

Bariatric emergencies: what should know the general surgeon

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Rezumat

Urgențe bariatrice: ce ar trebui să știe chirurgul generalist

Introducere: tratamentul chirurgical al obezității patologice (bariatric) s-a intensificat ca urmare a creșterii dramatice a incidenței obezității, dar și datorită avântului laparoscopiei din ultimii 20 de ani. Chirurgii generaliști se pot confrunta cu complicații acute sau cronice ale acestui tratament, având în vedere numărul crescut al acestor operații practicate în Europa și S.U.A.

Obiectiv: prezentarea posibilelor urgențelor chirurgicale după chirurgia bariatrică.

Metode: Tehnica bariatrică cea mai utilizată în Europa este inelul gastric aplicat laparoscopic. Complicația cea mai frecventă este slippage-ul acut (alunecarea anterioară/posterioară a peretului gastric cranial față de inel) ce necesită tratament de urgență: desuflarea totală a inelului, laparoscopie de urgență pentru re poziționare/indepărtare. Migrarea intragastrică a inelului este de obicei o complicație ocultă, recunoscută doar la controlul radiologic sau endoscopic, care nu necesită tratament de urgență. Ulcerul marginal anastomotic apare după tehnicile bariatrice mai complexe care necesită anastomoze digestive (bypass gastric, diversie biliopancreatică) și se poate complica prin hemoragie (de obicei tratată endoscopic) dar și prin perforație, care reprezintă urgență chirurgicală majoră. Ocluzia

intestinului subțire prin hernia internă reprezintă o urgență majoră după bypass gastric sau diversia biliopancreatică cauzată de neînchiderea defectelor mezenterice, dar și prin hernia de trocar, prin aderențe, stricturi, hematom, pensări laterale. Diagnosticul corect și tratamentul urgent sunt obligatorii. Scăderea ponderală rapidă după chirurgia bariatrică poate determina litiaza biliară ce se poate complica prin colecistite acute, coledocolitiază și determină probleme de tratament în cazul tehnicilor cu bypass gastric.

Concluzii: Chirurgul generalist trebuie să cunoască cele mai răspândite tehnici bariatrice, complicațiile posibile ale acestora, și să le trateze ca pe alte proceduri gastro-intestinale. Atitudinea minim-invazivă trebuie să fie de primă intenție în majoritatea cazurilor, dar depinde de experiența personală a chirurgului.

Cuvinte cheie: chirurgia bariatrică, complicații bariatrice, urgențe chirurgicale, laparoscopie

Abstract

Background: bariatric surgery presented a dramatic increase due to the obesity epidemics and the laparoscopic approach. General surgeons might face acute or chronic complications of bariatric surgery, considering the increasing figures of obesity procedures performed every year in USA, as well as in Europe. **Aim:** to present the possible surgical emergencies after bariatric surgery.

Methods: laparoscopic adjustable gastric banding is the most widely performed bariatric procedure in Europe. Acute anterior/posterior slippage of the gastric wall is the most frequent complication, and needs emergency treatment: band's deflation, laparoscopy for repositioning/removal. Intragastric band migration is diagnosed at the radiological or endoscopic controls and usually does not represent a surgical emergency. Anastomotic

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marginal ulcer may appear after gastric bypass GBP or biliopancreatic diversion BPD (with/without duodenal switch DS), and can be complicated by bleeding or rarely by perforation. Small bowel obstruction due to internal hernia after GBP or BPD represents major emergency that can be caused as well by trocar site hernia, intussusceptions, adhesions, strictures, kinking or blood clots. Correct diagnosis and immediate treatment are mandatory. Rapid weight loss after bariatric surgery can cause gallbladder diseases and choledocholithiasis that can be difficult to treat after gastric bypass procedures. **Conclusions:** General surgeon has to know the most diffuse bariatric procedures and their complications and to treat them as other gastrointestinal surgical procedures. Minimally-invasive approach should be considered in most of the cases, but the approach depends on the general surgeon's experience.

Key words: bariatric surgery, bariatric complications, surgical emergencies, laparoscopy

Introduction

Surgical treatment of morbid obesity (bariatric surgery) has faced dramatic changes in the last two decades. Initial bariatric procedures originated and applied in the years 1950s and 1960s (1) had been abandoned, especially with the contribution of Mason (2), Scopinaro (3) and Kuzmak (4), which proposed the main modern malabsorptive, restrictive and mix techniques, endorsed by the National Institutes of Health in 1991 (5). Laparoscopy determined a further development and diffusion of bariatric surgery. In the mean time, worldwide continuous increase of obesity epidemics, with dramatic increase of morbid obesity forced medical authorities to adopt more aggressive surgical methods. Indications to surgery consist in morbid obese patient (body mass index BMI > 40 kg/m², or over 35 in presence of co-morbidities), history of obesity of more than 5 years, resistance to conservative weight loss methods. Actually, bariatric surgery is the only long term effective treatment, with very good long term results on weight loss, co-morbidities and mortality improvement (6,7).

A total of 40.000 bariatric operations were performed in 2000 in the United States, while in 2005 more than 150.000, with an estimated total of 180.000 bariatric operations performed in 2008 (8). Bariatric surgery is popular in Europe and Australia as well, with figures as 14.000 operations performed during 1996-2005 in Italy, a reported number increased up to near 5000/year in 2006 and 2007 (9), most of them in laparoscopy. First laparoscopic bariatric procedure was performed in Romania in 2002 (10), with previous, earlier experiences characterized by malabsorptive procedures in the 60s (11). In the last 6 years more than 350 morbid obese patients underwent different types of laparoscopic bariatric procedures in one specialized Romanian center (12), with initial experiences all over the country. It was estimated that more than a million people undergone bariatric surgery in the world, with more than half of them in the USA.

Modern bariatric techniques

Briefly, the modern bariatric techniques recommended by all international surgical societies (5,13-15) are divided in 3 categories. The most popular is the restrictive category and consists in laparoscopic adjustable gastric banding (LAGB), sleeve gastrectomy (SG) and vertical banded gastroplasty (VBG). These operations have a pure restrictive physiopathological mechanism, with a special mention for the SG, where neuro-hormonal influences are described as well. The malabsorptive category is based on the biliopancreatic diversion, proposed by Scopinaro in Italy, over 30 years ago (3). The same technique is widely used both in open and laparoscopic approach for its effectiveness, together with the modified version, biliopancreatic diversion with duodenal switch. The last but not least category is represented by gastric bypass, considered as gold standard for the treatment of morbid obesity in the United States. It has a complex mechanism, both restrictive and partial malabsorptive, with a very important neuro-hormonal effect that makes this operation very effective on metabolic syndrome (16).

All these bariatric procedures have specific indications, based on a very accurate patient's selection, with good outcomes on weight loss and on comorbidities improvement, with full and long term remission of type 2 diabetes in over 80% of the cases, and with a well documented significant reduction of all-cause mortality (17). Bariatric surgery is safely performed in specialized centers (<1% in almost all published experiences, with <0,35% in some specialized centers, like after cholecystectomy) (9). Bariatric procedures (open or laparoscopic) represent major surgery and thereafter surgical complications may occur, even in the long term follow-up. Generally these complications include hemorrhage, infection, malnutrition, gastrointestinal leak, pulmonary embolism, failure of weight loss and death. General surgeons, regardless their interest in obesity surgery, should have a basic anatomic and surgical understanding of these common procedures because nowadays might face acute or chronic complications of bariatric surgery during their activity.

The aim of this review is to present some specific bariatric surgical emergencies that may occur anytime after bariatric surgery and should be recognize and treat by the general surgeon.

Laparoscopic adjustable gastric banding (LAGB)

This is the most popular bariatric procedure in Europe, Australia, with a progressive diffusion in the USA (Fig. 1 post-operative control normal contrast X-ray). LAGB represents the most safely bariatric procedure, but emerging long-term data show a high incidence of postoperative complications that lead to band reposition or removal (18,19). The main causes are pouch dilation, insufficient weight loss, erosion, and psychological (15%). A 13% incidence of major reoperations was observed for a group of 448 patients operated between 1996-2006, particularly when the long-term follow-up data was considered, and could occur at any point after surgery. More

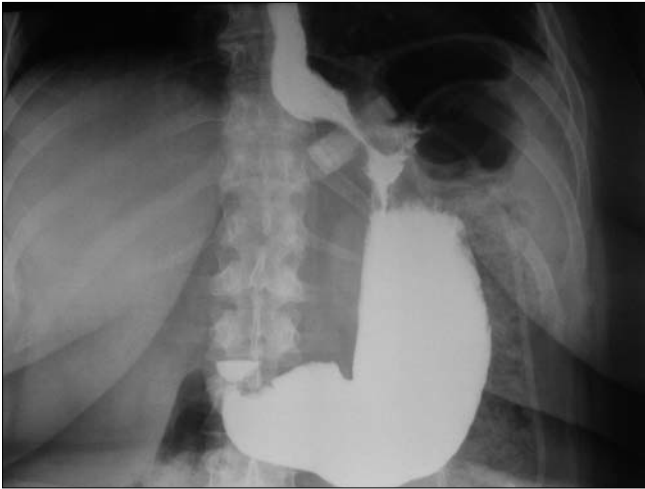


Figure 1. Laparoscopic adjustable gastric banding (LAGB)
1st day postoperative control (with Gastrographin®):
normal contrast X-ray

severe obesity (body mass index BMI > 50 kg/m²) seemed to carry a greater risk of reoperation (18). These findings highlighted the need for lifelong multidisciplinary management and surveillance.

Slippage is the most common LAGB complication and the leading cause of re-operation. It can develop early and late postoperatively and consists in the increase of the gastric pouch volume above the band in three different modalities: anterior, posterior or eccentrically (see Fig. 2 anterior dilation, horizontalized band in obtuse angle contrast X-ray; Fig. 3 posterior slippage contrast X-ray; Fig. 4 eccentrically slippage contrast X-ray). The chronic situation is known as gradual pouch dilation and main symptoms are food intolerance, decrease in satiety and restriction, where diagnosis and treatment is usually managed by the bariatric surgeon. In case of an acute slippage the situation is characterized by persistent abdominal pain, vomits and eventually obstructive symptoms (<0,5% incidence, when it represents surgical emergency). Nowadays the incidence of acute slippage is around 2-10% due to a better pars flaccida band positioning technique (25% with the initial perigastric technique). Radiological diagnosis is based on the modified orientation of the band on plain or contrast abdominal X-ray, and an enlarged gastric pouch (see Fig. 5 parallel band with dorsal spine plain X-ray; Fig. 6 horizontalized band contrast X-ray). Emergency treatment consist in complete band deflation through the subcutaneous port system, naso-gastric tube positioning and intravenous administration of prokinetics, antiemetics and proton pump's inhibitors. Good results can be achieved with conservative treatment, especially in the eccentrically dilation, but in case of persistence of the symptoms more than 5 days surgical treatment is needed. Laparoscopy is the standard choice for the surgical approach, when no gastric necrosis is found (20). Opening of the band (without cutting it where possible, due to the its costs) is mandatory in most of the cases, with stomach reduction and band's repositioning. When

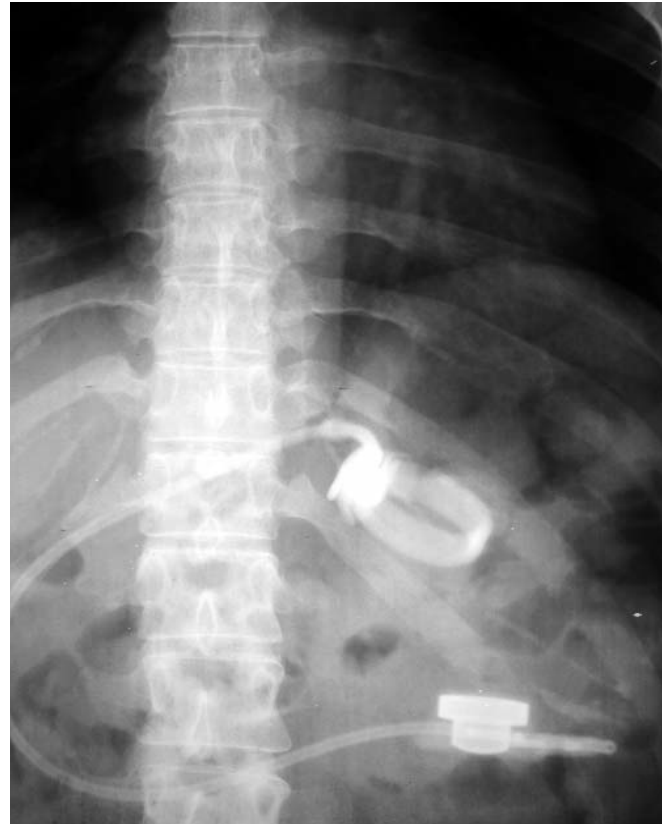


Figure 2. LAGB anterior dilation, horizontalized band in obtuse angle, contrast X-ray



Figure 3. LAGB posterior slippage, contrast X-ray

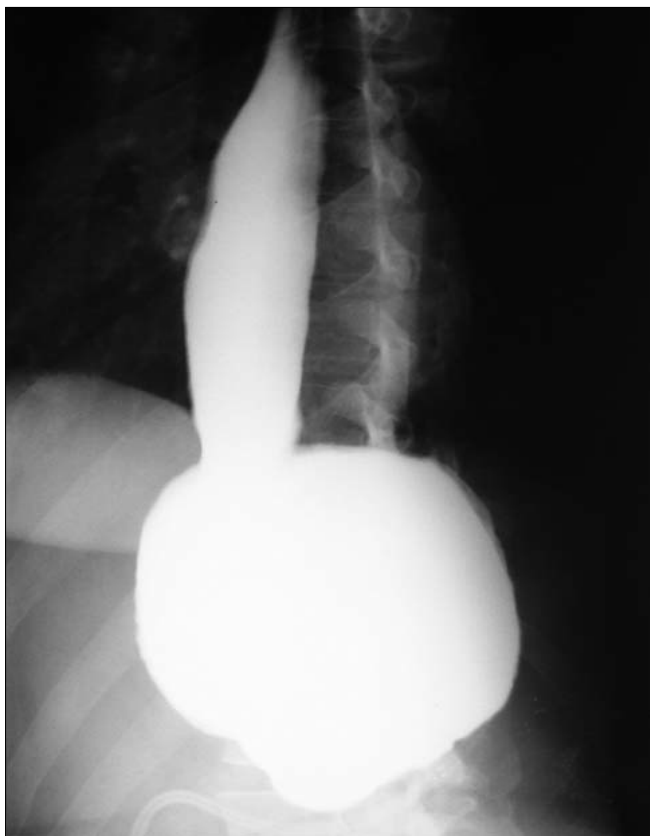


Figure 4. LAGB eccentrically slippage, contrast X-ray



Figure 5. LAGB parallel band with dorsal spine, plain X-ray

initial perigastric positioning technique was used, the band should be repositioned through the pars flaccida way. Removal of the band might be necessary as well (21). Gastric necrosis after late slippage is rare, but reported (22-24). The general surgeon without previous bariatric surgery experience, when encountering acute slippage of LAGB, must remove the band in order to treat the emergency.

Laparoscopic approach in case of acute slippage is effective in over 95% of the cases, but regardless the surgical incision, this complication should be recognized and treated as any major emergency. Intraoperative, exposure of the band is facilitated by following the connecting tube with the subcutaneous calibrating port. Once it is found, the cut of the prosthesis with regular laparoscopic scissors will remove the obstruction of the gastric outlet.

Intragastric band migration is usually diagnosed at the radiological or endoscopic controls and usually does not represent a surgical emergency. Band removal is mandatory because of the risk of life threatening hemorrhage or perforation, but is part of standard approach which includes serial upper GI endoscopies.

Vertical banded gastroplasty VBG

The VBG consists in a 20 ml vertical gastric pouch created along the lesser curvature using a circular stapler and the firing of 2 linear staplers, separating the fundus of the stomach from



Figure 6. LAGB horizontalized band, contrast X-ray



Figure 7. Vertical banded gastroplasty VBG gastro-gastric fistula, contrast X-ray

the pouch starting from the transgastric window up to the His angle. This pouch is banded with a 1.5 cm high and 7 cm long polypropylene band, secured with 2 stitches. Early complications like bleeding, gastric perforation, fistula or pouch emptying delays are managed usually in the bariatric settlement, but an unrecognized or persistent fistula (not resolved with conservative methods) impose a surgical approach at the minimum onset of sepsis (25). Late complications include outlet stenosis, gastroesophageal reflux, pouch dilation, subcardial diverticulum, gastro-gastric fistula (see Fig. 7 vertical banded gastroplasty gastro-gastric fistula contrast X-ray) or weight loss failure. Surgical treatment is required but usually not in an emergency settlement. Recognition is essential in order to proceed to further surgical treatment.

Laparoscopic sleeve gastrectomy LSG

LSG is today recognized as a stand-alone procedure, that originates from the two-stages approach of the biliopancreatic diversion with duodenal switch (BPD-DS). It consists in a vertical gastrectomy performed alongside the small curvature, using linear staplers, obtaining a complete removal of the gastric fundus and part of the antrum (see Fig. 8 laparoscopic sleeve gastrectomy normal contrast X-ray, 2nd day postoperative control). Specific, early complications are rare (< 1%), but most feared, due to the stapler line: bleeding or leaks and usually are

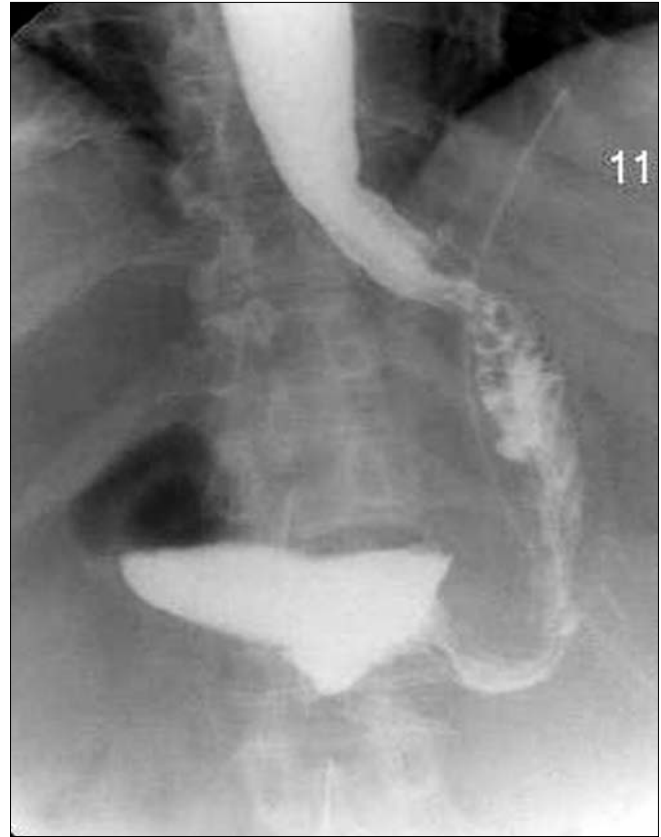


Figure 8. Laparoscopic sleeve gastrectomy (LSG) 2nd day postoperative control (with Gastrographin®): normal contrast X-ray

resolved by the bariatric surgeon in the postoperative care.

Bleeding can be a consequence of the staple line or other sources. Trocar site bleeding, splenic injury, or liver laceration from retractor injury are all potential hemorrhage sources, but rare. Bleeding can be extra- or intraluminal. Although the clinical picture in the case of bleeding often leaves no room for doubts (anemia, hypotension, tachycardia, haematemesis and melena), the site of bleeding and the relative management can sometime represent a challenge. In all cases, management includes serial blood counts evaluation and upper GI endoscopy. The source of bleeding can be controlled endoscopically by adrenaline injection, electro-coagulation or endoclips. Management differs according to the time of bleeding: during the first 24 hours, associated with hemodynamic instability, laparoscopic or laparotomic reoperation is required. If the bleeding occurs after 48 hours, in a stable patient, a conservative approach can be adopted (fluid administration, blood transfusions when hemoglobin < 8 g/dl).

The incidence of suture line leak after LSG ranges between 0,7% and 4,6% (26). The critical areas for leak are the top of the suture line (particular attention is warranted in this area during staple firings and suture reinforcement, especially in revisional surgery after other bariatric procedures) and the transition point between sequential cartridge. To prevent leak many Authors suggest the reinforcement of the stapler line with buttressed material, running suture or biological fibrin glue.

The appearance in the early postoperative period of atypical symptoms as pain in the left shoulder, left pleural effusion or lung condensation, even depression may be signs of a gastric or anastomotic fistula/abdominal sepsis and these situations should be correctly evaluated and treated.

Late complications after LSG can interfere with a general surgeon's activity. Vomiting is caused by the gastric tube stricture (range between 0,7% and 4%), as a result of an intra-operative sleeve gastrectomy calibrated on a too narrow tube or due to the oversewing of the staple line (26,27). Persistent vomiting does not represent a surgical emergency, as well as late, severe gastroesophageal reflux, which can be found maybe more than is reported (up to 5%) (28). Late suture line fistula, initially not recognized at the postoperative contrast X-ray control, can be found at routine upper gastrointestinal contrast study or can evolve as an abdominal emergency, when abdominal plain X-ray, contrast X-ray study and/or CT scan are necessary for diagnosis. The attitude will be based on the fistula's pattern: site on the staple line, associated abscess, patient's status. The suture-line fistulas can be managed successfully by percutaneous drainage plus total parenteral nutrition and antibiotics associated, in selected cases, with endoscopic endoprosthesis or endoscopic fibrin glue application (29). In case of large dehiscence, signs of sepsis and failure of the conservative management, surgical approach could be laparoscopic or open, based on the patient's characteristics and the surgical experience.

Anastomotic ulcer AU

Represents an early or late complication of the more complex bariatric procedures that involve digestive anastomoses. Incidence depends on the type of bariatric procedure and post-operative PPI therapy. The incidence of marginal ulcer after gastric bypass (GBP) ranges between 0,3-16% and depends on the operative technique (inclusive type of absorbable/non-absorbable sutures used), patient age, history of previous gastric surgery, presence of preoperative diabetes, coronary artery disease, or peptic ulcer disease, and use of nonsteroidal anti-inflammatory medications or tobacco (30). GBP represents gold standard of the surgical treatment of morbid obesity in the United States and consist in the creation of a upper small gastric pouch of 25-30 ml using linear staplers, where usually a Roux-en-Y alimentary limb is anastomosed in three different manners: manual suture, linear or circular mechanical stapler. The gastric remnant, duodenum and first portion of the jejunum are bypassed, but not removed. Original Scopinaro's biliopancreatic diversion (BPD) consists in a distal hemigastrectomy, with a reconstruction that consists in a gastro-ileostomy on a Roux-en-Y limb of 250 cm and an ileo-ileostomy at 50 cm, both measured from the ileo-cecal valve. It was followed by frequent AUs (up to 67%, most of them treated conservatively), but different technical adaptations determined a reduction to about 3,4% in 562 consecutive cases (31). Biliopancreatic diversion with duodenal switch (BPD-DS) is characterized by a sleeve gastrectomy rather than a subtotal gastrectomy, a duodenal-ileal anastomosis of the alimentary limb immediately

beyond the pylorus, while the biliopancreatic diversion is connected to the ileum at 75-100 proximal to the ileo-cecal valve. Marginal ulcers of the duodeno-ileal stomy range between 8-10%.

While medical treatment of AU and surgical treatment of those refractory's do not represent a surgical emergency, complications like acute, severe hemorrhage or perforation can be faced by a general surgeon (32). Both complications are common to all gastrointestinal (GI) operations, and early diagnosis and treatment is mandatory. Hemorrhage can be diagnosed based on the presence of hematemesis, melena or enterorrhage, systemic symptoms and decrease of the hemoglobin and hematocrit. It can occur early after surgery (first 30 days) or late in the postoperative course. Endoscopy is essential for diagnosis, indicating site and severity, as well as for treatment. The only diagnostic tool for assessing bleeding from the ileo-ileal anastomosis (in case of biliopancreatic diversion) in the clinical practice is the spiral angio-CT scan. No difference with the management of other GI bleedings should be made: transfusions, hemodynamic equilibration, PPI etc. Endoscopic management is essential and only its failure can conduct to angiography (selected cases) or surgical exploration (regardless the approach, based on the surgeon's experience).

Perforated AU is the most feared complication and clinical presentation is similar to any other visceral perforations, even without any previous symptoms. Incidence is < 1% and well-known systemic and local signs as acute, severe epigastric pain, tachycardia, fever, leukocytosis are accompanied by free air on plain radiographs or CT-scans. Surgical management is mandatory almost always and can be made in both approaches: laparoscopy or open access. Repair of the perforation, buttressing omental patch and/or fibrin glue application, cavity wash-up and placement of drainage tubes are known steps. A gastrostomy tube in the excluded stomach should be considered for enteral nutrition. High doses of PPI are always associated.

Small bowel obstruction (occlusion) SBO

Intra-abdominal surgical procedures, both in open and laparoscopy, can be complicated by small bowel obstruction any time after surgery. Even if laparoscopy is usually associated with less adhesions, a higher risk of internal hernia due to SBO was described after laparoscopic GBP, probably due to deficient closure of the mesenteric defects (33). SBO is determined predominantly by internal hernia after GBP or BPD (32,33), as well as by intussusceptions, adhesions, trocar hernia, incision site hernia, lateral kinking (especially jejuno-jejunostomy), strictures, intraluminal blood clot (34).

Internal hernia: mesenteric defects left open or closed with absorbable sutures can determine the migration and obstruction of small bowel, even years after surgery, probably due to continuous weight loss that determines defect's increase. Obstruction can involve the alimentary limb, the biliopancreatic limb or the common channel, in a various incidence in base of surgical technique from 0,4% to 7,5% (35). Various techniques were ideated to prevent internal hernia, including closure of mesenteric defects with non-



Figure 9. Laparoscopic gastric bypass LGBP internal hernia, plain X-ray

absorbable stitches or fibrin glue application (36). There are 3 classic locations where SBO can occur after GBP: Petersen space (between Roux-limb's mesentery and transverse mesocolonic), at the transverse mesocolonic defect and at the jejunojejunostomy (33). Symptoms can evolve chronically, with intermittent and recurrent abdominal pain, associated with nausea and vomiting that can be misinterpreted as diet in compliance, AUs or gastroesophageal reflux. Acute presentation have the classical signs and symptoms of SBO (nausea, vomiting, constipation, abdominal pain and distension). Symptoms can induce the site of obstruction's identification before surgery: gastroesophageal reflux, vomiting are associated with the common channel or alimentary limb's obstruction; bilious emesis originates from the common channel's obstruction; distension of the gastric remnant and biliopancreatic limb suggest common channel and biliopancreatic limb's obstruction.

Diagnosis is based on the clinical presentation and examination, plain abdominal X-ray (see Fig. 9) and upper gastrointestinal studies. Abdominal CT-scan with a small amount of oral contrast (see Fig. 10) can demonstrate the dilation of the Roux limb, of the gastric remnant or the biliopancreatic limb, depending on localization; a rotational pattern around the superior mesenteric artery axis is described, as long with controversy about its sensitivity in the detection of internal hernia. Any patient that undergone GBP or BPD and presents with a SBO should be suspicious for an internal hernia. Early

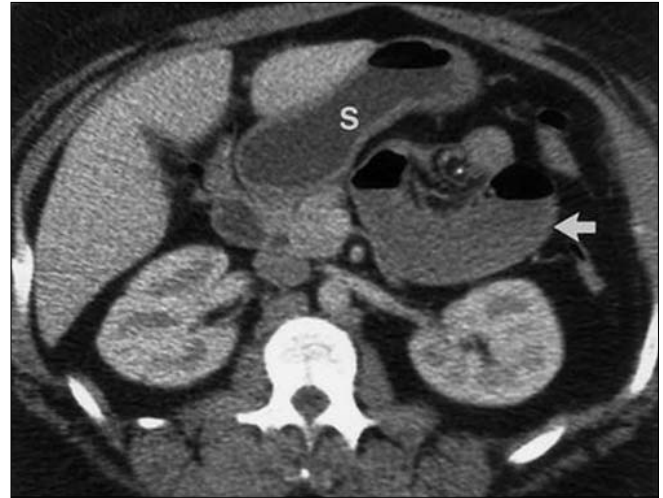


Figure 10. GBP internal hernia, abdominal CT scan

diagnosis and intervention are imperative in order to reduce morbidity and mortality associated with intestinal necrosis (37). In case of any doubts, with symptoms persistence, or in acute ill patient with signs of an acute abdomen laparoscopic examination is the best choice (in case of previous laparoscopic bariatric procedure and where it is available). Small bowel examination is not easy, regardless the access, and a retrograde control starting from the ileo-cecal valve should be considered. In case of positive identification of an internal hernia, a gentle reduction should be done, with the closure of the mesenteric defect and enterotomy when necessary. Patients with history of bariatric procedures undergoing other abdominal procedures (cholecystectomy, incisional hernia repair, gynecological) should be checked intraoperative for potential mesenteric defects.

In case of SBO caused by other mechanisms, the surgical approach will depend on the intraoperative findings and site of obstruction: revision of the jejuno-jejunostomy, clot evacuation after affected limb's opening, adhesiolysis, reduction of the intussusceptions, even enterectomy in case of intestinal necrosis. Bypass of the obstructed limb (Roux or biliopancreatic) proximal to the site of obstruction can be made to either to the common channel or the other not affected limb.

Small bowel obstruction can occur even after LAGB. Recent report of two cases of SBO after LAGB due to pelvic adhesions in patients with multiple history of surgical interventions underlines the necessity of early diagnose of SBO and early intervention which can be as simple as fluid removal from the LAGB and nasogastric insertion (38). Failure of these minimal gestic can determine a bad prognosis, with evolution towards gastric necrosis. Diagnosis is not always easy due to the fact that patients with LAGB may be unable to vomit, while liquids accumulation due to the close loop determines severe gastric dilation that can determine gastric wall necrosis.

Gastric remnant dilation

Is a possible complication after gastric bypass that can develop acute or chronic, early or late postoperative. Evaluation of the

remnant stomach after GBP is complicated for endoscopy and contrast studies, but virtual gastroduodenoscopy is feasible (39). Gastric remnant dilation is caused by an obstruction at the jejuno-jejunostomy, on the biliopancreatic limb or common channel. Presentation of patients that undergone GBP can include abdominal pain, nausea, hiccup, vomiting and tachycardia. Elevated hepatic functional markers and pancreatic enzymes can occur due to the duodenal pressure. CT scan may show the gastric remnant dilation. Decompression is mandatory and can be performed under CT guide, taking care of the Roux limb's position, but is not effective in case of hematoma when surgery is required. Revision of the jejunostomy may be required. In the emergency setting it is mandatory to decompress the stomach and subsequently, through the antegastric access, is possible to make X-ray contrast studies or endoscopy.

Biliary tract lithiasis

Age, female sex and obesity represent risk factors for gallstone disease in the general population, with an incidence estimated to 15%. Rapid weight loss after bariatric surgery can cause biliary tract lithiasis that can increase incidence up to 30%. Predictors of symptomatic gallstone formation after bariatric surgery, and especially after GBP, are represented by the postoperative factor of weight loss of more than 25% of original weight, as it was shown by a multivariate analysis in a cohort of 586 morbid obese patients (40). Most gallstones have formed in the first 6 months after surgery, with a symptomatic onset after mean period of 10,2 months. Prophylactic methods have been suggested like routine cholecystectomy, postoperative use of ursodeoxycholic acid, regular ultrasound examination for asymptomatic gallstones, or combination of these.

Laparoscopic bariatric surgery changed the policy of a routine prophylactic cholecystectomy due to a much difficult approach for concomitant procedures and risk of contamination. Symptomatic gallstones, including acute cholecystitis should not be a diagnosis and treatment problem for a general surgeon that manages a patient with history of bariatric surgery. A recommendation for these cases is the routine use of intraoperative cholangiography during cholecystectomy for a correct diagnosis of choledocolithiasis.

Choledocolithiasis can be difficult to diagnose and treat after gastric or intestinal bypass due to the exclusion of the gastro-duodenal region from the digestive tract and lack of endoscopic access using endoscopic retrograde cholangiopancreatography (ERCP). Diagnosis can be based on the ultrasound, computed tomography or magnetic resonance cholangiopancreatography. Once common bile duct obstruction is diagnosed, the surgical approach (laparoscopy or open access) depends on the surgeon's experience and patient's status. Minimally-invasive approach can be achieved following laparoscopic access followed by proximal jejunum clamping and gastric remnant securing to the abdominal wall, transgastric 15-mm trocar positioning through which gastroduodenoscopy and ERCP can be performed, with common bile duct stones removal (41). The procedure can be performed concomitant with the laparoscopic cholecystectomy.

Algorithm for the surgical approach to a bariatric patient referred for emergency (proposal)

When an emergency occurs, assessment of the bariatric surgical patient follows a typical medical approach. Evaluation of patient's mental status, airway patency, breathing mechanics and circulation adequacy should be made. Anamnesis is fundamental for finding out the type of procedure, time from surgery and postoperative evolution so far (usually patients with history of bariatric surgery carry out an information card in the wallet). Supine position should be avoided, due to possible respiratory problems caused by excess skin and adipose tissue. In case of endotracheal intubation necessity, anesthetists should be aware of the potential intubation difficulties. Once the airway is secure, oxygenating and ventilating the patient should be considered. In case of recent bariatric surgery (up to 8 weeks), patient might still have abdominal medication and/or drains in place. Ventilation in this patient may be impaired by his body status or from splinting due to surgical site pain or wound dehiscence. Alterations in heart rate (tachycardia or bradycardia) and blood pressure (hypo- or hypertension), signs of infection/sepsis should be noticed (most common cause of mortality within first 12 weeks after surgery is an intra-abdominal infection from a leaking anastomosis). Peritonitis and sepsis can represent the final stage of an anastomotic leak. Increase in body temperature and erythema of the wound site can be found as well.

Nausea and vomiting after bariatric surgery is a common finding and can be a sign of a LAGB complication or can accompany the dumping syndrome after malabsorptive procedures, when profound dehydration is usually found. Signs of dehydration includes tachycardia, warm, dry skin and pallor to the mucosal membranes, decreased urinary output. Prompt hydration should be obtained with intravenous fluid administration.

Alterations of the postoperative cardiovascular status are caused by dehydration secondary to decreased oral intake, nausea and vomiting, sepsis and increased output from the dumping syndrome. Further stabilization consists in assessing the surgical site for signs of bleeding, intravenous access and crystalloid solution administration (42).

Nasogastric or orogastric intubation should be avoided due to the changed anatomy of the upper GI tract, unless type of surgical operation is confirmed. An easy way of recognizing the previous LAGB positioning is the presence of the subcutaneous port, usually in the left upper abdominal quadrant. Slippage is the most frequent complication of LAGB, and band deflation through the subcutaneous port, naso-gastric tube positioning and intravenous administration of prokinetics, antiemetics and proton pump's inhibitors should determine an important improvement of the symptomatology.

After the stabilization is obtained, imaging should complete the clinical evaluation. Plain abdominal and chest radiographies are mandatory, while ultrasound examination can be useful. Diagnosis of band complication can be obtained based on the clinical evaluation and plain radiographies. Identification of major complications after other bariatric

procedures need more sophisticated investigations like CT (internal hernia), spiral-angio CT (anastomotic bleeding), cholangio-MRI (cholelithiasis). Endoscopy, where available, is very important for both diagnose and treatment (bleeding, leaks, biliary lithiasis),

Surgical attitude will be influenced by patient's status, necessity of immediate or postponed surgical approach, and personal experience of the surgeon.

Conclusions

Bariatric surgery has a low rate of postoperative complications, and some of them can evolve as surgical emergencies. The particularity of these situations do not exceed of any other gastrointestinal surgical procedures, but should be in-time recognized and correctly treated. The surgeon must understand if problems arise from the specific bariatric procedures that the patient undergone, and must be aware of the potential impact of these procedures could have on the diagnose and treatment of other abdominal diseases. Simple procedures, like band deflation, can be essential and even enough for the patient's evolution. When stabilization and transfer to a specialized centre is not achieved in real time and surgery is required, basic concepts of digestive surgery should be followed. Laparoscopic examination and treatment should be feasible in most of the cases, but the access depends on the general surgeon's experience.

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