ENDOSCOPIC MANAGEMENT OF BARIATRIC SURGERY COMPLICATIONS

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At the end of this presentation, the learners should be able to:

- Identify complications of bariatric surgery which are best diagnosed endoscopically.
- Formulate an effective diagnostic and treatment strategy for endoscopically identified bariatric surgical complications.
- Apply the best available endoscopic technologies and techniques toward the optimal management of bariatric surgical complications.

Bariatric surgery involves operations that reduce the size of the gastric reservoir, and may be combined with features that induce malabsorption. Such procedures achieve impressive results, with 50% or greater reduction in excess body weight within 18-24 months of operation. As a result, bariatric surgical procedures have become widespread, with over 100,000 bariatric procedures performed each year, and patient demand continuing to escalate. While most patients achieve successful outcomes, some develop postoperative gastrointestinal symptoms, many of which require endoscopic evaluation. A substantial proportion of these patients will demonstrate surgical complications upon endoscopic evaluation, some of whom will require endoscopic treatment. Thus, it is imperative for today’s expert gastrointestinal endoscopist to understand bariatric surgical anatomy and its potential complications well—to know which symptoms call for endoscopic evaluation, the specific types of complications that can be encountered, and how best to manage them as an indispensable member of the bariatrics team.

Most of the bariatric patients seen by gastroenterologists in the United States will have undergone laparoscopic Roux-en-Y gastric bypass (RYGB) surgery or laparoscopic adjustable gastric banding (LAGB), as these have been, by far, the most commonly performed bariatric procedures in the U.S. for the past 10-15 years. Gastric banding results in the creation of a small proximal gastric pouch upstream from the adjustable, fluid-filled circumferential band, but involves no discontinuity or anastomosis of the gastrointestinal tract, and is, therefore, a solely restrictive procedure. RYGB, on the other hand, involves the creation of a small gastric pouch for restriction, but also employs a Roux-en-Y intestinal bypass reconstruction which results in both intentionally malabsorbing and intentionally bypassed limbs of jejunum, thus resulting in a procedure which is both restrictive and malabsorptive. Over the past two to three years, laparoscopic sleeve gastrectomy has gained tremendous traction, and, in many bariatric surgery programs, is largely supplanting LAGB. Sleeve gastrectomy is a restrictive procedure in which a longitudinal staple line is created parallel to the greater curve of the stomach, essentially “tubularizing” the proximal stomach to reduce its volume and increase resistance to the flow of food into and through the stomach. However, there are still many patients with LAGBs, and earlier iterations of gastric restriction surgeries; thus, the gastroenterologist must remain familiar with the anatomy of these operations and the management of complications arising from them.

There are gastric lumen-occupying devices in the form of gastric balloons employed as restrictive bariatric devices. Although gastric balloons are not presently FDA approved for placement in the U.S., American endoscopists are well-advised to be familiar with their existence and the management of complications they can induce, because patients who have had such devices placed abroad may encounter complications while living or traveling in the U.S.

Biliopancreatic diversion (BPD) involves partial gastrectomy and the creation of a long-limb Roux-en-Y anastomosis with a short 50-cm alimentary channel. The remnant stomach and attached short segment of jejunum are anastomosed to the ileum near the ileocecal valve, effectively bypassing the duodenum and the jejunum, resulting in malabsorption in all but the terminal ileum, where the jejunum, contiguous with the upstream duodenum and its pancreatic and biliary secretions, also empties. One variant of BPD incorporates a duodenal switch. This procedure involves a 70-80% greater curve (longitudinal) gastrectomy, maintenance of the pylorus and a small part of the duodenum, and Roux-en-Y duodenojejunostomy. Biliopancreatic diversion with duodenal switch (BPD/DS) achieves weight loss comparable with BPD with fewer side effects because maintenance of the pylorus and duodenum reduces the risk of stomal ulcers and dumping syndrome and preserves nutrient absorption. Proponents of BPD/DS claim it almost entirely eliminates these complications.

Because the vast majority of bariatric patients seen by gastroenterologists in the U.S. and Canada will have undergone RYGB or LAGB, this syllabus emphasizes these two operations and their gastrointestinal complications accordingly.

**Gastric Band Complications**

Gastrointestinal symptoms occurring most commonly after LAGB placement include dysphagia, vomiting, gastroesopha-
Anastomotic Complications

RYGB Complications: Gastric Pouch/Pouch-enteric

Anastomotic Complications

In gastric bypass, the most common late complications are those affecting the pouch-enteric, or gastrojejunostomy, anastomosis. The most common complication occurring at the pouch-enteric anastomosis is the anastomotic ulcer, which occurs in 1-16% of patients post-RYGB on either the jejunal side of the anastomosis (marginal ulcer), or, less commonly, on the gastric pouch side of the anastomosis (stomal ulcer) with prospective studies and retrospective series reporting incidences of 3-7%. Symptomatic ulcers are most likely to cause epigastric pain, but may also present with nausea, vomiting, or bleeding. Putative etiologies of pouch-enteric anastomotic ulcers include local ischemia, acid injury to the jejunal mucosa, and exposure of mucosa to retained staples and sutures at or near the anastomosis. Marginal ulcers can extend distally from the immediate anastomotic orifice, and satellite ulcers not contiguous with the anastomotic rim may be demonstrable endoscopically several folds distal to, or opposite, the anastomotic lumen. Ulcers are more likely than strictures to cause pain, whereas strictures are more likely to present with vomiting, but either complication may result in pain or vomiting, or both, in addition to nausea or vague dyspepsia. The negative impact of retained anastomotic and peri-anastomotic sutures and staples is less well-characterized in the absence of adjacent active ulcers, but these foreign bodies are felt by many experts to have probable potential harmful effects as they can cause discomfort or contribute to mucosal injury in the form of erosions or ulcers, and are therefore typically removed when identified during endoscopic investigation. Symptomatic obstruction of the gastric outlet by retained anastomotic suture has been described.

Proton-pump inhibitors (PPI) are the cornerstone of therapy for anastomotic ulcers. Sucralfate is added by some clinicians, particularly for larger ulcers, those which prove slow to heal, or are refractory to complete healing with PPI monotherapy, but no comparative or objective data exists to support this practice. Early evidence suggested significantly fewer anastomotic complications in patients in whom *H. pylori* demonstrated preoperatively had been eradicated before gastric bypass. Retrospective and prospective series suggest that *H. pylori* may potentiate marginal ulcer formation. Extrapolating from this data, many experts recommend testing for *H. pylori* in all patients who develop anastomotic ulceration post-RYGB. However, existing limited data does not demonstrate cause-and-effect correlation between anastomotic ulcers and *H. pylori*, and there is no evidence to demonstrate that treating *H. pylori* positivity detected at the time of anastomotic ulcer diagnosis specifically leads to faster healing or a more durable response to anastomotic ulcer treatment in these patients. Cigarette smoking has also been associated with anastomotic ulcers post-RYGB.

Anastomotic strictures are also common post-RYGB, although less common than anastomotic ulcers. They can occur in the absence or presence of concomitant anastomotic ulceration, or may develop as a consequence of an anastomotic ulcer or leak. The most common symptom is vomiting, which may
or may not be preceded by nausea, and excessively early satiety may also occur, as may pain, typically meal-related. Food bezoars may also develop, making gastric pouch-outlet obstruction worse or complete. When created, the pouch-enteric anastomosis is 10-15 mm in diameter; a stricture is arbitrarily defined as an anastomotic diameter less than 10 mm. Practically applied, this rule of thumb translates clinically to the endoscopist’s ability to pass a diagnostic-diameter endoscope across the anastomotic lumen without palpable resistance. Endoscopy is preferred over contrast radiography as the initial investigation, since treatment can be effected concomitantly with diagnostic study. Unlike esophageal dilation, no set guidelines exist regarding specific techniques for anastomotic stricture dilation. While a single dilation may suffice for some patients, other series suggest risk reduction via serial, graduated dilation. Regardless, endoscopic dilation has demonstrated effectiveness and durability in multiple series. Some patients may require recurrent dilations, while lack of response to sequential dilation may necessitate consideration of surgical revision. Temporary endoluminal stent placement has shown efficacy in case reports and small series.

While pouch staple line leaks and pouch-enteric anastomotic leaks are typically early complications, they do occur as late complications, although they are considerably less common than anastomotic ulcers and strictures. Post-RYGB, leaks are more common at the pouch-enteric anastomosis than at the gastric pouch staple line. While their treatment has been traditionally surgical, case reports and series have demonstrated endoscopic techniques successfully effecting closure of smaller leaks and fistulas using hemostatic clips, argon plasma coagulation, endoluminal suturing devices, fibrin glue, and temporary endoluminal stenting, including varying combinations of these technologies. One large series of 95 patients utilizing clips and sutures noted 95% technical success, but limited durability, with 65% recurrence over a mean of 177 days. Suture- and staple-line disruptions are also traditionally the purview of surgical management; however, successful nonsurgical intervention has been reported. Successful endoscopic treatment of bariatric gastrocutaneous fistulae was reported in 80% of five patients who were treated using a biomaterial plug placed via endoscopic-percutaneous rendezvous technique.

Gastric pouch enlargement and enlargement of the pouch-enteric anastomosis have been identified as putative etiologies for regain of excess weight after gastric bypass surgery. Traditional treatment has been surgical revision, but pilot trials suggest potential endoluminal solutions to this problem, either by decreasing pouch volume, diminishing pouch-enteric anastomotic diameter, or both.

Complications are seen at the jejunoojejunostomy anastomosis much less frequently than at the pouch-enteric anastomosis, most likely because the pouch-enteric anastomosis is exposed to acid and may be under greater tension. The most common complications of the jejunoojejunostomy anastomosis are anastomotic bleeding, anastomotic stricture, and anastomotic leak or fistula. These are also not seen frequently by the gastroenterologist because they are often taken care of (treated) by the surgeon directly because the jejunoojejunostomy anastomosis in these patients is typically far enough distally to require deep enteroscopy techniques to approach—techniques for which local expertise may not be available at many institutions.

Complications of Bilio-pancreatic Diversion
Complications of bilio-pancreatic diversion (BPD) are seldom seen by most gastroenterologists because this operation, and its closely-related procedure incorporating the duodenal switch, are much less commonly performed in the U.S. than LABG and RYGB. The sleeve gastrectomy portion of the procedure involves excision of part of the gastric wall parallel to the lesser curve, creating a tubularized stomach with a long staple line. Thus, it is susceptible to suture/staple line disruption and any possible resultant leak, fistula, or stricture, although the sleeve gastrectomy itself does not involve an anastomosis, and, thus, is not itself at risk of developing anastomotic complications.

Synthesis of the Endoscopist’s Role in Bariatric Surgical Complications Management
The gastroenterologist’s role in the post-bariatric patient is primarily in the evaluation of, and, when appropriate, the management of, gastrointestinal symptoms and true surgical complications. As noted above, most such situations will be in the setting of late, rather than early, surgical complications.

EGD has high comparative yield in post-bariatric surgery patients versus non-bariatric patients in terms of identifying pathology etiologic of symptoms for which it is performed, and in terms of altering management based on such findings. Thus, in post-bariatric surgery patients, EGD should be considered to be the diagnostic test of first choice in patients presenting with upper abdominal pain or vomiting.
Treatment of endoscopically identifiable bariatric complications, of course, requires a gastroenterologist knowledgeable in symptoms associated with such complications, and an endoscopist familiar with the morphologic identification of such specific stigmas, as well as with endoscopic and medical management of such complications, in addition to an expert understanding of exactly when such complications require surgical address. The gastroenterologist’s role, then, is twofold: as an expert diagnostician in the setting of post-bariatric surgery symptoms of gastroenterological origin, and as an expert in the endoscopic diagnosis and treatment therein. It is equally important for the gastroenterologist to remember that gastrointestinal disorders that affect the non-bariatric surgery population also affect the bariatric surgery population. Such common disorders include GERD and PUD. Workup and treatment is analogous to that of non-bariatric surgery patients; however, caveats introduced by surgical anatomy may alter access and clinical approach to diagnosis and treatment.

The role of endoscopy in LAGB is rather more limited than in RYGB. In both, the role of endoscopy is largely diagnostic, although in food obstructions and bezoars, endoscopy provides highly successful therapy in both LAGB and RYGB, and in pouch-enteric anastomotic strictures in RYGB, endoscopic therapy is applied routinely, and is largely successful, and durably so. There are case reports and small series demonstrating therapeutic success of endoscopic gastric band removal in both LAGB and VBG as detailed above, as well as case reports and small series documenting similar success in endoscopic closure of small leaks at staple lines and anastomoses. Endoscopic therapy of gastrointestinal bleeding is approached using the same principles and techniques applied to non-bariatric surgery patients, while taking into consideration the anatomic idiosyncrasies of the particular bariatric surgical anatomy at hand, which will require attention to the type and location of anastomoses present, as well as technical limitations of endoscopic access particular to reconstructive anatomy, such as the need to use deep (balloon-overtube assisted or rotational overtube) enteroscopy or laparoscopically-assisted endoscopic methods to obtain access to the excluded (remnant) stomach, duodenum, afferent Roux limb, jejunojejunostomy Roux anastomosis, or even the effenter limb distal to the reach of a gastro scope or pediatric colonoscope in the long-limb (malabsorbing) Roux-en-Y reconstruction typically employed in RYGB. Cholelithiasis and other biliary disorders arising in Roux-en-Y anatomy can be approached via a combined laparoscopic-endoscopic method in the OR (with access to the excluded stomach and duodenum gained through a temporary gastrostomy), or via device-assisted deep enteroscopy in some patients.

The role of endoscopy in sleeve gastrectomy complications shares some similarity to the role of endoscopy in LAGB complications, since both surgeries involve gastric restriction, and neither involves the creation of an anastomosis. However, sleeve gastrectomy results in a long staple line, typically in excess of 10 cm in axial length, in the proximal aspect of the stomach, parallel and opposite to the lesser curve. Thus, staple line complications, such as disruptions and leaks, may occur. Case reports and small series document the success of attempts at endoscopic management of staple line leaks using covered self-expanding metallic stents, endoscopic clips, endoscopic suturing devices, fibrin glue, and other endoluminal techniques and technologies.

REFERENCES