The management of bariatric surgery complications

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Abstract

Bariatric surgery is now commonplace in the UK and has been demonstrated to be safe and effective. Complications that present as an emergency are unusual but will be seen more frequently as the number of patients who have undergone weight loss surgery rises. The optimal management encompasses a low threshold of suspicion and early diagnosis of complications, coupled with expertise to deal with them. It is therefore important for a general surgeon to have an understanding of the common bariatric procedures (gastric banding, gastric bypass, sleeve gastrectomy and duodenal switch), their known complications and when to refer to a specialist centre. All general surgeons should know how to deflate a gastric band and know to suspect an internal hernia in a patient with abdominal symptoms following bariatric surgery. It is also important to appreciate the significance of finding or suspecting there to be a gallstone in the common bile duct in patients who have had either of the bypass procedures. All bariatric centres in the UK should be able to provide specialist advice at any time. This advice should be sought at an early stage in the patient's care.

Keywords Bariatric surgery; complications; gallstones; gastric banding; internal hernia; obesity; upper GI haemorrhage; weight loss

Introduction

Bariatric (or metabolic) surgery is a relative newcomer to the surgical scene. As such, many general surgeons are unfamiliar with complications that might arise in these patients. Fortunately, emergency complications are rare but this may compound the situation, as it can be difficult for a non-specialist to gain the experience to recognize and manage these conditions. Consequently, such patients are frequently misdiagnosed leading to unnecessary delays in potentially life-saving treatment.

In response to the current obesity epidemic and the wealth of evidence demonstrating the long-term benefits of weight loss surgery, the number of bariatric procedures performed in the UK has risen substantially. Only a small percentage of these patients are likely to present as a general surgery emergency with complications related to their surgery. However, as the number of procedures performed increases, both long- and short-term complications are likely to occur more frequently. Given the geographical spread of specialist bariatric centres and the fact that many patients choose to travel abroad for their surgery, patients will not necessarily present to their original centre, especially as more time passes from the index procedure.

Just as it is important for a surgical trainee to learn about the treatment of acute cholecystitis or the management of an anastomotic leak after colorectal surgery, it is now vital that surgeons should have an understanding of the consequences of the various bariatric operations. This article will focus on the recognition and management of complications that might be expected to present as an emergency during a surgical on-call.

The operations

A full description of the indications for bariatric surgery, the operations available and how they work is beyond the scope of this paper. These details have been comprehensively covered in this journal.[1] However, for reference it is worth describing again the four most common procedures performed in the UK.

Laparoscopic adjustable gastric banding (LAGB) (Figure 1)

This restrictive procedure involves the placement of an adjustable ring around the top of the stomach, leaving a small pouch of stomach above it. In order to maintain a good position, most surgeons will then place some sutures between the fundus and the pouch, creating a 'tunnel' around the band. The band is attached via tubing to an adjustment port positioned on the fascia of the anterior abdominal wall or xiphisternal area. The aperture of the band can be adjusted by injecting saline into the port to achieve sufficient restriction to the passage of food, giving the patient the sensation of fullness after a small amount of food.

Roux-en-Y gastric bypass (RYGB) (Figure 2)

This is one of the most common operation performed in the UK for morbid obesity and is usually performed laparoscopically (LRYGB). It involves the creation of a 20-ml proximal gastric pouch using stapling devices to separate it from the rest of the stomach. A 'Roux-en-Y reconstruction' is then performed. This creates an alimentary limb (carrying food from the new pouch), a proximal jejunal limb (carrying biliopancreatic juices) and a common channel where the two are joined. The exact length of these limbs can vary, but both are generally between 50 cm and 150 cm in length. There are several techniques to achieve this reconstruction, but the most important variation to be aware of is whether the alimentary limb travels retrocolic (through the mesentery of the transverse colon) or antecolic (over the top of the transverse colon). A similar operation, known as the One Anastomosis Gastric Bypass is gaining popularity. It is similar to the RYGB but uses a longer pouch, a loop (rather than Roux-en-Y) reconstruction and a longer biliary limb.

Laparoscopic sleeve gastrectomy (LSG)

This procedure has rapidly gained popularity and is now the most common bariatric procedure. It involves mobilizing the greater curvature from the omentum and then excising a majority of the stomach by stapling beside a 30–40 Fr bougie placed along the lesser curvature, removing most of the body and fundus of the stomach.

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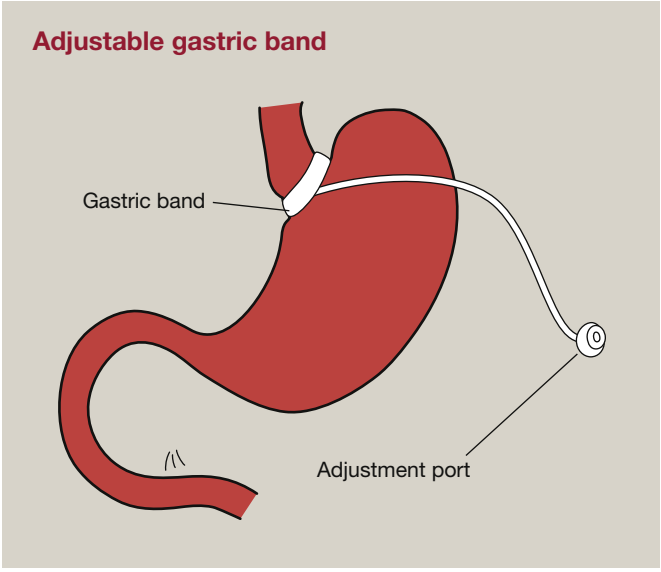

Figure 1

A variation on this is gastric plication. This entails a similar mobilization of the greater curvature then imbricating (folding in) the free edge two or three times with sutures. A bougie is used to judge the size of the gastric lumen, with the intention of creating a similar result to a sleeve gastrectomy without the expense of using stapling devices.

Duodenal switch (Figure 3)

Whereas the operations above rely primarily on restriction and hormonal changes to bring about weight loss, the duodenal switch also causes malabsorption. This procedure is usually performed laparoscopically and begins with a loose sleeve gastrectomy (either at the same time or prior to the rest of the procedure). A reversed bypass is then performed, such that the alimentary limb is attached to a transected duodenum and the common channel starts much further along the small bowel (about 100 cm from the ileocaecal valve). This complex procedure carries an increased morbidity risk at the time of surgery and a significant long-term risk of malnutrition if not properly monitored. However, it does offer more dramatic and guaranteed weight loss as well as tighter diabetic control than the other procedures. Another variant of this known as SADI-S involves a single anastomosis loop reconstruction and is sometimes offered to patients with weight regain after LSG.

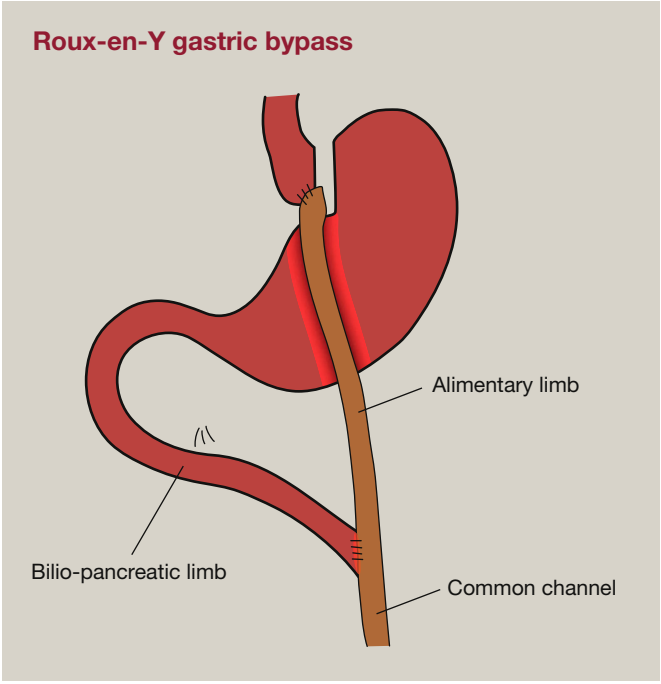

Figure 2

Complications from bariatric surgery

These can be classified into early (during the immediate post-operative period) or delayed (usually beyond 30 days post-operatively).

Early complications

In most specialist units, immediate complications are rare following bariatric surgery. However, they can be tricky to detect as signs (such as distension and guarding) are often difficult to elicit in the morbidly obese patient. Frequently, the signs of an impending intra-abdominal catastrophe can be determined from patient observations. Persistent tachycardia should be taken as a serious warning sign until proved otherwise. Other signs include spikes of fever, abdominal heaviness, hiccups and failure to progress. Many experienced bariatric surgeons will choose to re-laparoscope any patient who is 'not quite right' after their

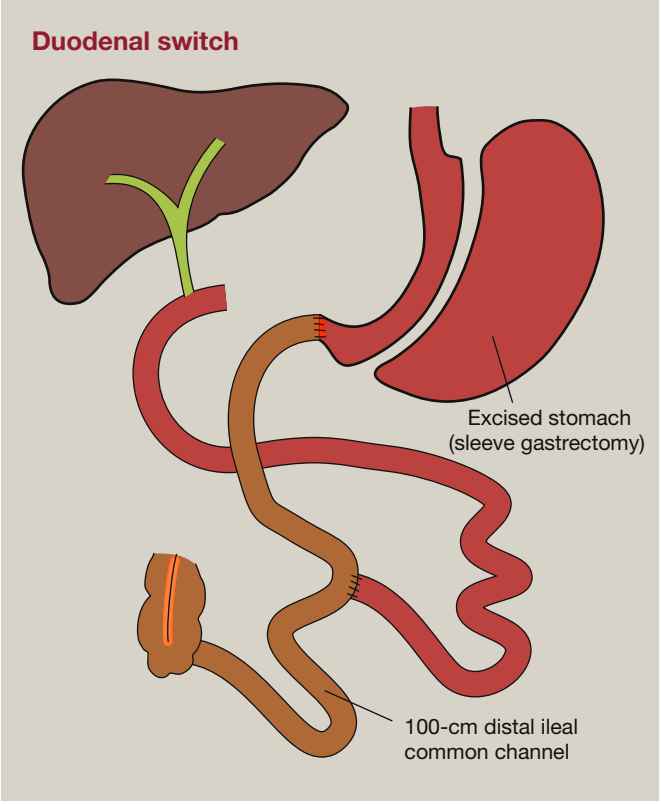

Figure 3

operation as radiological imaging of these patients can be inconclusive and difficult to undertake.

The complications that can occur immediately after bariatric surgery depend on the type of surgery that has been performed but include:

- haemorrhage (intra- or extra-luminal)
- anastomotic leak
- gastric or small bowel perforation
- deep vein thrombosis/pulmonary embolism.

These complications are most likely to occur prior to discharge from the institution where the operation was performed, but with increasing use of day case or short stay surgery they may occasionally present to a non-specialist unit. After initial fluid resuscitation, contact should be made with the specialist centre or the responsible bariatric surgeon to help with the management of the patient; 24/7 cover is now required of bariatric surgery centres.

Delayed complications

Delayed complications are relatively specific to the operation that has been performed. We will focus on the complications that might be expected to present as an emergency.

Gastric band complications: although the initial operation to insert a gastric band is simple with an extremely low morbidity, the late complication rate is relatively high. Numbers vary between centres and reported series, but around 20% of gastric bands require further surgery at some point. The two classic complications are band slippage and erosion, although small bowel obstruction due to the bowel looping over excess tubing is also occasionally seen.

Gastric band slippage – band slippage occurs when the fundus of the stomach migrates above the band. This can happen slowly and cause chronic obstructive-type symptoms or happen acutely. In the acute setting, the patient typically gives a history of regurgitation, dysphagia, heartburn and pain. This should be considered a true emergency because there is a risk of impending gastric necrosis as the stomach is constricted by the band. Investigations can help confirm the diagnosis but should not necessarily be done before instigating the appropriate treatment outlined below. A plain abdominal X-ray may show that the band has migrated some way from the cardia of the stomach or it may simply be lying in the wrong orientation. A normally positioned gastric band sits between 30° and 60° from the horizontal pointing towards the angle of His/left crus of the diaphragm (Figure 4a), whereas a slipped band is typically seen in a horizontal position or face on (the 'O' sign; Figure 4b). If an investigation is to be performed to confirm the diagnosis, a contrast swallow is the one of choice. This will show the malposition of the band, a dilated gastric pouch and obstruction to the flow of contrast.

The immediate treatment of a band slippage is to deflate the band. The patient should be able to show you the adjustment port site. It is typically secured to the fascia of the anterior abdominal wall beneath the largest of the scars from the laparoscopic placement. A non-coring (Huber) needle should be used to deflate the band to avoid permanent damage to the system which can occur with a conventional needle. This is the same type of needle used to access a Portacath, so are often stocked on

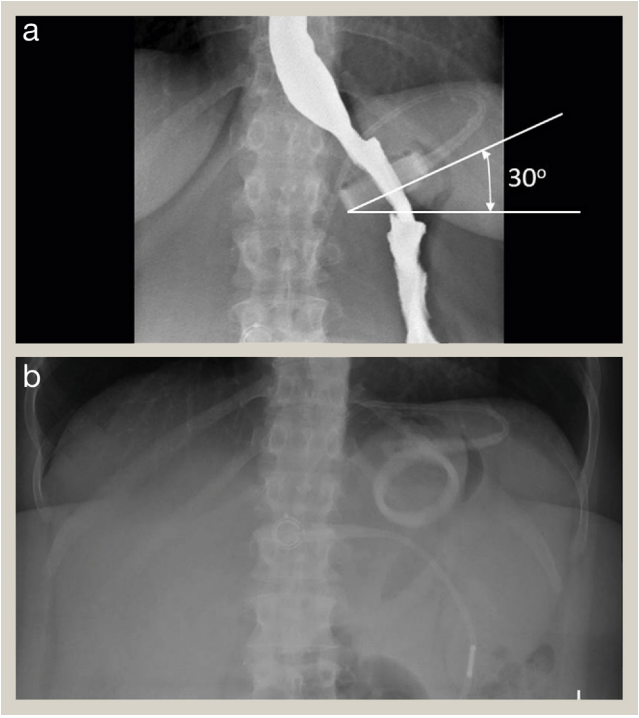

Figure 4 (**a**). A satisfactorily positioned band seen during a barium swallow. (**b**). A plain radiograph on the same patient who subsequently presented acutely with a slippage demonstrating the O sign.

paediatric and oncology wards (although these may be shorter than typically used for bariatric patients). The skin should be cleaned with an alcoholic wipe and the port stabilized between two fingers. Lifting both legs off the bed or performing a valsalva manoeuvre can help tense the abdominal wall and stabilize the port. Aim for the centre of the port. The needle (attached to a 10-ml syringe) should pass through easily until it hits a metal base plate. The fluid can then be withdrawn and should be aspirated until dry. Occasionally, adjustment ports can rotate or become suboptimally positioned as the patient loses weight. If there is difficulty the aspiration can be attempted under ultrasound or fluoroscopic control, or surgically explored if all else fails.

For most patients, deflating the band will give significant relief of their symptoms and they can be reviewed semi-electively by a bariatric surgeon. However, if this fails to resolve their symptoms then an urgent exploratory laparoscopy (or laparotomy) should be performed. Usually the most appropriate and safest intervention is to remove the gastric band completely – which can be achieved either by uncoupling the buckle of the band, or by simply cutting through it with scissors. Some experienced bariatric surgeons may opt to reposition the band, assuming that there is no evidence of gastric necrosis. A third option (provided that there is no gastric necrosis) is to unfasten the band so that it is no longer an immediate threat to the patient but this is not possible with all makes of gastric band.

If a patient presents with symptoms consistent with band slippage shortly after a band fill, it is more likely that a little too much fluid has been introduced. However, the treatment should be the same and the safest thing to do is empty the band.

Gastric band erosion – this means that the band has eroded through into the lumen of the stomach. This may be as a

consequence of an injury to the stomach during implantation, chronic slippage or a low-grade infective process initiated at the time of insertion. Patients often present with few symptoms except for a loss of restriction or weight regain. They may occasionally present as an emergency with gastrointestinal haemorrhage, intra-abdominal sepsis or as an incidental finding on endoscopy in a non-specialist unit.

If the patient presents with sepsis then a CT of the chest and abdomen should be performed to assess the situation and help plan any intervention. Whatever the presentation, it is an absolute indication for gastric band removal. Dependent on the patient's condition and local expertise, this can be performed endoscopically using an instrument designed to cut the band (remembering that the adjustment port will also need to be removed) or laparoscopically. Assuming that there is no significant gastric necrosis (which may need debridement), the laparoscopic technique uses the same principle as the endoscopic method – the band should removed into the lumen of the stomach (via a distal gastrotomy). This avoids dissection around the band's 'tunnel' which could increase the size of the perforation. For most patients any abscess cavity caused by the erosion will drain into the stomach. Occasionally further debridement or drainage may be required, sometimes necessitating a laparotomy.

Adjustment port site infection – this can present as cellulitis or an abscess around the adjustment port. There are typically three instances when this can occur. The first is shortly after the gastric band is fitted and is usually skin flora causing contamination. The second is if infection is introduced during a band adjustment. The third and more common delayed port site infection is as a result of gastric band erosion, with infection travelling along the band tubing to the adjustment port.

Immediate management should be with appropriate intravenous antibiotics and drainage if an abscess is present. The patient should then be referred urgently to a bariatric surgeon who will either need to resite the adjustment port or remove the gastric band completely.

Complications of gastric bypass or duodenal switch: essentially, the Roux-en-Y gastric bypass is analogous to a subtotal gastrectomy for cancer. The reconstruction is the same and the new anatomic windows are identical. Most emergency complications related specifically to the bypass procedures are due to intestinal obstruction. The risk of developing an obstruction following a LRYGB may be as high as 5%, with the mean time to presentation being approximately 1 year.[2] There are a number of reasons why an obstruction might develop, including internal herniation, scarring or adhesion formation, anastomotic stricture, incisional/port site hernia and intestinal intussusception.[3]

Any post-bypass patient presenting with colic should be considered to have an obstruction until proved otherwise. The nature of presentation will vary based upon the anatomical point of obstruction. An obstruction of the alimentary limb or common channel will usually present as a classic small bowel obstruction, with elements of abdominal pain, nausea/vomiting, abdominal distension and absolute constipation. They can often be differentiated as the vomitus from the common channel is usually bilious whereas from the alimentary limb it will be lower volume and absent of bile. Obstruction of the biliopancreatic limb is more difficult to diagnose. It is less likely to present as an emergency and patients usually describe vague, cramping left upper quadrant pains, often after eating. Their stomach may be palpably distended with bile juices by the time the diagnosis is made.

Internal hernias account for around 50% of cases of intestinal obstruction following LRYGB[4] and typically occur over 2 years after the index operation.[5] It is important to understand the anatomy of this to guide treatment. There are up to three mesenteric defects created during the procedure that can all lead to this complication. These are the jejunal mesenteric window (at the site of the jejuno-jejunostomy where the two limbs become the common channel), Petersen's defect (the angle between the mesentery of the alimentary limb and the transverse mesocolon) and, in patients who have a retrocolic alimentary limb, the defect in the transverse mesocolon. Most bariatric surgeons will attempt to close these defects during the bypass surgery. However, some do not and they can still cause morbidity if an absorbable suture is used, the suture fails to hold or the defect enlarges as the patient loses weight.[3]

The immediate treatment for these patients is the same as for any patient with small bowel obstruction – including intravenous fluid resuscitation, placement of a nasogastric tube, making them nil by mouth and monitoring their urine output. A CT scan of the abdomen and pelvis with oral contrast may help to guide further treatment although this can sometimes be difficult to interpret, missing the diagnosis in around 10% of patients[6] so good clinical acumen is required. Occasionally, patients may present during pregnancy which adds further complexity to the diagnostic process, but consideration to their operation should be made for any patient post-bariatric surgery with vomiting during pregnancy, especially if after the first trimester.

Definitive treatment will require surgery. Local expertise and the condition of the patient will help determine the approach taken. For many patients the problem can be dealt with laparoscopically but often a laparotomy will be required. The surgeon should aim to reverse the cause of the obstruction (reduce the hernia/intussusception or release the adhesions), excise any non-viable, ischaemic bowel and close any hernial defects. For most suspected internal herniae, it is best to locate the ileocaecal valve and work proximally. It is important to look at all the potential defects listed above and close any that remain patent (even if they are not the immediate problem) so as to avoid further morbidity.

Complications following laparoscopic sleeve gastrectomy: the risks from a LSG are predominantly in the immediate postoperative period. Haemorrhage and leakage are the most significant risks. Leaks are usually seen around the proximal staple line and thought to be due to the 'sleeve' being made too tight. This causes high intraluminal pressures in the proximal stomach that can result in a perforation. It will usually present in the first 48 hours after surgery, but can occasionally present long after the patient has been discharged.

Treatment of a leak should be carried out in a specialist centre. The immediate management should be resuscitation with intravenous fluids and antibiotics. A CT scan can help confirm the diagnosis but the patient will need to return to theatre for definitive care. The basic principles of management are to drain the sepsis (usually via a surgically placed intra-abdominal drain),

to drain the stomach via a nasogastric tube and attempt to reduce the intragastric pressure (perhaps by stenting the narrowed stomach). Such perforations can take several weeks to heal, so consideration should be given to providing the patient with enteral nutrition, either via a nasojejunal tube or a feeding jejunostomy.

Longer term, strictures are the most common complication and may present with vomiting on an emergency take. Endoscopic dilatation in a specialist centre is the initial treatment of choice for such patients, as it would be for an anastomotic stricture following bypass surgery.

The other potential complication following LSG, although very rarely reported, is of gastric volvulus. This should be considered in a patient who has undergone LSG who presents with vomiting and upper abdominal pain.

Gallstones: due to changes in the cholesterol content of bile and in the motility of the gallbladder, the period of rapid weight loss immediately following bariatric surgery can result in the formation of gallstones. Before the laparoscopic approach was adopted, bariatric surgeons routinely removed the gallbladder as part of the operation. However, performing a cholecystectomy during a laparoscopic bariatric procedure can be difficult and requires different port sites to those used for the weight loss surgery. Therefore, most surgeons will wait until the patient has lost some weight and is actually symptomatic before offering cholecystectomy (unless they have symptomatic gallstones prior to the procedure).

Bariatric patients who do present as emergency with complications from gallstones (such as cholecystitis or acute pancreatitis) should be offered an emergency laparoscopic cholecystectomy. However, if patients who have undergone RYGB or duodenal switch are found to have calculi within their common bile duct they cannot undergo routine endoscopic retrograde cholangiopancreatography (ERCP) due to the long Roux-en-Y loop. An intraoperative cholangiogram should therefore be considered mandatory during a cholecystectomy in these patients and the expertise should be available to perform an immediate bile duct exploration if a calculus is identified. If appropriate expertise exists, another option is to perform an ERCP through a gastrotomy although this is usually considered as a last resort.

Gastrointestinal haemorrhage: haemorrhage as a late complication of bypass surgery is an uncommon but recognized phenomenon. Ulceration can occur at any of the anastomoses, but most commonly at the gastrojejunostomy. It is known as stomal or marginal ulceration and is particularly recognized in smokers. After initial fluid resuscitation and perhaps transfusion, most acute bleeds can be managed endoscopically. Surgical intervention is indicated if this fails to control the bleeding or if the ulcer fails to subsequently heal with medical management (using bismuth chelate, proton pump inhibitors and cessation of smoking).

Similar to the general population, upper gastrointestinal bleeding can also occur from conditions unrelated to the surgery such as peptic ulceration or gastric cancers. Endoscopic access to the stomach and duodenum to assess and control haemorrhage is challenging following RYGB. Expert endoscopists may be able to get good views of the site of haemorrhage by negotiating their way through the alimentary and the biliopancreatic limbs with a paediatric colonoscope, but passing a therapeutic endoscope is more challenging. If the expertise is available, the haemorrhage can often be controlled by radiological embolization, otherwise surgery is indicated to oversew the point of bleeding or to excise the gastric remnant.

Summary

Bariatric surgical procedures are becoming commonplace in UK surgical practice. Patients may present with complications of their procedure, or more common pathology in association with a previous bariatric procedure. Specialist advice should be available at any bariatric surgery centre on a 24/7 basis and should be sought early rather than resort to desperate measures. ◆

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