have undergone SG [41]; RYGB generally is considered a better operative choice for patients with significant preoperative diagnosis of GERD.

Postoperative GERD symptoms should be managed as in nonbypass patients [42]. Endoscopy should be considered to rule out inciting factors such as obstruction of the gastrojejunal anastomosis, increased pouch size, and distal limb obstruction and for the evaluation of symptoms refractory to medical therapy. Reflux symptoms and/or regurgitation in patients after LAGB might indicate an inappropriately tight or overfilled band, and these patients should be referred to their surgeon for additional management.

Dumping syndrome

Dumping syndrome is caused by the rapid emptying of osmotically active stomach contents, such as simple carbohydrates and other calorie-dense materials, into the small bowel. It is typically experienced by patients who have undergone a procedure with a malabsorptive component (eg, RYGB, duodenal switch) and does not occur after VBG and LAGB. Symptoms occur postprandially and include tachycardia, palpitations, diaphoresis, flushing, diarrhea, nausea, and vomiting. The mechanism may be related to rapid fluid shifts, release of vasoactive peptides, and fluctuations in serum glucose. The true incidence in post–bariatric surgery patients is unknown, but has been reported to be 14% in a meta-analysis of 62 studies [43], whereas individual studies have reported rates as high as 45% to 70% [44, 45]. The diagnosis of dumping syndrome is based on clinical presentation, but endoscopy may be considered to exclude other causes [46].

Diarrhea and nutritional deficiencies

Some bariatric procedures are designed to cause intestinal malabsorption. A full description of the nutritional issues in these patients is beyond the scope of this document. The incidence of diarrhea after nonmalabsorptive bariatric operations has not been quantified. Endoscopic evaluation for symptoms of diarrhea or nutritional deficiencies should only be pursued if there is a suspicion of small-bowel mucosal disease as a cause for diarrhea. The role of endoscopy in the evaluation of diarrhea has been reviewed in a separate ASGE document [47]. Bacterial overgrowth can also occur because of blind loop syndrome and/or dysmotility and is occasionally seen associated with procedures in which long limbs of intestine are bypassed, leaving the patient with long biliopancreatic limbs. Bacterial overgrowth should be considered in patients experiencing abdominal bloating or discomfort with or without abrupt changes in bowel movement frequency from their postoperative baseline.

BAND SLIPPAGE AND EROSION

Band erosion into the gastric lumen can occur after LAGB in 2% to 4% of cases [48, 49] and band slippage at a rate of 8% [50]. With increased surgeon experience, the rates of band erosion and slippage decrease [49]. A recent meta-analysis of 19 large studies (at least 500 patients) followed for a minimum of 2 years estimated the rates of slippage and erosion to be 5% and 1%, respectively [51]. Band erosion may be asymptomatic or can produce abdominal pain, nausea, vomiting, abdominal access port site infection, increased food intake or weight gain, or GI bleeding. Chronic band slippage may present with weight gain, increasing reflux symptoms, dysphagia, or abdominal pain. Endoscopic findings of chronic band slippage may include enlarged pouch size and reflux esophagitis, gastritis, or ulcers. In severe cases, acute band slippage can lead to gastric necrosis and can be life-threatening [52, 53]. In patients with VBG and LAGB, endoscopic removal of polypropylene mesh erosion and control tubing has been reported [54–56].

MARGINAL ULCERS

Marginal ulcers can occur at any time after RYGB surgery and present with abdominal pain, bleeding, or nausea, although they may be asymptomatic [57, 58]. The incidence of marginal ulcer after RYGB is estimated to range from 0.6% to 36% [33, 57, 58]. Ulcers occur at the gastrojejunal anastomosis, usually on the intestinal side, and are thought to arise as the result of a number of factors including local ischemia, staple line disruption, effects of acid on exposed intestinal mucosa, and the presence of luminally exposed staples or suture material [59]. Factors that increase the risk of marginal ulcers include gastrogastric fistula, *H pylori,* smoking, diabetes, excessive gastric pouch length, and the use of nonsteroidal anti-inflammatory drugs [33, 57, 59]. The use of proton pump inhibitors was found in 1 study to be associated with a decreased risk of marginal ulcers [33].

FISTULAE AND LEAKS

Gastric leaks and gastrogastric fistulae are potentially serious adverse events of weight loss surgery and occur in 1% to 6% of patients [60–63]. Extraluminal gastric leaks can result in cutaneous fistulae, peritonitis, abscess, sepsis, organ failure, and death [64]. Clinical manifestations include tachycardia, fever, nausea, vomiting, and flank, abdominal, or chest pain. Most gastric bypass leaks occur at the gastrojejunal anastomosis with nearly all others occurring in the remnant (excluded) stomach. Leaks from the jejunojejunal anastomosis are uncommon but do occur and usually require reoperation. Most leaks associated with SG are distributed along the staple line with the majority occurring near the cardia. Upper GI contrast studies or CT usually permit the diagnosis of postoperative extraluminal leaks, although the false negative rate has been reported to be as high as 30% [65]. After discussion with surgical colleagues, endoscopy can be considered in the early postoperative period (within 30 days) if the patient is clinically stable and there is uncertainty about the diagnosis or if there is a planned endoscopic intervention [66, 67]. Endoscopy in this clinical scenario should be reserved for centers with experience in the endoscopic treatment of postoperative adverse events and in coordination with surgeons experienced in the care of patients with bariatric surgery adverse events. The use of carbon dioxide may be preferable to room air for insufflation. Fibrin glue injection, placement of clips, or insertion of fully covered self-expandable metal stents (SEMSs) have been used successfully to seal postoperative leaks in some patients [68, 69].

Chronic gastrogastric fistulae may be found in the presence of marginal ulcers, and patients may present with nausea, vomiting, heartburn, epigastric pain, and weight gain. An upper GI contrast study is sensitive for their detection. Fistulae can be visualized endoscopically, but this requires careful inspection and familiarity with their appearance. Endoscopic therapies for postoperative fistulae have been performed by using fibrin glue injection [70, 71] or SEMSs with varied results [72–74]. Case reports and small case series indicate fistula closure may also be achieved by using various combinations of mucosal ablation, glue or fibrin plugs, application of endoscopic clips, placement of SEMSs, and endoscopic suture placement [67, 75, 76]. Endoscopic therapies should be coordinated with the bariatric surgery team in the event that such endoscopic treatments are not provided directly by the surgeon as these therapies are not uniformly successful and often serve as a bridge to stabilize the patient for eventual operation.

STOMAL STENOSIS

Gastrojejunal stomas are generally between 14 and 16 mm in diameter to maximize the restrictive nature of a bariatric operation. Anastomotic strictures, defined as anastomoses that are < 10 mm in diameter, are a common adverse event of RYGB, occurring in 3% to 28% of patients [77–80]. The occurrence of gastrojejunal strictures may be associated with marginal ulcers. Patients with anastomotic strictures generally present with nausea, vomiting, or dysphagia, usually within the first year after surgery. Stenosis can be identified by contrast radiography, but direct endoscopic visualization is preferred because of its high sensitivity [78]. In addition, marginal ulceration can be identified, and stricture dilation of strictures can be performed.

Endoscopic dilation of anastomotic strictures can be performed safely and effectively by using through-the-scope balloon dilators and wire-guided bougie dilators, although the former is preferred by bariatric surgeons [81, 82]. Gradual dilation over multiple sessions may reduce the risk of perforation [83]. Even with multiple sessions, some stenoses cannot be adequately dilated endoscopically, and reoperation is needed [84]. There is ongoing controversy whether stoma size is associated with weight regain or efficiency of weight loss, and although there is little evidence to support concern, some authors caution against dilation to a diameter >15 mm. However, in 1 study, dilation to at least 15 mm was not associated with weight regain and was associated with a reduced need for repeat procedures [82]. The perforation rate of balloon dilation of RYGB strictures is estimated to be 2% to 5% [85, 86].

It is important to recognize that in patients with RYGB, the Roux limb can be delivered to the upper abdomen to connect with the gastric pouch in an antecolic fashion, (in front of the transverse colon) or through a retrocolic tunnel

created in the transverse mesocolon. If the retrocolic tunnel is created too tightly or postoperative stricturing occurs, this limb can be narrowed, leading to obstructive symptoms [84]. Endoscopically, the gastrojejunal anastomosis will be normal, but the jejunum beyond the anastomosis will be dilated to the point where it traverses the mesentery where luminal narrowing may be seen. Because the risk of perforation is high, dilation in this location is not advised [85]. Review of the operative notes and communication with the operating surgeon are helpful in determining which type of limb delivery was used.

Luminal gastric stenosis after SG may be amenable to endoscopic management, particularly if short segments are involved, but long stenoses may require seromyotomy or other options such as revision to gastric bypass [86].

FOREIGN BODY MATERIAL

Staples and suture material are common findings at endoscopy in patients who have undergone GI surgery, but in patients after RYGB, remnant surgical material may contribute to marginal ulcers, stomal stenosis, unexplained abdominal pain, and dysphagia [87, 88]. Removal of material by using forceps or endoscopic scissors has improved symptoms in as many as 87% of patients undergoing endoscopy [88]. Removal of material should only be considered after maturation of the anastomosis. Use of a dual-lumen endoscope, 1 for grasping and 1 for cutting, is efficient but not essential.

BEZOARS

Food bezoars can occur in weight-loss surgery patients, most commonly after gastric banding [89, 90]. When they occur in patients seen after RYGB, they most commonly occur within the gastric pouch, although there are numerous case reports demonstrating their development at the jejunojejunal anastomosis [91–93]. They may form within the first month after surgery or present later with symptoms of nausea, vomiting, and dysphagia. Bezoars can be diagnosed and treated endoscopically with fragmentation and removal [94].

BLEEDING AND ANEMIA

GI bleeding in the post-bariatric surgery patient may be acute or chronic and may present as iron deficiency anemia [95]. Luminal bleeding may arise anywhere in the upper GI tract, including the excluded portion of the stomach in RYGB patients. In the early postoperative period, bleeding occurs from the anastomotic staple lines in about 1% to 4% of patients undergoing RYGB [96]. Bleeding is rare in patients undergoing LAGB with a reported incidence as low as 0.1% [97, 98]. Patients with signs or symptoms of acute or chronic bleeding should be evaluated with endoscopy. Accessing the excluded portion of the stomach and the Roux limb can be difficult and may require the use of a colonoscope or a device-assisted enteroscope [99]. When traditional approaches to access the excluded stomach and/or Roux limb in the patient with bleeding or anemia are unsuccessful, access may be gained through a surgically created gastrostomy [100].

Anemia may be related to deficiencies in vitamin B_{12} and iron, which are common after RYGB, with an estimated prevalence of 30% to 50% [101, 102]. The mechanisms are multifactorial. If GI bleeding is suspected as the source of iron deficiency, an appropriate workup should include endoscopic evaluation.

CHOLEDOCHOLITHIASIS AND ERCP POST-RYGB

Morbid obesity is a risk factor for cholelithiasis, and rapid weight loss is an independent and potentially compounding risk factor. Studies have noted the prevalence of gallstones to be 27% in patients planning LAGB and 14% in patients planning RYGB [103]. Gallstones form in approximately one-third of patients who did not have gallstones preoperatively, and ursodiol treatment for 6 months after surgery can reduce this risk. Cholecystectomy is required in 7% to 41% of patients after RYGB [104, 105]. Rates of choledocholithiasis after RYGB are unknown. Although ERCP usually can be performed in a routine fashion after LAGB and SG, ERCP in RYGB patients presents significant technical challenges because the length of the Roux limb is typically beyond the reach of standard forward- or side viewing endoscopes. Nonendoscopic means of diagnosis (eg, MRCP) and therapy (eg, percutaneous transhepatic intervention) are available for the evaluation of RYGB patients with choledocholithiasis in whom endoscopic management is not practical. Case reports have demonstrated successful ERCP by using colonoscopes or enteroscopes with and without adjuncts such as Savary wires, although this is not possible in patients with long Roux limbs [106]. Double-balloon enteroscopy, single-balloon enteroscopy, and spiral-assisted enteroscopy have all been used with variable success in reaching the papilla, with no single modality demonstrating superiority [107, 108]. An alternative to transoral enteroscopy is laparoscopically assisted transgastric ERCP [109, 110]. Success rates are superior to those achieved with enteroscopy alone [111], but must be performed in concert with a surgeon familiar with both the bariatric anatomy and advanced minimally

invasive surgical techniques. A 15-mm trocar is placed in the left upper quadrant for the endoscope and a gastrotomy placed as far to the left of the stomach as possible; balloon-tipped trocars advanced through the gastrotomy may prevent the spillage of gastric contents. ERCP can also be done via a retrograde approach through an enterotomy in the Roux limb. In nonurgent situations, a gastrostomy tube (PEG) can be placed in the gastric remnant by using laparoscopic or radiographic techniques, and once the site matures, an ERCP may be performed through the dilated tract [112]. A recent case series reported the feasibility of a single procedure retrograde PEG accompanied by tract dilation via an esophageal SEMS with subsequent antegrade ERCP in 5 RYGB patients with sphincter of Oddi dysfunction [113].

WEIGHT REGAIN

Failure to lose weight or regaining weight after an initial postoperative weight loss may indicate the development of a gastrogastric fistula from staple line dehiscence, a patulous gastrojejunal anastomosis that fails to adequately restrict food intake, dilation of the gastric pouch, or behavioral recidivism by the patient. Although anatomic causes may be diagnosed by contrast radiography, confirmation or visualization by endoscopy may be preferable as subsequent therapeutic surgical options are being considered. Furthermore, some small gastrogastric fistulae can be managed endoscopically [66, 96–101]. Excessively patulous gas- trojejunal anastomoses have been treated successfully with 4-quadrant endoscopic injection of sodium morrhuate into the stoma to induce scarring. In 1 small study using this method, restoration of a stomal size of $\leq$12 mm was achieved in 18 of 28 patients (64%) [114]. Endoscopic suturing devices have also been developed to reduce stoma size and gastric pouch volumes, but have not been widely adopted. Quality data regarding endoluminal approaches to stomal reduction and its resultant impact on weight management remain sparse, and these approaches cannot be recommended for widespread application at this time. Furthermore, modification to previous bariatric operations should be performed after a multidisciplinary evaluation because weight regain is very often related to lifestyle and eating behaviors.

RECOMMENDATIONS

1 We suggest that the decision to perform preoperative endoscopy should be individualized in patients scheduled to undergo bariatric surgery after a thorough discussion with the surgeon, taking into consideration the type of bariatric procedure performed. ⊕⊕◯◯

2 We recommend water-soluble contrast radiography rather than endoscopy as the initial investigation in the postoperative bariatric patient suspected of having a leak or fistula. ⊕⊕⊕◯

3 We recommend endoscopy as a first-line diagnostic study in the evaluation of the postoperative bariatric patient with abdominal pain, nausea, or vomiting. In the immediate postoperative period consultation with the surgeon is recommended. ⊕⊕⊕◯

4 We suggest endoscopic management of postoperative fistulae and leaks by an endoscopist with experience with these techniques accompanied by a treatment strategy developed in consultation with a bariatric surgeon. ⊕◯◯◯

5 We recommend that endoscopic dilation of symptomatic stomal stenoses be planned in accordance with the type of anastomosis created during the original bariatric operation. Generally, dilation should be limited to 15 mm and should be avoided after LAGB and VBG procedures. ⊕⊕⊕◯

6 We suggest endoscopic removal of luminal surgical material from the mature gastrojejunal anastomosis in symptomatic patients. ⊕⊕◯◯

7 We suggest that the approach to ERCP in patients with RYGB should be individualized based on preprocedure imaging and the objective of the procedure. ⊕⊕◯◯

8 We suggest that any attempt at endoscopic stoma reduction in patients with weight regain related to patulous gastrojejunal anastomoses be conducted in the multidisciplinary weight management setting because there are sparse data regarding its effectiveness. ⊕⊕◯◯

DISCLOSURE *Dr Kothari is a proctor for Torax. Dr Stefanidis has received honoraria from Bard and Gore. Dr Khashab is a consultant for Boston Scientific. Dr Hwang is on the speakers' bureau of Novartis, is a consultant for US Endoscopy, and has received a research grant from Olympus. Dr Saltzman is a consultant for Cook Endoscopy and Beacon Endoscopic. Dr Muthusamy is a consultant for and has received honoraria from Boston Scientific and Covi- dien GI Solutions. Dr Chathadi is on the speakers' bureau of Boston Scientific. All other authors disclosed no financial relationships relevant to this article.*

Abbreviations: BMI, body mass index; LAGB, laparoscopic adjustable gastric band; RYGB, Roux-en-Y gastrojejunal bypass; SEMS, selfexpandable metal stent; SG, sleeve gastrectomy; VBG, vertical banded gastroplasty.

References

1. Guyatt G, Oxman AD, Akl EA et al (2011) GRADE guidelines: introduction—GRADE evidence profiles and summary of findings tables. J Clin Epidemiol 64:383–394
2. Anderson MA, Gan SI, Fanelli RD et al (2008) Role of endoscopy in the bariatric surgery patient. Gastrointest Endosc 68:1–10

3. Kethu SR, Banerjee S, Barth BA et al (2012) Endoluminal bariatric techniques. Gastrointest Endosc 76:1–7
4. Flegal KM, Carroll MD, Ogden CL et al (2010) Prevalence and trends in obesity among US adults, 1999–2008. JAMA 303:235–241
5. Finkelstein EA, Khavjou OA, Thompson H et al (2012) Obesity and severe obesity forecasts through 2030. Am J Prev Med 42:563–570
6. Adams KF, Schatzkin A, Harris TB et al (2006) Overweight, obesity, and mortality in a large prospective cohort of persons 0 to 71 years old. N Engl J Med 355:763–778
7. Zhang C, Rexrode KM, van Dam RM et al (2008) Abdominal obesity and the risk of all-cause, cardiovascular, and cancer mortality: sixteen years of follow-up in US women. Circulation 117:1658–1667
8. Reis JP, Araneta MR, Wingard DL et al (2009) Overall obesity and abdominal adiposity as predictors of mortality in U.S. White and black adults. Ann Epidemiol 19:134–142
9. McTigue K, Larson JC, Valoski A et al (2006) Mortality and cardiac and vascular outcomes in extremely obese women. JAMA 296:79–86
10. Pischon T, Boeing H, Hoffmann K et al (2008) General and abdominal adiposity and risk of death in Europe. N Engl J Med 359:2105–2120
11. Whitlock G, Lewington S, Sherliker P et al (2009) Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. Lancet 373:1083–1096
12. Bray GA (2007) The missing link—lose weight, live longer. N Engl J Med 357:818–820
13. Adams TD, Gress RE, Smith SC et al (2007) Long-term mortality after gastric bypass surgery. N Engl J Med 357:753–761
14. Sjostrom L, Narbro K, Sjostrom CD et al (2007) Effects of bariatric surgery on mortality in Swedish obese subjects. N Engl J Med 357:741–752
15. NIH conference (1991) Gastrointestinal surgery for severe obesity. Consensus development conference panel. Ann Intern Med 115:956–961
16. ASMBS Clinical Issues Committee (2013) Bariatric surgery in class I obesity (body mass index 30–35 kg/m^2). Surg Obes Relat Dis 9:e1–e10
17. Feitoza AB, Baron TH (2001) Endoscopy and ERCP in the setting of previous upper GI tract surgery. Part I: reconstruction without alteration of pancreaticobiliary anatomy. Gastrointest Endosc 54:743–749
18. Hampel H, Abraham NS, El-Serag HB (2005) Meta-analysis: obesity and the risk for gastroesophageal reflux disease and its complications. Ann Intern Med 143:199–211
19. Korenkov M, Sauerland S, Shah S et al (2006) Is routine preoperative upper endoscopy in gastric banding patients really necessary? Obes Surg 16:45–47
20. Zeni TM, Frantzides CT, Mahr C et al (2006) Value of preoperative upper endoscopy in patients undergoing laparoscopic gastric bypass. Obes Surg 16:142–146
21. Loewen M, Giovanni J, Barba C (2008) Screening endoscopy before bariatric surgery: a series of 448 patients. Surg Obes Relat Dis 4:709–712
22. Mong C, Van Dam J, Morton J et al (2008) Preoperative endoscopic screening for laparoscopic Roux-en-Y gastric bypass has a low yield for anatomic findings. Obes Surg 18:1067–1073
23. Frigg A, Peterli R, Zynamon A et al (2001) Radiologic and endoscopic evaluation for laparoscopic adjustable gastric banding: preoperative and follow-up. Obes Surg 11:594–599
24. Dolan K, Finch R, Fielding G (2003) Laparoscopic gastric banding and crural repair in the obese patient with a hiatal hernia. Obes Surg 13:772–775
25. Erim T, Cruz-Correa MR, Szomstein S et al (2008) Prevalence of Helicobacter pylori seropositivity among patients undergoing bariatric surgery: a preliminary study. World J Surg 32: 2021–2025
26. Verma S, Sharma D, Kanwar P et al (2013) Prevalence of Helicobacter pylori infection in bariatric patients: a histologic assessment. Surg Obes Relat Dis 9:679–685
27. Rasmussen JJ, Fuller W, Ali MR (2007) Marginal ulceration after laparoscopic gastric bypass: an analysis of predisposing factors in 260 patients. Surg Endosc 21:1090–1094
28. Hartin CW Jr, ReMine DS, Lucktong TA (2009) Preoperative bariatric screening and treatment of Helicobacter pylori. Surg Endosc 23:2531–2534
29. Papasavas PK, Gagne DJ, Donnelly PE et al (2008) Prevalence of Helicobacter pylori infection and value of preoperative testing and treatment in patients undergoing laparoscopic Roux-en-Y gastric bypass. Surg Obes Relat Dis 4:383–388
30. Almazeedi S, Al-Sabah S, Alshammari D et al (2014) The impact of Helicobacter pylori on the complications of lapaoscopic sleeve gastrectomy. Obes Surg 24:412–415
31. Kurian M, Sultan S, Garg K et al (2010) Evaluating gastric erosion in band management: an algorithm for stratification of risk. Surg Obes Relat Dis 6:386–389
32. Lee JK, Van Dam J, Morton JM et al (2009) Endoscopy is accurate, safe, and effective in the assessment and management of complications following gastric bypass surgery. Am J Gastroenterol 104:575–582; quiz 83
33. Wilson JA, Romagnuolo J, Byrne TK et al (2006) Predictors of endoscopic findings after Roux-en-Y gastric bypass. Am J Gastroenterol 101:2194–2199
34. Di Francesco V, Baggio E, Mastromauro M et al (2004) Obesity and gastroesophageal acid reflux: physiopathological mechanisms and role of gastric bariatric surgery. Obes Surg 14:1095–1102
35. Foster A, Richards WO, McDowell J et al (2003) Gastrointestinal symptoms are more intense in morbidly obese patients. Surg Endosc 17:1766–1768
36. Klaus A, Gruber I, Wetscher G et al (2006) Prevalent esophageal body motility disorders underlie aggravation of GERD symptoms in morbidly obese patients following adjustable gastric banding. Arch Surg 141:247–251
37. Nelson LG, Gonzalez R, Haines K et al (2005) Amelioration of gastroesophageal reflux symptoms following Roux-en-Y gastric bypass for clinically significant obesity. Am Surg 71:950–953; discussion 953–954
38. Cobey F, Oelschlager B (2005) Complete regression of Barrett's esophagus after Roux-en-Y gastric bypass. Obes Surg 15: 710–712
39. Suter M, Dorta G, Giusti V et al (2005) Gastric banding interferes with esophageal motility and gastroesophageal reflux. Arch Surg 140:639–643
40. Westling A, Bjurling K, Ohrvall M et al (1998) Silicone-adjustable gastric banding: disappointing results. Obes Surg 8:467–474
41. Howard DD, Caban AM, Cendan JC et al (2011) Gastroesophageal reflux after sleeve gastrectomy in morbidly obese patients. Surg Obes Relat Dis 7:709–713
42. Soricelli E, Iossa A, Casella G et al (2013) Sleeve gastrectomy and crural repair in obese patients with gastroesophageal reflux disease and/or hiatal hernia. Surg Obes Relat Dis 9:356–361
43. Monteforte MJ, Turkelson CM (2000) Bariatric surgery for morbid obesity. Obes Surg 10:391–401
44. Padoin AV, Galvao Neto M, Moretto M et al (2009) Obese patients with type 2 diabetes submitted to banded gastric bypass: greater incidence of dumping syndrome. Obes Surg 19:1481–1484

45. Pories WJ, Caro JF, Flickinger EG et al (1987) The control of diabetes mellitus (NIDDM) in the morbidly obese with the Greenville gastric bypass. Ann Surg 206:316–323
46. Ahn LB, Huang CS, Forse RA et al (2005) Crohn's disease after gastric bypass surgery for morbid obesity: is there an association? Inflamm Bowel Dis 11:622–624
47. Shen B, Khan K, Ikenberry SO et al (2010) The role of endoscopy in the management of patients with diarrhea. Gastrointest Endosc 71:887–892
48. Cherian PT, Goussous G, Ashori F et al (2010) Band erosion after laparoscopic gastric banding: a retrospective analysis of 865 patients over 5 years. Surg Endosc 24:2031–2038
49. Weiner R, Blanco-Engert R, Weiner S et al (2003) Outcome after laparoscopic adjustable gastric banding—8 years experience. Obes Surg 13:427–434
50. Keidar A, Szold A, Carmon E et al (2005) Band slippage after laparoscopic adjustable gastric banding: etiology and treatment. Surg Endosc 19:262–267
51. Singhal R, Bryant C, Kitchen M et al (2010) Band slippage and erosion after laparoscopic gastric banding: a meta-analysis. Surg Endosc 24:2980–2986
52. Foletto M, De Marchi F, Bernante P et al (2005) Late gastric pouch necrosis after Lap-Band, treated by an individualized conservative approach. Obes Surg 15:1487–1490
53. Iannelli A, Facchiano E, Sejor E et al (2005) Gastric necrosis: a rare complication of gastric banding. Obes Surg 15:1211–1214
54. Adam LA, Silva RG Jr, Rizk M et al (2007) Endoscopic argon plasma coagulation of Marlex mesh erosion after vertical-banded gastroplasty. Gastrointest Endosc 65:337–340
55. Evans JA, Williams NN, Chan EP et al (2006) Endoscopic removal of eroded bands in vertical banded gastroplasty: a novel use of endoscopic scissors (with video). Gastrointest Endosc 64:801–804
56. El-Hayak K, Timratana P, Brethauer SA et al (2013) Complete endoscopic/transgastric retrieval of eroded gastric band: description of a novel technique and review of the literature. Surg Endosc 27:2974–2979
57. Azagury DE, Abu Dayyeh BK, Greenwalt IT et al (2011) Marginal ulceration after Roux-en-Y gastric bypass surgery: characteristics, risk factors, treatment, and outcomes. Endoscopy 43:950–954
58. El-Hayek K, Timratana P, Shimizu H et al (2012) Marginal ulcer after Roux-en-Y gastric bypass: what have we really learned? Surg Endosc 26:2789–2796
59. MacLean LD, Rhode BM, Nohr C et al (1997) Stomal ulcer after gastric bypass. J Am Coll Surg 185:1–7
60. Carrodeguas L, Szomstein S, Soto F et al (2005) Management of gastrogastric fistulas after divided Roux-en-Y gastric bypass surgery for morbid obesity: analysis of 1,292 consecutive patients and review of literature. Surg Obes Relat Dis 1:467–474
61. Filho AJ, Kondo W, Nassif LS et al (2006) Gastrogastric fistula: a possible complication of Roux-en-Y gastric bypass. JSLS 10:326–331
62. Gould JC, Garren MJ, Starling JR (2004) Lessons learned from the first 100 cases in a new minimally invasive bariatric surgery program. Obes Surg 14:618–625
63. Gumbs AA, Duffy AJ, Bell RL (2006) Management of gastrogastric fistula after laparoscopic Roux-en-Y gastric bypass. Surg Obes Relat Dis 2:117–121
64. Carucci LR, Turner MA, Conklin RC et al (2006) Roux-en-Y gastric bypass surgery for morbid obesity: evaluation of postoperative extraluminal leaks with upper gastrointestinal series. Radiology 238:119–127
65. Gonzalez R, Sarr MG, Smith CD et al (2007) Diagnosis and contemporary management of anastomotic leaks after gastric bypass for obesity. J Am Coll Surg 204:47–55
66. Eisendrath P, Cremer M, Himpens J et al (2007) Endotherapy including temporary stenting of fistulas of the upper gastrointestinal tract after laparoscopic bariatric surgery. Endoscopy 39:625–630
67. Merrifield BF, Lautz D, Thompson CC (2006) Endoscopic repair of gastric leaks after Roux-en-Y gastric bypass: a less invasive approach. Gastrointest Endosc 63:710–714
68. Brolin RE, Lin JM (2013) Treatment of gastric leaks after Roux-en-Y gastric bypass: a paradigm shift. Surg Obes Relat Dis 9:229–233
69. Spyropoulos C, Argentou MI, Petsas T et al (2012) Management of gastrointestinal leaks after surgery for clinically severe obesity. Surg Obes Relat Dis 8:609–615
70. Evans JA, Branch MS, Pryor AD et al (2007) Endoscopic closure of a gastrojejunal anastomotic leak (with video). Gastrointest Endosc 66:1225–1226
71. Papavramidis ST, Eleftheriadis EE, Papavramidis TS et al (2004) Endoscopic management of gastrocutaneous fistula after bariatric surgery by using a fibrin sealant. Gastrointest Endosc 59:296–300
72. Fukumoto R, Orlina J, McGinty J et al (2007) Use of Polyflex stents in treatment of acute esophageal and gastric leaks after bariatric surgery. Surg Obes Relat Dis 3:68–71; discussion 72
73. Kriwanek S, Ott N, Ali-Abdullah S et al (2006) Treatment of gastro-jejunal leakage and fistulization after gastric bypass with coated selfexpanding stents. Obes Surg 16:1669–1674
74. Salinas A, Baptista A, Santiago E et al (2006) Self-expandable metal stents to treat gastric leaks. Surg Obes Relat Dis 2:570–572
75. Roberts KE, Duffy AJ, Bell RL (2007) Laparoscopic transgastric repair of a gastrogastric fistula after gastric bypass: a novel technique. Surg Innov 14:18–23
76. Torres-Villalobos G, Leslie D, Kellogg T et al (2007) A new approach for treatment of gastro-gastric fistula after gastric bypass. Obes Surg 17:242–246
77. Carrodeguas L, Szomstein S, Zundel N et al (2006) Gastrojejunal anastomotic strictures following laparoscopic Roux-en-Y gastric bypass surgery: analysis of 1291 patients. Surg Obes Relat Dis 2:92–97
78. Messmer JM, Wolper JC, Sugerman HJ (1984) Stomal disruption in gastric partition in morbid obesity (comparison of radiographic and endoscopic diagnosis). Am J Gastroenterol 79:603–605
79. Podnos YD, Jimenez JC, Wilson SE et al (2003) Complications after laparoscopic gastric bypass: a review of 3464 cases. Arch Surg 138:957–961
80. Sanyal AJ, Sugerman HJ, Kellum JM et al (1992) Stomal complications of gastric bypass: incidence and outcome of therapy. Am J Gastroenterol 87:1165–1169
81. Escalona A, Devaud N, Boza C et al (2007) Gastrojejunal anastomotic stricture after Roux-en-Y gastric bypass: ambulatory management with the Savary-Gilliard dilator. Surg Endosc 21:765–768
82. Peifer KJ, Shiels AJ, Azar R et al (2007) Successful endoscopic management of gastrojejunal anastomotic strictures after Roux-en-Y gastric bypass. Gastrointest Endosc 66:248–252
83. Go MR, Muscarella P 2nd, Needleman BJ et al (2004) Endoscopic management of stomal stenosis after Roux-en-Y gastric bypass. Surg Endosc 18:56–59
84. Hwang RF, Swartz DE, Felix EL (2004) Causes of small bowel obstruction after laparoscopic gastric bypass. Surg Endosc 18:1631–1635
85. Wetter A (2007) Role of endoscopy after Roux-en-Y gastric bypass surgery. Gastrointest Endosc 66:253–255
86. Parikh A, Alley JB, Peterson RM et al (2012) Management options for symptomatic stenosis after laparoscopic vertical

sleeve gastrectomy in the morbidly obese. Surg Endosc 26:738–746
87. Ryou M, Mogabgab O, Lautz DB et al (2010) Endoscopic foreign body removal for treatment of chronic abdominal pain in patients after Roux-en-Y gastric bypass. Surg Obes Relat Dis 6:526–531
88. Yu S, Jastrow K, Clapp B et al (2007) Foreign material erosion after laparoscopic Roux-en-Y gastric bypass: findings and treatment. Surg Endosc 21:1216–1220
89. Parameswaran R, Ferrando J, Sigurdsson A (2006) Gastric bezoar complicating laparoscopic adjustable gastric banding with band slippage. Obes Surg 16:1683–1684
90. Veronelli A, Ranieri R, Laneri M et al (2004) Gastric bezoars after adjustable gastric banding. Obes Surg 14:796–797
91. Powers WF, Miles DR (2011) Phytobezoar causing small bowel obstruction seven years after laparoscopic Roux-en-Y gastric bypass. Surg Obes Relat Dis 7:e3–e5
92. Roy M, Fendrich I, Li J et al (2012) Treatment option in patient presenting with small bowel obstruction from phytobezoar at the jejunojejunal anastomosis after Roux-en-Y gastric bypass. Surg Laparosc Endosc Percutan Tech 22:e243–e245
93. Sarhan M, Shyamali B, Fakulujo A et al (2010) Jejunal Bezoar causing obstruction after laparoscopic Roux-en-Y gastric bypass. JSLS 14:592–595
94. Pinto D, Carrodeguas L, Soto F et al (2006) Gastric bezoar after laparoscopic Roux-en-Y gastric bypass. Obes Surg 16:365–368
95. Buchwald H, Avidor Y, Braunwald E et al (2004) Bariatric surgery: a systematic review and meta-analysis. JAMA 292:1724–1737
96. Nguyen NT, Longoria M, Chalifoux S et al (2004) Gastrointestinal hemorrhage after laparoscopic gastric bypass. Obes Surg 14:1308–1312
97. Biertho L, Steffen R, Ricklin T et al (2003) Laparoscopic gastric bypass versus laparoscopic adjustable gastric banding: a comparative study of 1,200 cases. J Am Coll Surg 197:536–544
98. Rao AD, Ramalingam G (2006) Exsanguinating hemorrhage following gastric erosion after laparoscopic adjustable gastric banding. Obes Surg 16:1675–1678
99. Sakai P, Kuga R, Safatle-Ribeiro AV et al (2005) Is it feasible to reach the bypassed stomach after Roux-en-Y gastric bypass for morbid obesity? The use of the double-balloon enteroscope. Endoscopy 37:566–569
100. Sundbom M, Nyman R, Hedenstrom H et al (2001) Investigation of the excluded stomach after Roux-en-Y gastric bypass. Obes Surg 11:25–27
101. Amaral JF, Thompson WR, Caldwell MD et al (1985) Prospective hematologic evaluation of gastric exclusion surgery for morbid obesity. Ann Surg 201:186–193
102. Halverson JD (1986) Micronutrient deficiencies after gastric bypass for morbid obesity. Am Surg 52:594–598
103. Villegas L, Schneider B, Provost D et al (2004) Is routine cholecystectomy required during laparoscopic gastric bypass? Obes Surg 14:206–211
104. Puzziferri N, Austrheim-Smith IT, Wolfe BM et al (2006) Three-year follow-up of a prospective randomized trial comparing laparoscopic versus open gastric bypass. Ann Surg 243:181–188
105. Wudel LJ Jr, Wright JK, Debelak JP et al (2002) Prevention of gallstone formation in morbidly obese patients undergoing rapid weight loss: results of a randomized controlled pilot study. J Surg Res 102:50–56
106. Wright BE, Cass OW, Freeman ML (2002) ERCP in patients with long-limb Roux-en-Y gastrojejunostomy and intact papilla. Gastrointest Endosc 56:225–232
107. Lennon AM, Kapoor S, Khashab M et al (2012) Spiral assisted ERCP is equivalent to single balloon assisted ERCP in patients with Roux-en-Y anatomy. Dig Dis Sci 57:1391–1398
108. Shah RJ, Smolkin M, Yen R et al (2013) A multicenter, U.S. experience of single-balloon, double-balloon, and rotational overtube-assisted enteroscopy ERCP in patients with surgically altered pancreaticobiliary anatomy (with video). Gastrointest Endosc 77:593–600
109. Ceppa FA, Gagne DJ, Papasavas PK et al (2007) Laparoscopic transgastric endoscopy after Roux-en-Y gastric bypass. Surg Obes Relat Dis 3:21–24
110. Martinez J, Guerrero L, Byers P et al (2006) Endoscopic retrograde cholan- giopancreatography and gastroduodenoscopy after Roux-en-Y gastric bypass. Surg Endosc 20:1548–1550
111. Schreiner MA, Chang L, Gluck M et al (2012) Laparoscopy-assisted versus balloon enteroscopy-assisted ERCP in bariatric post-Roux-en-Y gastric bypass patients. Gastrointest Endosc 75:748–756
112. Tekola B, Wang AY, Ramanath M et al (2011) Percutaneous gastrostomy tube placement to perform transgastrostomy endoscopic retrograde cholangiopancreaticography in patients with Roux-en-Y anatomy. Dig Dis Sci 56:3364–3369
113. Law R, Wong Kee Song LM, Petersen BT et al (2013) Single-session ERCP in patients with previous Roux-en-Y gastric bypass using transprosthetic endoscopic therapy: a case series. Endoscopy 45:671–675
114. Catalano MF, Rudic G, Anderson AJ et al (2007) Weight gain after bariatric surgery as a result of a large gastric stoma: endotherapy with sodium morrhuate may prevent the need for surgical revision. Gastrointest Endosc 66:240–245

Prepared by:
ASGE STANDARDS OF PRACTICE COMMITTEE
John A. Evans, MD
V. Raman Muthusamy, MD
Ruben D. Acosta, MD
David H. Bruining, MD
Vinay Chandrasekhara, MD
Krishnavel V. Chathadi, MD
Mohamad A. Eloubeidi, MD
Robert D. Fanelli, MD, SAGES Representative
Ashley L. Faulx, MD
Lisa Fonkalsrud, BSN, RN, SGNA Representative
Mouen A. Khashab, MD
Jenifer R. Lightdale, MD, MPH
Shabana F. Pasha, MD
John R. Saltzman, MD
Aasma Shaukat, MD, MPH
Amy Wang, MD
Dimitrios Stefanidis, MD, SAGES Representative
William S. Richardson, MD, SAGES Representative
Shanu N. Khothari, MD, ASMBS Representative
Brooks D. Cash, MD, Chair

This document was developed by the ASGE Standards of Practice Committee. This document was reviewed and approved by the governing boards of the American Society for Gastrointestinal Endoscopy, the American Society of Metabolic and Bariatric Surgery, and the Society of American Gastrointestinal and Endoscopic Surgeons.

This article is being published jointly in *Gastrointestinal Endoscopy, Surgery for Obesity and Related Diseases,* and *Surgical Endoscopy.*