



Editorial

Management of complications following bariatric surgery: Summary



Keywords:

Bariatric surgery
Obstruction
Internal hernias
Stenosis
Gastrointestinal bleeding

1. Introduction

The search for the ideal weight loss operation began more than 50 years ago. Surgical pioneers developed innovative procedures that initially created malabsorption, then restricted volume intake, and eventually combined both techniques. The prevalence of bariatric surgery is rising rapidly and the adoption of laparoscopic techniques has led to a dramatic increase in the annual number of bariatric procedures performed. The interventions mostly performed worldwide are the laparoscopic Roux en Y Gastric Bypass (RYGB), the Sleeve Gastrectomy, the gastric banding, the Vertical Banded Gastroplasty and the Bilio Pancreatic Diversion and the Duodenal Switch. As the number of bariatric procedures increases, it is inevitable that patients experiencing these complications will present to nonbariatric general surgeons. This review offers a comprehensive evidence-based guide to the management of patients experiencing complications after bariatric surgery.

As with most general surgery, pulmonary embolism is the most frequent cause of bariatric post-operative death, but fistula formation, hemorrhage, and infection are serious complications frequently encountered by the general surgeon. A study conducted by the Agency for Healthcare Research and Quality is the most extensive, to date, and identifies the major complications of bariatric surgery. The five most common complications found were dumping syndrome (nearly 20%), anastomotic complications such as leaks or strictures (12%), abdominal hernias (7%), infections (6%), and pneumonia (4%). In obese patients the Computed Tomography scan is considered the gold standard diagnostic test. For patients who are hemodynamically unstable, or for those who lack a clear diagnosis despite imaging, or who cannot undergo CT scan due to obesity limits, surgical exploration remains the rule. This review summarizes the presentation and management of postoperative complications most often encountered after bariatric surgery.

2. Obstruction

Internal hernia and anastomotic stenosis are common causes of intestinal obstruction following bariatric surgery.

2.1. Internal hernias

Internal hernia is a serious complication often missed by radiologists and can lead to intestinal ischemia if left undiagnosed. One study demonstrated that 20% of CT scans are reported as normal in patients with incarcerated internal hernias [1]. High clinical suspicion of an internal hernia must therefore prompt an aggressive surgical approach without undue delay despite negative radiography. Four types of internal hernia were reported after laparoscopic Roux-en-Y gastric bypass: Peterson's hernia, jejuno-jejunal herniae, mesenteric and mesojejunum [2]. The most common site of herniation is the space posterior to the Roux limb: Peterson defect. Roux-en-Y gastric bypass (RYGB) leaves an excluded stomach in the abdomen. It may be difficult to diagnose an internal hernia in the absence of obstruction [3] since vomiting is not always present due to surgical alteration of the stomach. Obstruction of the biliopancreatic limb may result in an increase of the level of lipase and bilirubin in the blood which may result in the misdiagnosis of pancreatitis and cholangitis. Bariatric surgeons need to be aware of this complication and must close the mesenteric defects, thus avoiding life-threatening outcomes. If a patient presents with a suspicion of an internal hernia, he should undergo a laparoscopic exploration, the defects should be checked, and if necessary, closure of the defects should be performed.

2.2. Stenosis of the gastrojejunal anastomosis

The causes of a stenosis of the gastrojejunal anastomosis are multifactorial and there no consensus regarding the management of these stenosis [4]. Endoscopic treatment (balloon dilatation) of a stenosis appears to be effective and safe, however, high-quality randomized controlled trials have not yet been performed [5]. Surgery is reserved for failures of the endoscopic treatment.

3. Postoperative gastrointestinal bleeding

Postoperative hemorrhage following bariatric surgery manifests as intraluminal bleeding or intraperitoneal hemorrhage (hemoperitoneum). Symptoms may be overt and present as hematemesis, (gastrojejunal anastomosis.), hematochezia, or melena (gastrojejunal anastomosis, Jejunojejunal anastomosis, excluded stomach, or stomach stapled), or they can be subtle with symptoms only of mild anemia. Immediate postoperative bleeding is most often due to poor hemostasis at the time of surgery and hemorrhage from the staple lines. Rapid gastrointestinal bleeding is typically localized by angiography, computed tomography scan, and/or upper endoscopy. Unlike CT scan, endoscopy can be therapeutic as well

as diagnostic, achieving hemostasis via local injection of a sclerosing agent; complications exist, however, and include gastric perforation and anastomotic disunion. Hemoperitoneum is usually due to bleeding from the gastric stapling line and often requires surgical intervention to perform the hemostasis. In the absence of visible bleeding, continuous overlock stitching along the staple line is recommended.

Delayed bleeding may result from anastomotic erosions and ulcerations, and can be severe. The gastric remnant sometimes necessitate re-operation because the bypassed segment is not available for endoscopic hemostasis.

4. Anastomotic leak and abscess

A gastrointestinal leak after obesity surgery is the most common cause of serious morbidity and mortality. Usually, the site of leakage lies along the staple line but other sites of leakage exist [6]. Signs and symptoms include tachycardia, fever, abdominal pain and sepsis, and these should raise suspicion for an anastomotic leak [7]. There is currently no well-defined management protocol for anastomotic leakage. In our experience, most leaks resulting from bariatric surgery are successfully managed using conservative treatment. If the patient is hemodynamically stable and the leak is contained or well drained, there is ample evidence in supporting the nonoperative management of the majority of leaks [8,9]. Early treatment is associated with shorter hospital stay [10]. Computed tomography-guided drainage and/or intraluminal stent placement could be the treatment of choice in selected patients. Endoscopic placement of self-expandable stents has in fact been shown to minimize the need for surgical revision and improve patient outcomes [11]. An uncontained leak, or one associated with hemodynamic instability, requires urgent operative intervention. This should consist of repair of the leak, placement of drains, and the creation of enteral feeding access, in addition to intravenous antibiotics. Laparoscopic or open surgical intervention may be appropriate.

5. Ulcers

Ulcers are often delayed, and may be located in the excluded stomach, gastric pouch or at the anastomoses. Marginal ulcers are quite common and refer to the development of mucosal erosions along the gastrojejunal anastomosis, typically on the jejunal side. Ulcers may require medical and/or surgical treatment. The use of intraoperative endoscopy is critical for revisional bariatric surgery as it clarifies anatomy and helps minimize surgical reintervention [10].

6. Postoperative peritonitis

Late diagnosis and intervention portends a poor outcome [1]. The mortality rate of patients with overt peritonitis following bariatric surgery is 0.1–2% [12]. It can be associated with nausea, vomiting, diarrhea, fever, gastrointestinal hemorrhage and can occur anywhere from 2 days to 2 months following surgery. If there is a suspicion of postoperative peritonitis, a laparoscopic or open laparotomy intervention must be performed.

7. Gastrogastric fistula

A gastrogastric fistula (GGF) is an abnormal communication between the gastric pouch and the excluded stomach. Symptomatic GGF will require surgical management. Most experienced laparoscopic surgeons would opt for the minimally invasive approach, combining laparoscopy with intraoperative endoscopy to identify,

isolate and transect the fistulous tract with an Endo GIA stapler [13].

8. Band erosion

This complication occurs gradually and most often asymptomatic. In some rare cases, it may be manifested by a failure to lose weight and weight regain. Band removal with delayed or immediate conversion to RYGB is feasible with an acceptable morbidity, and prevents weight regain in most cases [14].

9. Band slippage

Upper gastrointestinal tract imaging is required to diagnose this complication. The treatment options for patients with slipped bands include band removal, gastric reduction and reapplication of the original band, and band replacement [15].

10. Other complications

- Splenic Injury is a perioperative complication, usually requiring surgical repair. Removal of the spleen may be necessary
- Ventral incisional hernia
- Hiatus hernia [16],
- After gastric banding: esophageal dilatation, esophagitis,
- After Sleeve gastrectomy: reflux,
- After biliopancreatic diversion and duodenal switch jejunioileal bypass: cirrhosis
- After gastric bypass: Dumping syndrome, short bowel syndrome and hepatobiliary complications (gallbladder stones, Cholelithiasis, angiocholitis). This complication poses a particular challenge because of the reconfigured anatomy of stomach.

11. Conclusion

With all this evolution in bariatric surgeries, the postoperative complications are seen far more frequently. The General surgeon must be prepared to diagnose and treat the many serious complications that can result from bariatric surgery. Effective surgical interventions require a broad understanding of the altered anatomy, advanced surgical skills and cooperation with specialists in the field.

Conflict of interest

The authors declare no conflict of interest.

References

- [1] B. Schirmer, C. Erenoglu, A. Miller, Flexible endoscopy in the management of patients undergoing Roux-en-Y gastric bypass, *Obes. Surg.* 12 (2002) 634–638.
- [2] A. Kawkabani Marchini, A. Denys, A. Paroz, et al., The four different types of internal hernia occurring after laparoscopic Roux-en-Y gastric bypass performed for morbid obesity: are there any multidetector computed tomography (MDCT) features permitting their distinction? *Obes. Surg.* 4 (2011) 506–516.
- [3] R.Y. Patel, J.W. Baer, J. Texeira, D. Frager, K. Cooke, Internal hernia complications of gastric bypass surgery in the acute setting: spectrum of imaging findings, *Emerg. Radiol.* 16 (2009) 283–289.
- [4] R. Kassir, C. Breton, P. Lointier, P. Blanc, Laparoscopic Roux-en-Y gastric bypass with hand-sewn gastrojejunostomy using an absorbable bidirectional monofilament barbed suture: review of the literature and illustrative case video, *Surg. Obes. Relat. Dis.* 10 (3) (2014 May–Jun) 560–561.
- [5] J.M. Campos, F.S. Mello, A.A. Ferraz, J.N. Brito, P.A. Nassif, P. Galvão-Neto Mdos, Endoscopic dilation of gastrojejunal anastomosis after gastric bypass, *Arq. Bras. Cir. Dig.* 25 (2012) 283–289.

- [6] L. Rebibo, P. Verhaeghe, Dhahri, D.J.-M. Regimbeau, Les urgences abdominales de l'obèse opéré, *Le J. Coelio-chirurgie* 87 (2013).
- [7] R. Kassir, P. Blanc, L.M. Tibalbo, C. Breton, P. Lointier, *Surg Endosc.* (2014 Aug 27) [Epub ahead of print] PMID: 25159654, http://www.ncbi.nlm.nih.gov/pubmed.linkname=pubmed_pubmed&from_uid=25159654.
- [8] J. Sheila, S. Constantinou, E. Evangelos, A very challenging leak from a sleeve gastrectomy, *Surg. Obes. Relat. Dis.* 9 (2013) e56–e59.
- [9] R. Kassir, S. Piqueres, P. Blanc, Abscess after sleeve gastrectomy: conservative treatment by endoscopic dilation, *Surg. Obes. Relat. Dis.* (2014 May 24), <http://dx.doi.org/10.1016/j>.
- [10] H.J. Jacobsen, B.J. Nergard, B.G. Leifsson, et al., Management of suspected anastomotic leak after bariatric laparoscopic Roux-en-y gastric bypass, *Br. J. Surg.* 101 (2014) 417–423.
- [11] S.R. Puli, I.S. Spofford, C.C. Thompson, Use of self-expandable stents in the treatment of bariatric surgery leaks: a systematic review and meta-analysis, *Gastrointest. Endosc.* 75 (2012) 287–293.
- [12] M.R. St Jean, S.E. Dunkle-Blatter, A.T. Petrick, Laparoscopic management of perforated marginal ulcer after laparoscopic Roux-en-Y gastric bypass, *Surg. Obes. Relat. Dis.* 2 (2006) 668.
- [13] A.J. Filho, W. Kondo, L.S. Nassif, et al., Gastrogastric fistula: a possible complication of Roux-en-Y gastric bypass, *JSL* 10 (2006) 326–331.
- [14] M. Suter, V. Guisti, E. Heraief, J.M. Calmes, Band erosion after laparoscopic gastric banding: occurrence and results after conversion to Roux en Y gastric bypass, *Obes. Surg.* 14 (2004) 381.
- [15] M. Manganiello, S. Sarker, M. Tempel, V. Shayani, Management of slipped adjustable gastric bands, *Surg. Obes. Relat. Dis.* 4 (4) (2008 Jul–Aug) 534–538.
- [16] A. Iannelli, R. Kassir, A.S. Schneck, F. Martini, J. Gugenheim, Hiatal hernia of the Roux-en-Y gastric bypass pouch 8 years after surgery, *Obes. Surg.* 24 (9) (2014 Sep) 1494–1496.

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13 September 2014

Available online 11 November 2014