Endoscopic Treatment of Complications after Bariatric Surgery

53

Josemberg M. Campos, Patrícia Souza de Paula, and Almino C. Ramos

Abstract

With increasing incidence of obesity and its related comorbidities, there has been a steep rise in the number of bariatric procedures throughout the world. Clearly, this has resulted in a rise in the number of complications unique to bariatric surgical procedures. Given the fact that almost all current procedures revolve around the esophagus and stomach, there is a push (or need) to attempt resolve these complications endoscopically. Thus technically advanced endoscopic procedures have come into practice to help treat complications related to bariatric surgery. We collectively call this new methodology as 'bariatric endoscopy.' This could be considered as an interface between bariatric surgery and advanced therapeutic endoscopy.

Surgical therapy could result in other complications and is therefore being replaced by minimally invasive endoluminal endoscopic procedures, especially in the control of conditions such as infection, fistula, stenosis, food impaction, ring and band erosion, bleeding and choledocholithiasis.

Keywords

Bariatric surgery • Sleeve gastrectomy • Gastric bypass • Adjustable gastric band • Stenosis • Gastric fistula • Bariatric endoscopy

53.1 Introduction

With increasing incidence of obesity and its related comorbidities, there has been a steep rise in the number of bariatric procedures throughout the world [1]. Clearly, this has resulted in a rise in the number of complications unique to bariatric surgical procedures. Given the fact that almost all current procedures revolve around the esophagus and stomach, there is a push (or need) to attempt resolve these complications endoscopically. Thus technically advanced endoscopic procedures have come into practice to help treat complications related to bariatric surgery. We collectively call this new methodology as 'bariatric endoscopy.' This could be considered as an interface between bariatric surgery and advanced therapeutic endoscopy [2].

This chapter aims to present briefly the role of endoscopy in the treatment of complications that may arise after the procedures such as laparoscopic adjustable gastric band (LAGB), laparoscopic Roux-en Y gastric bypass (LRYGB) and sleeve gastrectomy (SG).

The technical details of endoscopic surgery in its role as therapeutic intervention to manage complications are discussed in this chapter [2].

Electronic supplementary material The online version of this chapter (doi:10.1007/978-3-319-04343-2_53) contains supplementary material, which is available to authorized users.

J.M. Campos, PhD (✉)
Departamento de Cirurgia, Centro de Ciências da Saúde, Universidade Federal de Pernambuco, Recife, Brazil
e-mail: josembergcampos@gmail.com

P.S. de Paula, MD
Research Group CNPq, Universidade Federal de Pernambuco – UFPE, Recife, Brazil

A.C. Ramos, MD
Department of Bariatric Surgery, Gastro Obeso Center, Sao Paulo, Brazil

S. Agrawal (ed.), *Obesity, Bariatric and Metabolic Surgery: A Practical Guide*, DOI 10.1007/978-3-319-04343-2_53

53.2 Laparoscopic Adjustable Gastric Band (LAGB) Complications

53.2.1 LAGB Erosion

Intragastric band erosion can occur in about 1.5 % of patients (0.23–32.65 %) commonly reported to occur 12 months after device placement [3].

Clinical presentation may be characterized by epigastric pain radiating to scapula, shoulder or retrosternal pain, subcutaneous port infection or weight regain. Diagnostic upper gastrointestinal (GI) endoscopy has been the investigation of choice in gastric erosion. It has the advantage of being able to facilitate treatment in most cases. On retroflexion you can directly view the eroding prosthesis in the gastric lumen, at the level of gastric cardia.

In asymptomatic patients with minimal erosion, patients should remain under close supervision due the risk of gastrointestinal bleeding or intraabdominal infection [4, 5]. It is safe to prescribe proton pump inhibitor (PPI) to minimize further gastric acid damage until the band is removed.

Endoscopic removal of gastric band is less invasive and is therefore increasingly preferred to surgical removal [6, 7]. Division of the LAGB can be performed with a gastric band cutter (GBC; Agency for Medical Innovations, a.m.I. GmbH, Götzis, Switzerland), facilitating endoscopic removal of the band (Video 53.1), followed by surgical removal of the subcutaneous port (see Figs. 53.1 and 53.2) [7].

53.2.2 LAGB Slippage

When the prosthesis is displaced distally, there is subsequent dilation of the proximal gastric pouch, hindering the passage of food. These patients present with vomiting, dysphagia, heartburn or halitosis. Endoscopy and or contrast swallow imaging is required to confirm the diagnosis [5].

It is important, that the band should be deflated immediately in all the patients with a suspected slippage. In principle, this allows the stomach to return to its normal anatomical position and negate the need for emergent surgery in most patients.

Should this fail to resolve symptoms, an upper GI endoscopy could be performed to evaluate if the prosthesis still remains slipped? If the prosthesis happens to remain slipped then hyperinflation of the stomach helps force proximal displacement of the band; thus repositioning the band to its usual site. This procedure is performed with the patient in lateral decubitus position under conscious sedation. This maneuver also allows temporary relief of obstructive symptoms.

In cases where this maneuver fails, the band needs be surgically removed [8]. We should anticipate an increased risk of aspiration at the time of endotracheal intubation. It is important to note that this is a temporary measure that allows definitive management by surgical removal of the band in an elective setting in the future.

53.3 Laparoscopic Roux-en-Y Gastric Bypass Complications

53.3.1 Food Impaction

Food impaction may occur after LRYGB. It may be associated with the use of surgically implanted restrictive ring due to ring slippage or erosion, dietary malcompliance, gastric pouch or gastrojejunostomy stenosis. Clinical presentation is consistent with upper GI obstruction, involving nausea, retrosternal pain, epigastric discomfort or postprandial vomiting [5]. Endoscopy allows both diagnosis and its immediate treatment (see Fig. 53.3).

Endoscopic retrieval basket is commonly used accessory for foreign body removal. It is often difficult to remove all the fragments orally. Retained fragments instead can sometimes

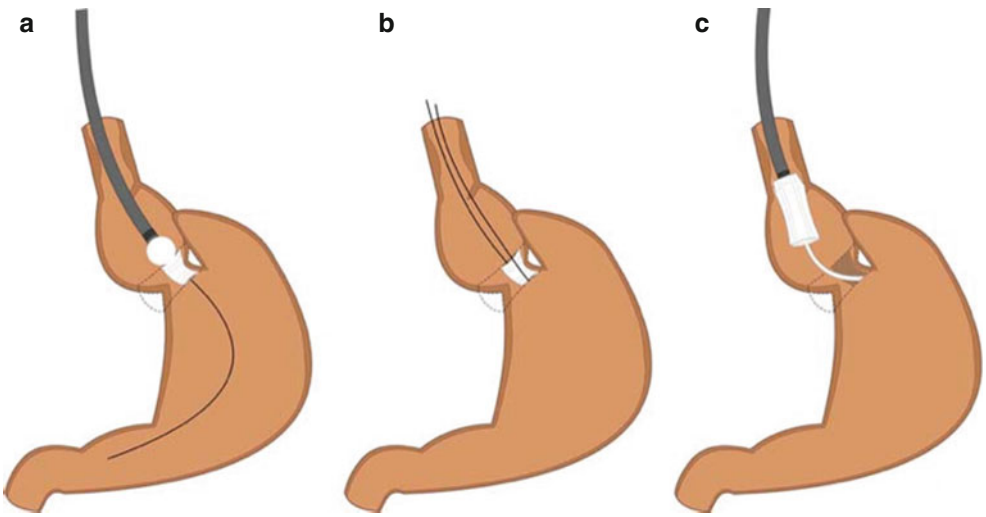

Fig. 53.1 Schematic images describing band removal with gastric band cutter. (**a**) Passage of metallic thread in between eroded band and gastric wall. (**b**) Recovery of thread by endoscope. (**c**) Oral removal of band after cutting it

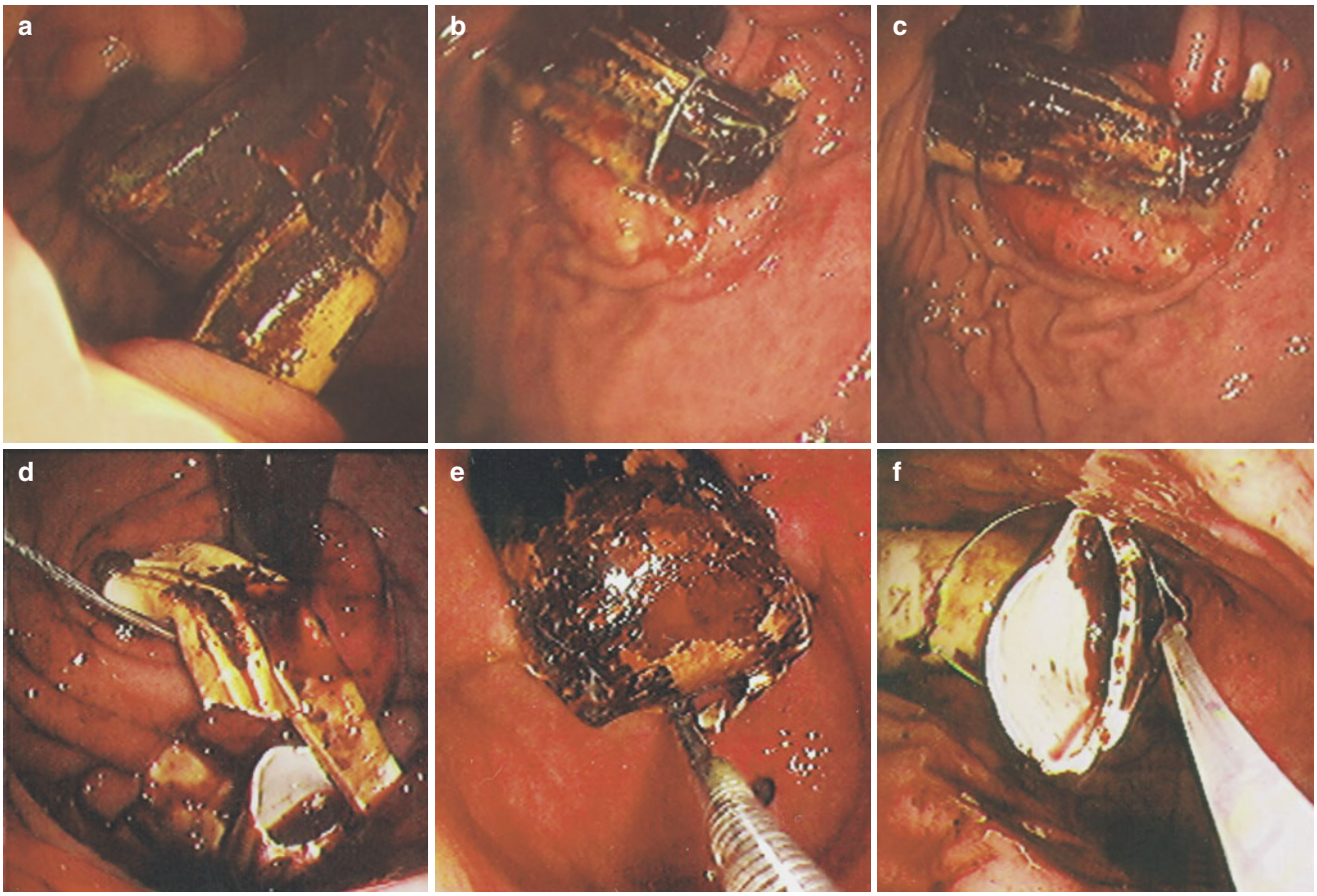

Fig. 53.2 Endoscopic images of band removal. (**a**) Eroded band. (**b**) Metallic thread over band. (**c**) Metallic thread "hanging" band. (**d**) Transected band pulled into antrum by polipectomy snare. (**e**) Band removal with polipectomy snare

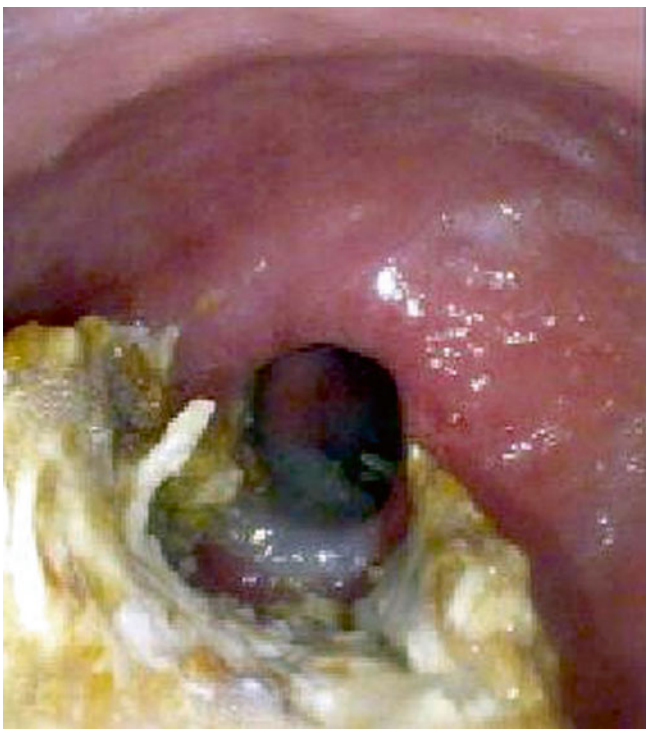

Fig. 53.3 Endoscopic image of food impaction in gastrojejunal anastomosis

be pushed gently into the distal jejunal loop, distal to the restriction point (ring or gastrojejunostomy). It is strongly advisable that after resolution of symptoms, the etiology of the narrowing should be investigated. The causes include stenosis and reinforcing ring complications. It is advisable to use minimal sedation during the procedure due to a potentially increased risk of aspiration of gastric contents. Alternatively, endotracheal intubation negates this risk. This can also be prevented by undertaking the procedure under general anesthesia after endotracheal intubation with or without the use of an overtube. An overtube is a device through which the endoscope is passed, serving to protect cardiac sphincter, esophagus and airways during removal of foreign body [9, 10].

53.3.2 Marginal Ulcer

Marginal ulcers occur as either an early or late complication of surgery. Its etiology post bariatric procedure is still not completely understood. Hence there is no established treatment protocol [11, 12]. It is found in 27–36 % of symptomatic patients. Interestingly, it is also incidentally detected in up to 6 % of asymptomatic patients after surgery [13]. When appearing as an early postoperative complication, this issue

is thought to be associated with the surgical management itself. In the late phase it may be secondary to the existence of large or long gastric pouch (greater number of parietal cells) or presence of nonabsorbable sutures or staples [14].

The development of a marginal or anastomotic ulcer after LRYGB may be explained by the preservation of the antrum and the vagus nerve, causing hypergastrinemia and increased gastric acid production. They are often located in the jejunal mucosa just below the gastrojejunal anastomosis and may involve the entire circumference of the small bowel [11].

Symptoms include epigastric pain and obstructive symptoms caused by edema. Upper GI endoscopy is the investigation of choice. Findings include injury to the gastrojejunal anastomosis, varying in size and depth, commonly on the lesser gastric curvature side of the pouch and with a fibrin covered ulcer base.

Prophylaxis with acid suppression after surgery is increasingly being used with an aim to prevent marginal ulcer formation. However, no consensus exists about the duration of its usage [15]. Its routine use postoperatively varies from 30 days to 2 years, with some recommending its use lifelong. Treatment should include high dose PPI therapy (for at least 2 months) and sucralfate (10 days). Upper GI endoscopy should be repeated to ensure healing.

53.3.3 Anastomotic Stricture

A stricture is diagnosed when the lumen at anastomosis is less than 10 mm in diameter making it difficult for a standard endoscope (9.8 mm in diameter) to pass through (see Fig. 53.4). The patients' main presenting symptom is dysphagia [16]. This is believed to be caused by ischemia, gastric hypersecretion, foreign body reaction to staples and anastomotic surgical technique [16].

Initial treatment with TTS (through the scope) balloon dilation is indicated, up to a maximum diameter of 15 mm when inflated (see Fig. 53.5). Subsequent balloon dilations up to 20 mm may be used as needed. Studies indicate that a small number of dilations, between one and two, are often enough to resolve the stricture. Persistent stenosis after two dilations or presence of gastrojejunostomy fibrosis is managed by division of the fibrous stenosis, which may be performed using a needle-knife [5]. Complication rates can be as high as 2.5 %, perforation being the most common, occurring in upto 1.86 % of patients; although this can be treated by conservatively [5].

Upper GI endoscopy is the diagnostic and therapeutic method of choice, for early stenosis occurring within the first week after surgery, when initial administration of corticosteroids to reduce anastomosis edema fails to improve symptoms. Balloon dilatation could be used in such cases with caution to allow low inflation pressures, as the risk of rupture otherwise is high [17].

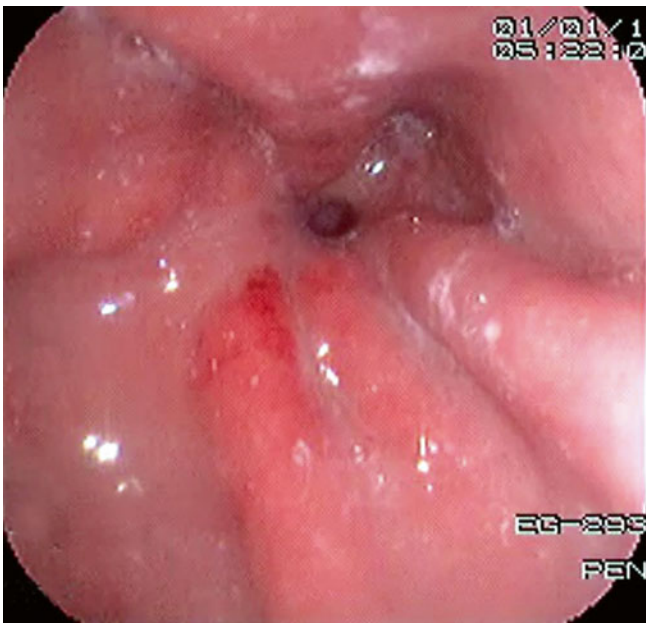

Fig. 53.4 Endoscopic image of gastrojejunal anastomosis stenosis, not allowing endoscope free passage

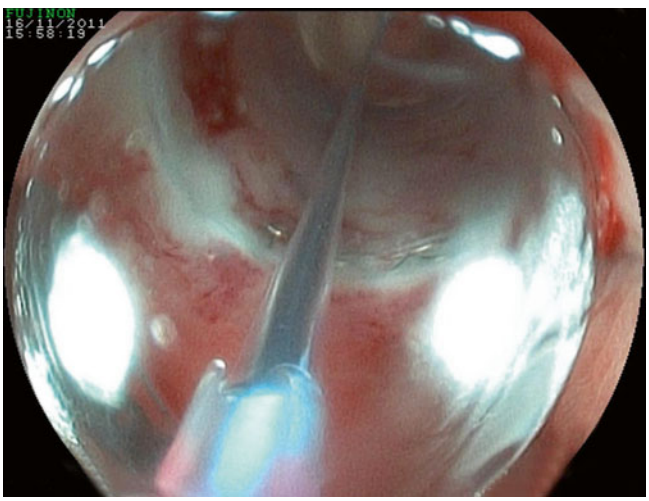

Fig. 53.5 Endoscopic image showing balloon dilation of anastomotic stricture

53.3.4 Choledocholithiasis

It is well known that the incidence of gall stone disease is increased after gastric bypass (LRYGB). Management of choledocholithiasis in these patients however can be technically difficult due to difficulty in accessing common bile duct (CBD) as a result of surgically altered anatomy of the stomach in LRYGB [8]. A combination of laparoscopy and endoscopy can be used wherein a transgastric endoscopic retrograde cholangiopancreatography (ERCP) (see Fig. 53.6) is performed along with laparoscopic cholecystectomy.

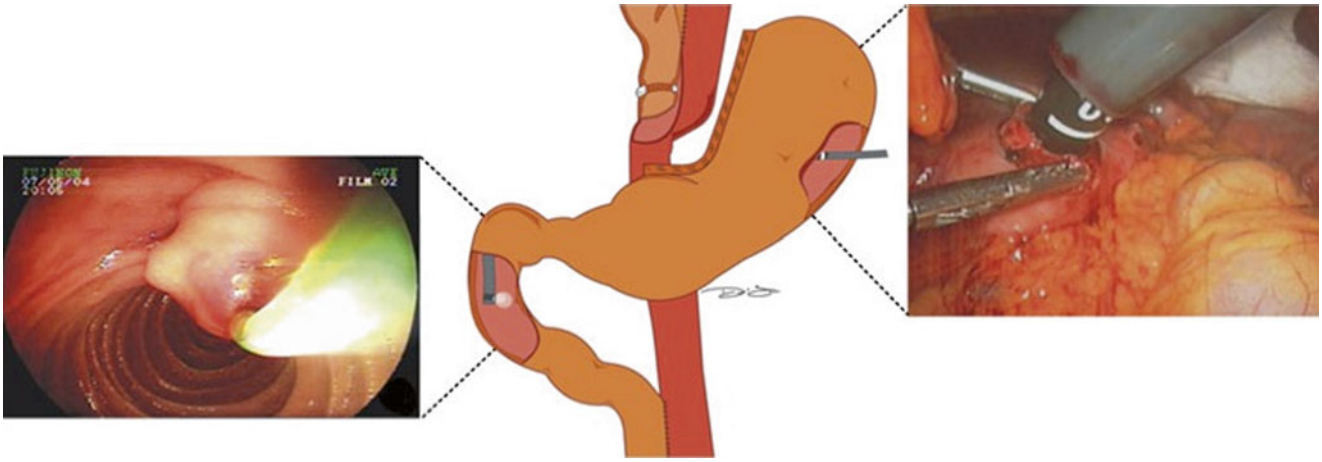

Fig. 53.6 ERCP procedure: insertion of the duodenoscope in the gastrotomy; schematic drawing of access to the duodenum through the remnant stomach; endoscopic view via cannulation of the papilla

Access is via a 1 cm incision in the anterior wall of the remnant stomach through which a duodenoscope (introduced laparoscopically) is passed. The rest of the procedure follows conventional ERCP [18].

In those cases where this is technically challenging, an alternate technique wherein access to CBD via jejunum is facilitated using double balloon enteroscope is used. This technique has a successful biliary cannulation rate of upto 60 % [19].

53.4 Banded Laparoscopic Roux-en-Y Gastric Bypass Complications

53.4.1 Erosion

With evolution of newer modifications of standard bariatric procedures, there has been a push to use a band or silastic ring implanted around the gastric pouch at the time of LRYGB. This technique presents a new array of complications, significant among which is gastric erosion. The intragastric erosion incidence varies from 0.9 to 7 %, occurs slowly with an inflammatory capsule formation around the ring. This prevents the leak of gastric contents in to the abdomen. Hence the clinical presentation is nonspecific as upto 15 % of the patients are asymptomatic. When symptoms do occur, they include weight regain, epigastric pain and obstructive symptoms, and upper gastrointestinal bleeding [5, 20].

At diagnostic endoscopy, the eroding prosthesis is often seen directly in the lumen of the gastric pouch (see Fig. 53.7). An early endoscopic finding may be an ulcer at the site of ring deployment. While these patients should be started on high dose PPI, there is evidence to suggest that migration of the band is found in more than 50 % of such patients [20].

It can be removed with a standard one channel endoscope utilizing an endoscopic scissor [21]. Should that fail due to the rigidity of the ring, an endoscopic lithotripter (or gastric band cutter) could be used.

Fig. 53.7 Endoscopic image of intragastric (pouch) ring erosion in RYGB

A dual channel device can also be used if the ring has only a small area of intragastric erosion and is adherent to the gastric pouch wall. The use of a dual channel endoscope allows the introduction of foreign body grasping forceps for traction, allowing better ring exposure. The other channel can then be utilized to pass an argon ablation catheter to divide the ring [21].

53.4.2 Slippage/Intolerance/Stenosis

Postprandial vomiting, dysphagia and other obstructive symptoms after a gastric band and banded gastric sleeve/

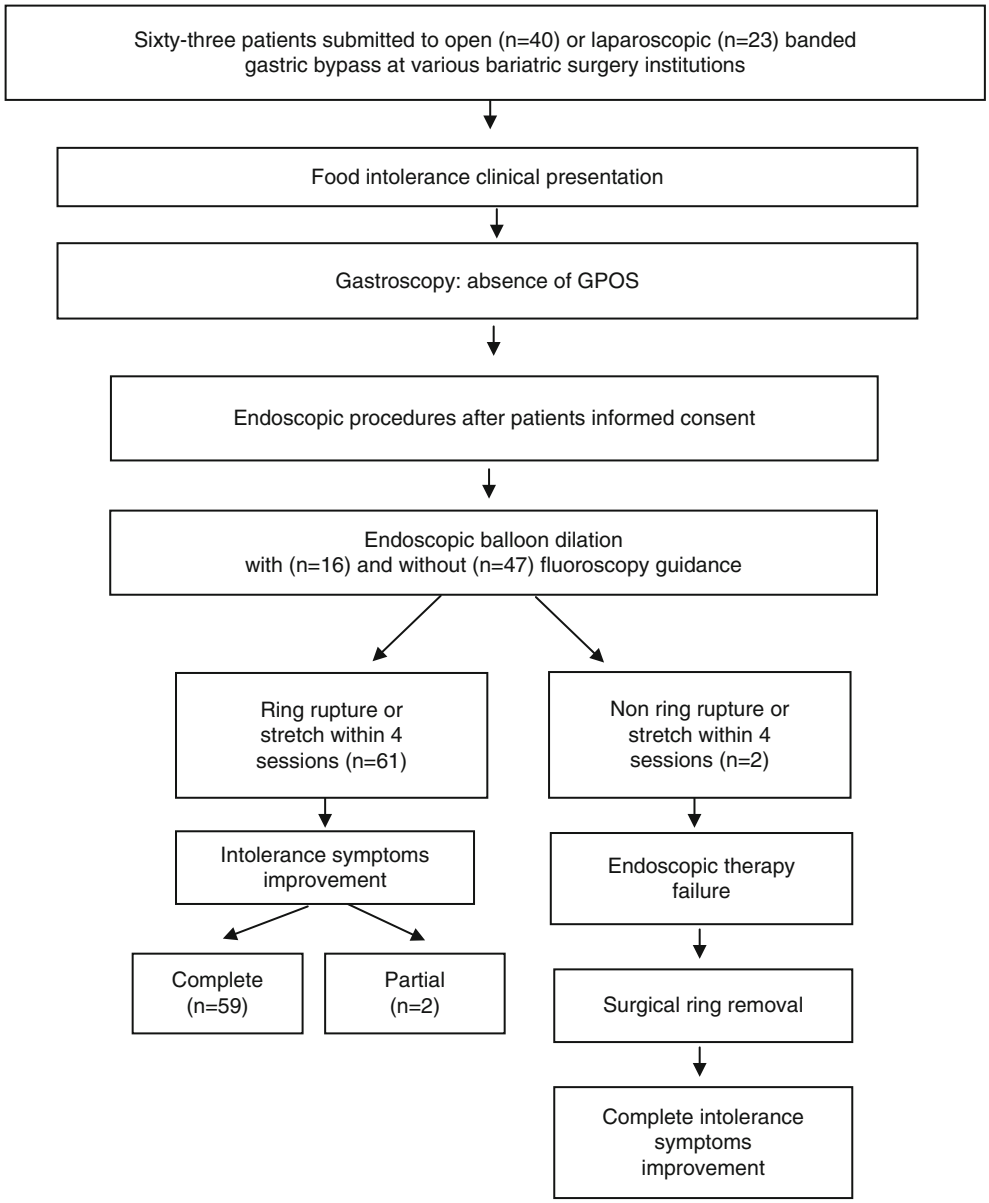

Fig. 53.8 Flowchart of food intolerance treatment by endoscopy

bypass procedure should always be investigated. Slippage corresponds to the prosthesis being displaced from the gastric pouch, subsequently causing obstructive symptoms. If there has been a complete slip, there can be signs of esophagitis from excessive vomiting, gastric pouch dilatation or formation of gastric "neofundus." [22] Food residue can also be seen in the pouch and a site of stenosis seen in the jejunal folds distal to the anastomosis.

Some patients may have frequent episodes of vomiting with no evidence of stenosis, a condition quoted by the authors as "food intolerance secondary to the presence of the ring" (see Fig. 53.8) [23].

Dilation with a 30 mm balloon (Rigiflex ®—Boston Scientific, Natick, MA) promotes stretching or rupture of the internal fibrotic band caused by the presence of the ring, which can relieve symptoms (see Fig. 53.9). If symptoms persist, a self expanding plastic stent, which promotes intragastric ring erosion allowing endoscopic oral removal, may be used [22].

53.5 Gastric Fistula After LRYGB and Sleeve Gastrectomy

This is one of the most feared complications after bariatric surgery and may present with variable symptoms corresponding to the site of the fistula [24, 25].

The incidence has decreased in recent years (approximately 1 %), due to the recognition of its etiology and improved surgical technique. It is more common in the first few weeks after surgery. However, it is still associated with high morbidity [2].

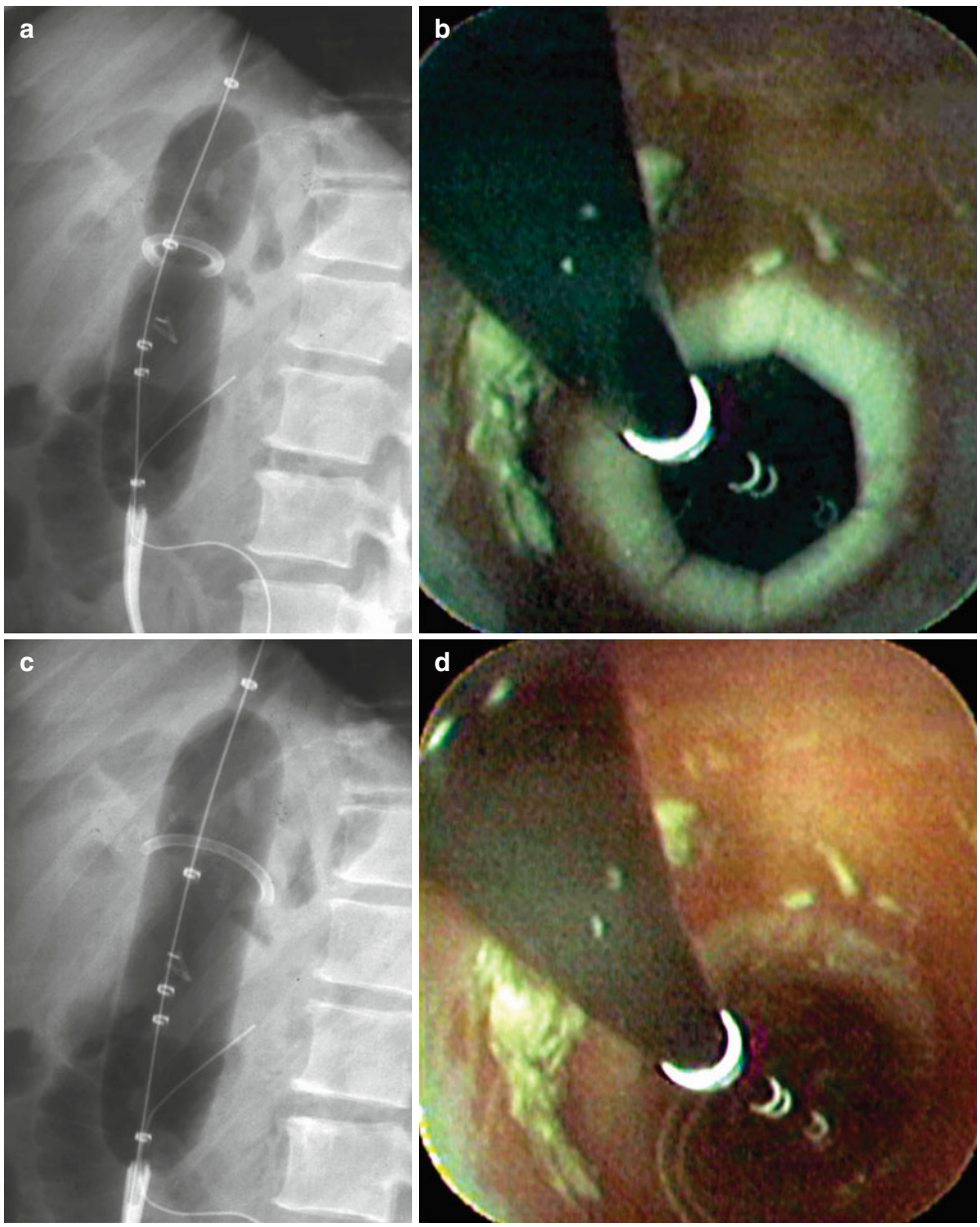

Fig. 53.9 X-ray (**a**) and endoscopic image (**b**) of gastric pouch evidencing Rigiflex® balloon inflated revealing ring compression. X-ray (**c**) and endoscopic image (**d**) evidencing ring opened ring after few minute dilation

The risk factors are male sex, increasing age, body mass index (BMI) more than 50 kg/m^2, the presence of comorbidity, revisional surgery and early learning curve [2]. The pathogenesis can be explained in some cases by ischemia of the angle of His, increased intraluminal pressure after surgery and staple line or suture failure [26].

The fistula may be difficult to control and, in some cases, does not heal after conventional treatment (reoperation, intraabdominal drainage and feeding distal to the fistula) [27]. When external drainage is not adequate, a chronic internal fistula (gastrocutaneous, gastrogastric, gastrojejunal, gastrocolic and gastrobronchial) may develop [28].

Increased pressure in the gastric pouch or tube, secondary to distal stricture or stenosis prevents fistula healing by direct surgery alone. Surgery is recommended in selected cases for abscess drainage and should always be performed in case of peritonitis [29].

Upper GI endoscopy facilitates diagnosis and simultaneous minimally invasive therapy. A stenosis can usually be identified distal to the fistula, for both sleeve gastrectomy or LRYGB. The resulting increased pressure leads to its delayed healing. Stricturoplasty and balloon dilatation can relieve distal stenosis (see Figs. 53.10 and 53.11) allowing the pouch or tube to resume a normal function by facilitating gastric pouch or tube emptying, reducing intragastric pressure and decreasing fistula output [29]. Also, occlusion of the internal opening of the fistula is possible with implantation of a removable stent.

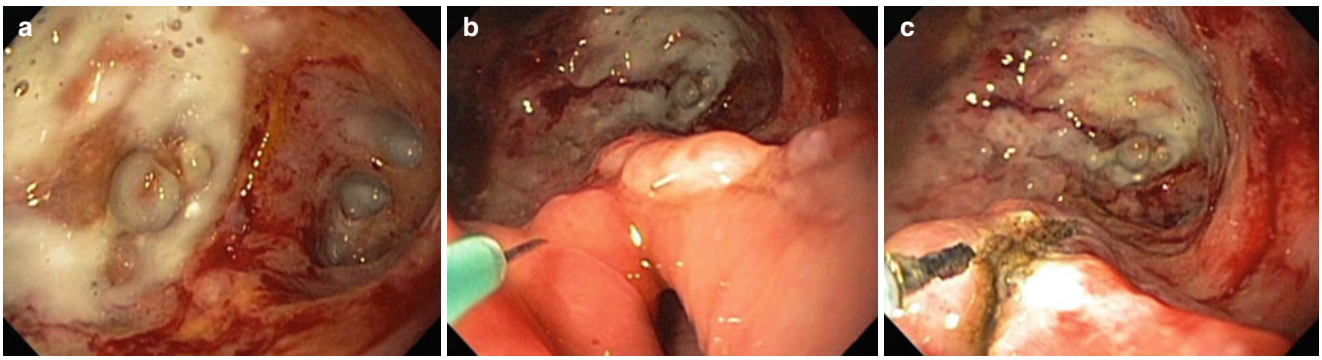

Fig. 53.10 Endoscopic septotomy: (**a**) perigastric cavity partially clean; (**b**) Begining of septotomy using needle-knife catheter (**c**) Sectioned septum

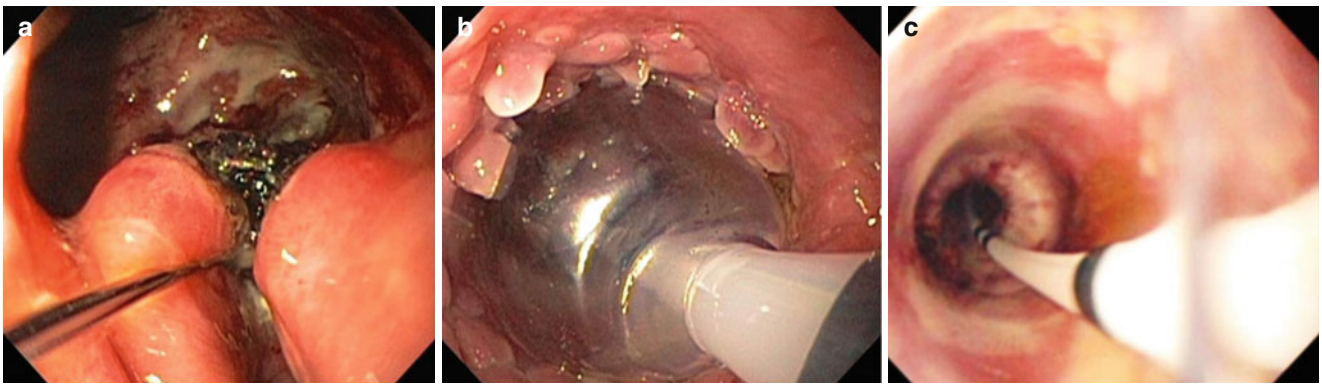

Fig. 53.11 Balloon dilation procedure: (**a**) Savary guide wire passage in stenosis area (**b**) Inflated balloon – Rigiflex (Boston) ® (**c**) Sectioned septum and removed edges after dilation

Acute (less than 7 days) and early (7–45 days) fistulas are treated with stents with good results [24]. In the late (1.5–3 months) and chronic (more than 3 months) stages balloon dilation and septotomy with electrocautery or argon plasma could be used. Options available to treat chronic fistula after sleeve gastrectomy are: open/laparoscopic reoperations or endoscopic procedures. There is still no standard of care for these conditions. Often, the redo surgery tends to be complex. Hence therapeutic endoscopy, a minimally invasive procedure, such as: stricturotomy and dilation with 30 mm balloon proves valuable [30].

In addition to the incision of the fibrotic band, a pneumatic balloon dilatation of up to 30 mm is performed aiming to correct its anatomical and functional changes. These procedures are repeated on a weekly basis in an outpatient setting until the digestive secretion flow and pouch axis are corrected, encouraging permanent fistula healing [8, 31].

Some other procedures such as clip placement and endoscopic application of sealents have also been described. Mercky et al. described clip placement with promising results [32].

53.6 Twisted Gastric Tube After Sleeve Gastrectomy

Twisted gastric tube after sleeve gastrectomy is a possible complication, rarely described in the international literature. It may lead to a leak or perforation. Its diagnostic investigations of choice are plain or contrast x-ray, computerized tomography (CT) scanning and or endoscopy. X-ray images may be difficult to interpret as there is radiological evidence of a stenosis in the absence of stricture on endoscopic examination (see Fig. 53.12).

At endoscopy, twisted gastric folds with an axis deviation are pathognomonic of twisted gastric tube. Endoscopic treatment can be attempted by balloon dilation with a 30 mm balloon. If it persists, open incision of the great curvature including the first muscle layer, followed by balloon dilatation, is indicated. This procedure can be performed with argon plasma or electrocautery (Needle knife®, Cook), being comparable to the gastric seromyotomy reported by Himpens [33] and is relatively less invasive, that appears to be safe and effective.

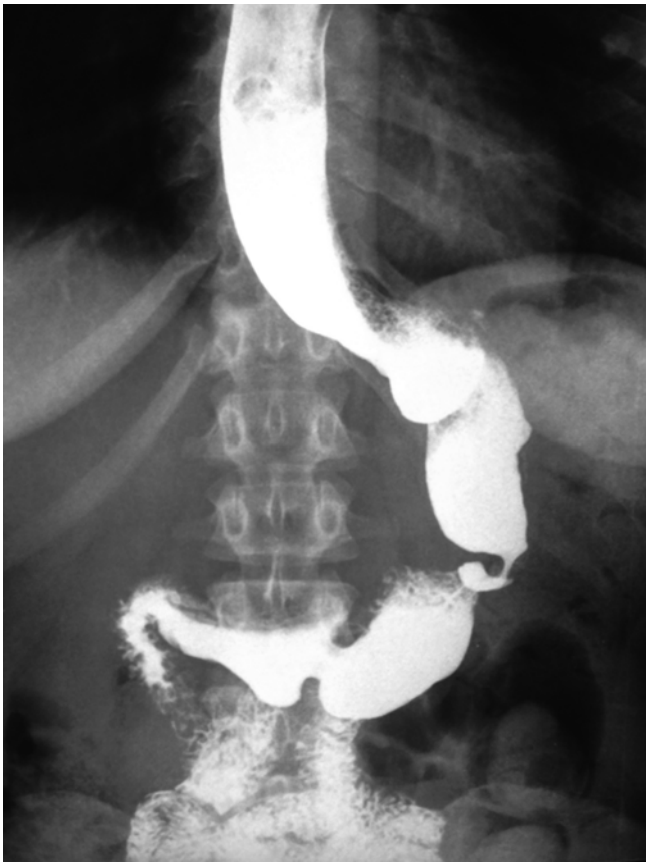

Fig. 53.12 X-Ray image showing gastric twist twists

53.7 Secondary Treatment for Obesity

Some patients undergoing LRYGB may regain approximately 30 % of their excess weight loss; around 20–30 % of these patients regain a large proportion of their lost weight. This leads to a negative impact on quality of life clearly negating the expected long term benefits of surgery for management of obesity [34]. Several factors may be related to regain, such as detrimental nutrition, fistula, poor surgical technique, and implant complications. Poor eating habit is one of the main factors associated with this complication. Increased caloric intake can be related to esophageal, gastric or anastomotic dilation, with subsequent weight regain. It is important that dietary and behavioral habits such as volume and quality of the meal and anxiety disorders are always evaluated when there is inadequate weight loss.

Weight regain in the late postoperative period after LRYGB should be reviewed by a multidisciplinary team as well as endoscopic or radiologic evaluation to study the surgical anatomy. When there is dilation of the anastomosis after LRYGB, endoscopic diameter reduction methods

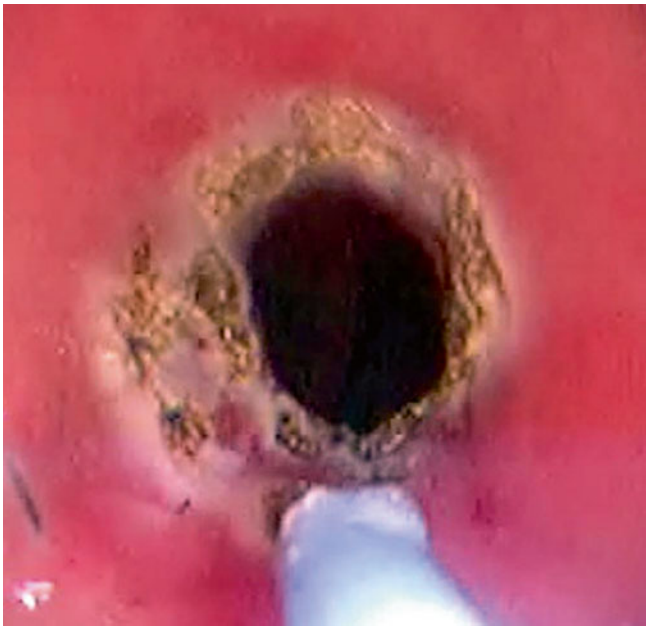

Fig. 53.13 Endoscopic argon plasma application at gastrojejunal anastomosis

(as described below) may be tried. Reoperation has been the most traditional option, but it is high risk procedure with high morbidity and mortality [34].

There are good results reported after injection of sclerosing substances into a dilated anastomosis [35]. Application of argon plasma has been reported as a way to induce the formation of fibrotic scar and consequent anastomotic diameter reduction (see Fig. 53.13) [34]. Significant dietary restrictions should be observed post procedure due to anticipated anastomotic edema and a local inflammatory response. Subsequently, the edema is replaced by fibrosis. This procedure may have to be repeated to achieve satisfactory results.

Endoscopic suturing devices, such as Apollo ® EndoCinch have been presented as minimally invasive alternatives, and may be used alone or in association with argon plasma [27]. The procedure involves suturing the internal mucosa with flexible endoscope thereby restricting the gastric lumen. The sutures are performed under direct vision, with the aid of curved needle [27].

Key Learning Points

- Endoscopic removal to treat band erosion is a safe, effective and minimally invasive procedure; it has been replacing the surgical approach.
- Abdominal pain is the main complaint of patients with marginal ulcers; healing usually occurs with the prolonged use of PPI and sucralfate.

- Upper digestive endoscopy is the best diagnostic and therapeutic method to manage stenosis of gastrojejunal anastomosis. Endoscopic balloon dilation is a safe and effective approach with a low morbidity rate.
- In order to treat choledocholithiasis after gastric bypass, combined management (laparoscopic and endoluminal procedures) can be performed by transgastric endoscopic retrograde cholangiopancreatography (ERCP); enteroscopy has been performed as a minimally invasive approach, recently.
- Gastrojejunal anastomotic leak after RYGB has been treated by autoexpandable metallic stent.
- Gastrobronchial fistula after sleeve gastrectomy can be due to clinical conditions such as chronic fistula, recurrence of subphrenic abscess and absence of abdominal drain.

References

1. Buchwald H, Oien DM. Metabolic/bariatric surgery worldwide 2011. Obes Surg. 2013;23(4):427–36.
2. Buchwald H, Avidor Y, Braunwald E, Jensen MD, Pories W, Fahrbach K, et al. Bariatric surgery: a systematic review and meta-analysis. JAMA. 2004;292(14):1724–37.
3. Egberts K, Brown WA, O'Brien PE. Systematic review of erosion after laparoscopic adjustable gastric banding. Obes Surg. 2011; 21(8):1272–9.
4. Campos J, Ramos A, Galvao Neto M, Siqueira L, Evangelista LF, Ferraz A, et al. Hypovolemic shock due to intragastric migration of an adjustable gastric band. Obes Surg. 2007;17(4):562–4.
5. Campos JM, Evangelista LF, Galvao Neto MP, Ramos AC, Martins JP, dos Santos Jr MA, et al. Small erosion of adjustable gastric band: endoscopic removal through incision in gastric wall. Surg Laparosc Endosc Percutan Tech. 2010;20(6):e215–7.
6. Campos JM, Galvão Neto MP, Moura EGH. Endoscopia em cirurgia da obesidade. 1a ed ed. Santos: São Paulo; 2008.
7. Neto MP, Ramos AC, Campos JM, Murakami AH, Falcao M, Moura EH, et al. Endoscopic removal of eroded adjustable gastric band: lessons learned after 5 years and 78 cases. Surg Obes Relat Dis. 2010;6(4):423–7.
8. Boru C, Silecchia G. Bariatric emergencies: what the general surgeon should know. Chirurgia (Bucur). 2010;105(4):455–64.
9. Ginsberg GG. Management of ingested foreign objects and food bolus impactions. Gastrointest Endosc. 1995;41(1):33–8.
10. Conway WC, Sugawa C, Ono H, Lucas CE. Upper GI foreign body: an adult urban emergency hospital experience. Surg Endosc. 2007;21(3):455–60.
11. Sapala JA, Wood MH, Sapala MA, Flake Jr TM. Marginal ulcer after gastric bypass: a prospective 3-year study of 173 patients. Obes Surg. 1998;8(5):505–16.
12. El-Hayek K, Timratana P, Shimizu H, Chand B. Marginal ulcer after Roux-en-Y gastric bypass: what have we really learned? Surg Endosc. 2012;26(10):2789–96.
13. Wilson JA, Romagnuolo J, Byrne TK, Morgan K, Wilson FA. Predictors of endoscopic findings after Roux-en-Y gastric bypass. Am J Gastroenterol. 2006;101(10):2194–9.
14. Csendes A, Torres J, Burgos AM. Late marginal ulcers after gastric bypass for morbid obesity. Clinical and endoscopic findings and response to treatment. Obes Surg. 2011;21(9):1319–22.
15. Coblijn UK, Goucham AB, Lagarde SM, Kuiken SD, van Wagensveld BA. Development of ulcer disease after Roux-en-Y gastric bypass, incidence, risk factors, and patient presentation: a systematic review. Obes Surg. 2014;24(2):299–309.
16. Campos JM, Mello FS, Ferraz AA, Brito JN, Nassif PA, Galvao-Neto Mdos P. Endoscopic dilation of gastrojejunal anastomosis after gastric bypass. Arq Bras Cir Dig. 2012;25(4):283–9.
17. Espinel J, Pinedo E. Stenosis in gastric bypass: endoscopic management. World J Gastrointest Endosc. 2012;4(7):290–5.
18. Falcao M, Campos JM, Galvao Neto M, Ramos A, Secchi T, Alves E, et al. Transgastric endoscopic retrograde cholangiopancreatography for the management of biliary tract disease after Roux-en-Y gastric bypass treatment for obesity. Obes Surg. 2012;22(6):872–6.
19. Chu YC, Yang CC, Yeh YH, Chen CH, Yueh SK. Double-balloon enteroscopy application in biliary tract disease-its therapeutic and diagnostic functions. Gastrointest Endosc. 2008;68(3): 585–91.
20. Galvão Neto MP, Campos JM, Garrido T, Evangelista LF. Migración del anillo después del bypass gástrico. En: Campos JM, Galvão Neto MP, Moura EGH (Org.). Endoscopia en cirugía de la obesidad. 1a ed. Caracas: AMOLCA. p. 181–90.
21. Campos JM, Galvão Neto MP, Ramos A, Dib R. Endoscopia bariátrica terapêutica. 1a ed ed. Revinter: São Paulo; 2014.
22. Campos JM, Evangelista LF, Ferraz AA, Galvao Neto MP, De Moura EG, Sakai P, et al. Treatment of ring slippage after gastric bypass: long-term results after endoscopic dilation with an achalasia balloon (with videos). Gastrointest Endosc. 2010;72(1): 44–9.
23. Ferraz A, Campos J, Dib V, Silva LB, de Paula PS, Gordejuela A, et al. Food intolerance after banded gastric bypass without stenosis: aggressive endoscopic dilation avoids reoperation. Obes Surg. 2013;23(7):959–64.
24. Campos JM, Pereira EF, Evangelista LF, Siqueira L, Neto MG, Dib V, et al. Gastrobronchial fistula after sleeve gastrectomy and gastric bypass: endoscopic management and prevention. Obes Surg. 2011; 21(10):1520–9.
25. Campos JM, Siqueira LT, Ferraz AA, Ferraz EM. Gastrobronchial fistula after obesity surgery. J Am Coll Surg. 2007;204(4):711.
26. Puli SR, Spofford IS, Thompson CC. Use of self-expandable stents in the treatment of bariatric surgery leaks: a systematic review and meta-analysis. Gastrointest Endosc. 2012;75(2):287–93.
27. Galvoo Neto M, Rodriguez L, Zundel N, Ayala JC, Campos J, Ramos A. Endoscopic revision of Roux-en-Y gastric bypass stomal dilation with a suturing device: preliminary results of a first out-of-United-States series. Bariatric Times. 2011. Cited on [Dez 2014]. Available from: http://bariatrictimes.com/endoscopic-revision-of-roux-en-y-gastric-bypass-stomal-dilation-with-a-suturing-device-preliminary-results-of-a-first-out-of-united-states-series/.
28. Pickhardt PJ, Bhalla S, Balfe DM. Acquired gastrointestinal fistulas: classification, etiologies, and imaging evaluation. Radiology. 2002;224(1):9–23.
29. Spyropoulos C, Argentou MI, Petsas T, Thomopoulos K, Kehagias I, Kalfarentzos F. Management of gastrointestinal leaks after surgery for clinically severe obesity. Surg Obes Relat Dis. 2012;8(5):609–15.
30. Campos JM, Siqueira LT, Meira MR, Ferraz AA, Ferraz EM, Guimaraes MJ. Gastrobronchial fistula as a rare complication of gastroplasty for obesity: a report of two cases. J Bras Pneumol. 2007;33(4):475–9.
31. Zundel N, Hernandez JD, Galvao Neto M, Campos J. Strictures after laparoscopic sleeve gastrectomy. Surg Laparosc Endosc Percutan Tech. 2010;20(3):154–8.

32. Mercky P, Gonzalez J-M, Aimore Bonin E, Emungania O, Brunet J, Grimaud J-C, et al. Usefulness of over-the-scope clipping system for closing digestive fistulas. Digestive Endoscopy. 2015; 27(1):18–24.
33. Dapri G, Cadiere GB, Himpens J. Laparoscopic seromyotomy for long stenosis after sleeve gastrectomy with or without duodenal switch. Obes Surg. 2009;19(4):495–9.
34. Christou NV, Look D, Maclean LD. Weight gain after short- and long-limb gastric bypass in patients followed for longer than 10 years. Ann Surg. 2006;244(5):734–40.
35. Campos J, Galvão N M, Ferreira H, Souza H, Ferraz E, Ferraz A. Esclerose endoscópica de anastomose gastrojejunal para tratar reganho de peso pós-gastroplastia. XVII Seminário Brasileiro de Endoscopia Digestiva'; Vitória 2005.