

# Mistakes in bariatric surgery and how to avoid them

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Nowadays, obesity represents an immense burden for global healthcare. The number of overweight or obese cases has exceeded that of underweight individuals.<sup>1</sup> Bariatric surgery is accepted as a safe and effective treatment for patients with morbid obesity and has gained widespread popularity in the past two decades. Advancements in surgical techniques, perioperative care, and fellowship-based bariatric surgery training have substantially reduced morbidity and mortality rates. Nevertheless, several controversial aspects of surgical treatments of morbidly obese patients are still to be considered.

Here we discuss the mistakes made when managing patients who are candidates for or have been submitted to bariatric surgery in the preoperative, perioperative, and postoperative periods. As high-level evidence is lacking for many aspects of surgical bariatric care, the discussion is based on our long-standing clinical experience.

## Mistake 1 Underestimating preoperative Gastro-Oesophageal Reflux Disease (GORD) in gastric restrictive surgery candidates

Severely obese patients with coexisting GORD (with or without hiatal hernia) represent a significant percentage of cases of bariatric surgical candidates. When assessed systematically, hiatal hernia, erosive oesophagitis of any degree of severity and Barrett's Oesophagus (BO) are detected in 17%, 16.9%, and 0.7% of the cases, respectively.<sup>2</sup>

Worsening of the pre-existing GORD or occurrence of *de novo* GORD after surgery is an issue of increasing concern in bariatric surgery.

While it is generally accepted that Roux-en-Y gastric bypass (RYGB) (figure 1a) is associated with the improvement of pre-existing GORD, patients submitted to gastric banding (GB) (figure 1b), or sleeve gastrectomy (SG) (figure 1c) frequently experience significant deterioration of their symptoms. Up to 25% to 40% of patients submitted to SG may develop *de novo* GORD, and up to 30% show signs of erosive oesophagitis.<sup>3</sup>

Furthermore, there is compelling evidence that shows the *de novo* occurrence of non-dysplastic Barrett oesophagus after SG,<sup>4</sup> with a possible increase in the risk of developing oesophageal adenocarcinoma (OAC).<sup>5</sup> Indeed, there is anecdotal reporting of OAC three years after SG in a patient with preoperative evidence

of BO.<sup>6</sup> Conversely, there are no reports of *de novo* BO after RYGB.<sup>7</sup>

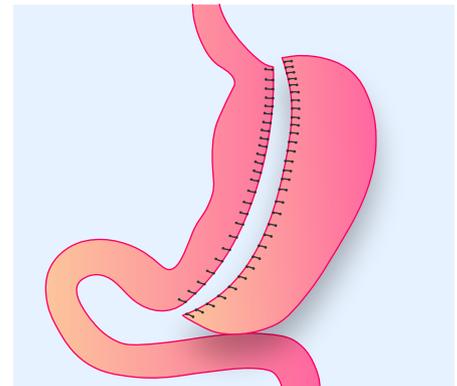
This finding highlights the importance of thorough preoperative endoscopic work-up of bariatric surgical candidates and the need for endoscopic surveillance of patients submitted to SG.<sup>8</sup> While the presence of BO is considered a significant contraindication to SG, GORD is not.

## Mistake 2 Inadequate patient management and optimization before surgery

Many bariatric surgery candidates have significant comorbidities that increase the operative risk. Optimal management of these comorbidities can significantly lower the risk.<sup>9</sup>

In contrast to simple patient assessment, where risk factors are passively identified, preoperative optimization involves active risk mitigation, occasionally delaying surgery until a specific goal is met. Among the most important preoperative goals are smoking cessation, glycaemic control, weight loss and management of obstructive sleep apnoea syndrome (OSAS).

There is ample evidence that smoking increases perioperative mortality and postoperative complications. An analysis of the national surgical quality improvement program data on over 35,000 laparoscopic bariatric operations showed that active smoking increased the likelihood of prolonged intubation or



re-intubation sepsis and doubled the risk of shock.<sup>10</sup>

Although there are no specific data on the bariatric population, it is reasonable to extrapolate the benefits of smoking cessation in surgical candidates from the general population to morbidly obese patients submitted to general surgery.

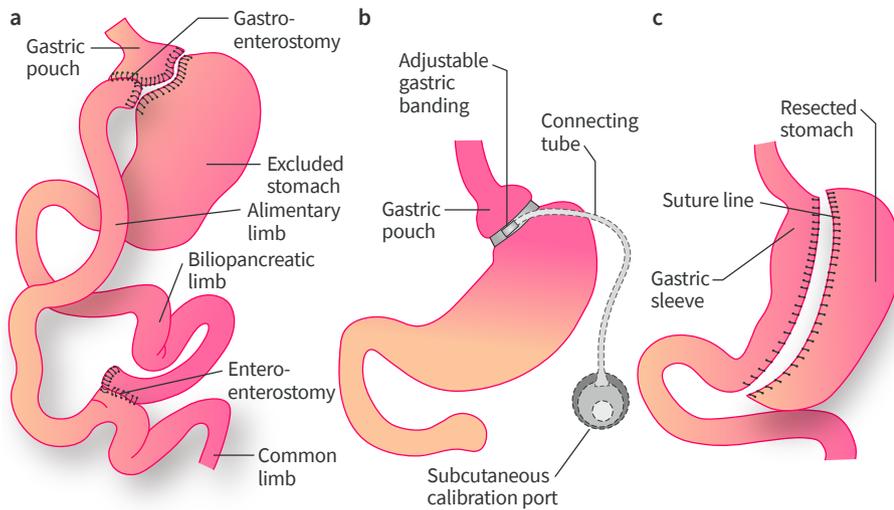
In addition, smoking is a vital predisposing factor for anastomotic ulcers after gastric bypass. Therefore, smoking within the past year might be considered a relative contraindication to this procedure.<sup>11</sup>

Insurance-mandated preoperative weight loss programs, which have modest clinical importance, typically require the patient to fail to lose weight to be considered a candidate for bariatric surgery.<sup>12</sup> Unlike these programs, structured preoperative weight loss may improve perioperative results in multiple ways.

First, preoperative weight loss is usually associated with a decrease of liver volume, which facilitates exposure to the operative field and reduces conversion rates to laparotomy.<sup>13</sup>

Furthermore, weight loss can facilitate intubation via reducing neck circumference, which is associated with the improvement of OSAS.<sup>14</sup>

Regarding preoperative management of cardiologic comorbidities, patients with recent myocardial infarction, unstable angina, decompensated heart failure, high-grade



**Figure 1** | a | Roux-en-Y gastric bypass. b | Adjustable gastric banding. c | Sleeve gastrectomy.

arrhythmias, or significant valvular heart disease should be referred to cardiologic consultation due to their increased risk.<sup>15</sup>

Symptoms of eating disorders should be investigated thoroughly and addressed appropriately because eating disorders correlate with poor post-surgical results.

Substance abuse represents an absolute contraindication to bariatric surgery. Addictions should therefore be ruled out because of concerns regarding postoperative adherence to adequate vitamin supplementation, intake of an appropriate diet, and postoperative lifestyle changes in patients with active substance abuse.<sup>16</sup>

### Mistake 3 Mispositioning the trocars

Laparoscopic surgery in morbidly obese patients faces unique challenges. Principles for correct trocar positioning include triangulation, correct positioning of the camera port to obtain adequate visualization of the operative field, and adequate spacing of the operative ports to minimize instruments interference.<sup>17</sup>

Obese patients present unusual characteristics when compared to lean individuals. The abdominal wall is thicker due to abundant subcutaneous tissues. Familiar anatomical landmarks are unreliable due to adiposities and a caudal shift of the umbilicus. Furthermore, in case of a wrong port positioning, the relocation of the trocar is usually tricky. It frequently leads to a pneumoperitoneum leak that further hinders an unobstructed and thorough exposure of the operative field.

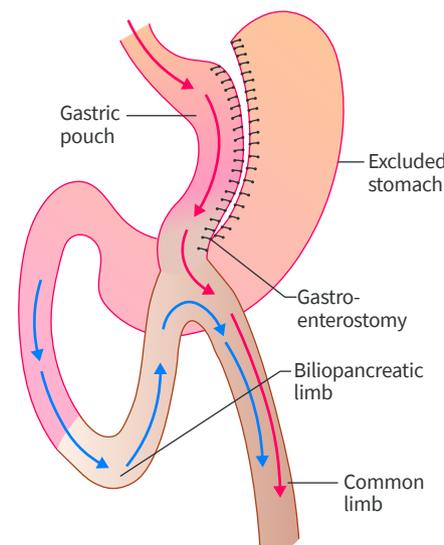
When positioning trocars for bariatric surgery, it is more efficient to use the xiphoid process or the costal arch as a fixed landmark.<sup>18</sup> Therefore, trocars shouldn't be positioned perpendicularly to the abdominal wall but rather at an angle towards the centre of the operative field.

### Mistake 4 Failing to recognize signs of a postoperative leak

Post-surgical leaks and perforations are life-threatening complications responsible for a significant portion of postoperative mortality.<sup>19</sup> It is essential to detect the symptoms and signs of a leak as soon as possible, bearing in mind that the clinical presentation in the obese patient is atypical (with a distinct paucity or lack of abdominal symptoms). For this reason, the diagnosis of intra-abdominal sepsis is often delayed, and its prognosis is severe.

Regardless of the performed surgical procedure, there are several common warning symptoms and signs of leakage or perforation in a patient with a recent bariatric history.

The first signs of a postoperative leak are usually extra-abdominal signs such as tachycardia (maintained above 100-110 bpm), tachypnoea, and oliguria despite adequate fluid



**Figure 2** | One-anastomosis gastric bypass.

administration, with a concurrent increase in serum creatinine and nitrogen.<sup>20</sup> Confusion or irritability, apathy or fatigue, and pain irradiated to the left shoulder may represent other initial symptoms. In general, the abdominal symptoms appear late when the patient has massively deteriorated, and an impending or clear-cut septic shock is seen.

When these early signs of postoperative sepsis are encountered, the patient must be investigated promptly and aggressively, then treated accordingly if the leak is detected.

Because bariatric patients are prone to rapid deterioration, a "wait-and-see" approach is not warranted even if the initial presenting symptoms appear to be mild.

The gold-standard for imaging these patients is a contrast-enhanced CT scan.<sup>21</sup> CT scans increase diagnostic confidence as it can highlight the location of the leak and the presence of intra-abdominal abscesses that can be drained percutaneously.<sup>22</sup> A negative Upper-GI series should be interpreted with caution because of its low diagnostic yield.<sup>23</sup>

When a leak is detected, treatment must be prompt and performed according to the bariatric operation. Wide-spectrum antibiotic therapy is started immediately. Exploratory laparoscopy is usually indicated after gastric banding or Roux-en-Y gastric bypass, with significant washout of the peritoneal cavity, drainage of all abscesses and suture of the leak. A feeding jejunostomy can be placed in patients in whom a difficult postoperative course is predicted, for example, in cases of long-standing infection or severe peritoneal contamination.

A leak after sleeve gastrectomy is more challenging to manage because of the high pressure within the narrow gastric tubule: in this context, gastric content tends to spill out in the peritoneal cavity if the pressure is not relieved. Furthermore, mid-sleeve stenosis is usually encountered together with a leak.

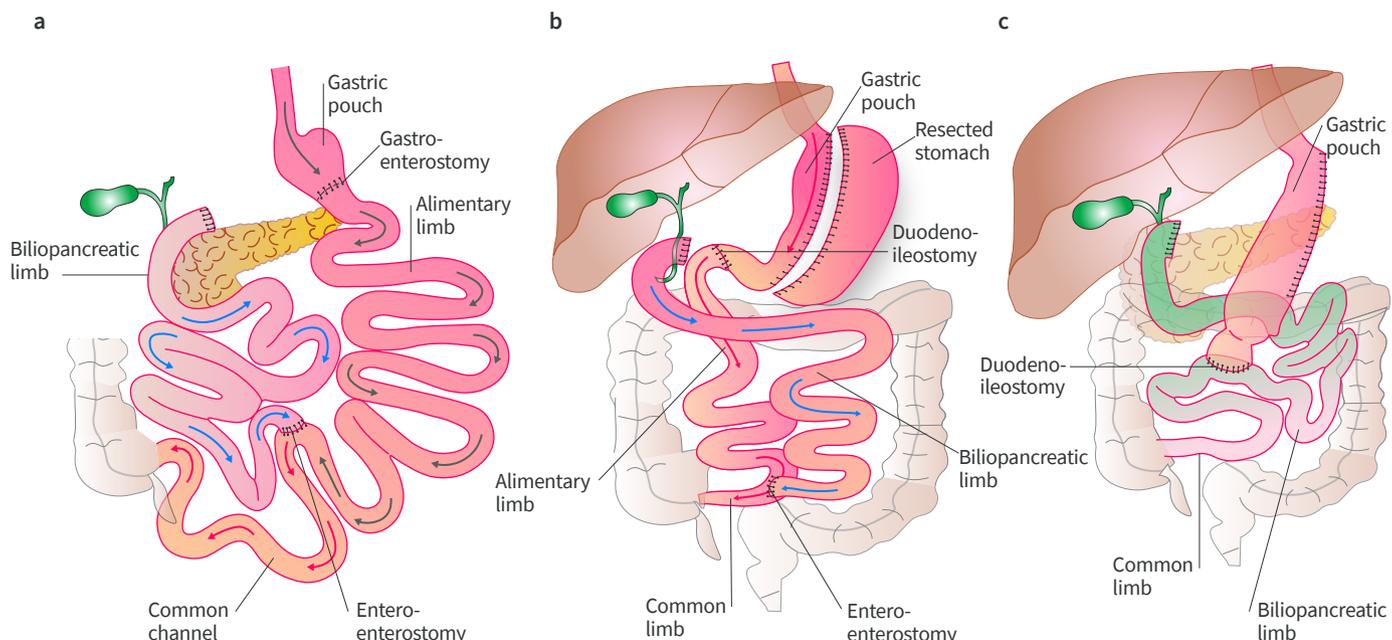
Due to this, the suture of the leak is not warranted. Peritoneal lavage and drainage and endoscopic placement of a stent are better-suited options. Chronic fistula represents a major clinical challenge and may require complex revisional surgery.<sup>24-27</sup>

### Mistake 5 Failing to recognize an internal hernia after Roux-en-Y gastric bypass

After bariatric surgery, intestinal obstruction may pose particular challenges.

The clinical picture of intestinal obstruction after restrictive gastric operations (gastric banding, sleeve gastrectomy) is relatively straightforward, with vomiting, abdominal pain, abdominal distension, and closure of intestinal transit to gas and stools.

However, after a derivative bariatric surgery such as gastric bypass, duodenal switch,



**Figure 3** | a | Standard biliopancreatic diversion. b | Biliopancreatic diversion with duodenal switch. c | Single-anastomosis duodeno-ileal bypass.

biliopancreatic diversion, and the related variants (figure 2), intestinal obstruction has a different presentation, with severe consequences if the diagnosis and treatment are not timely.<sup>19,28</sup>

Bowel obstruction after derivative bariatric surgery can appear at any time after surgery but usually appears months or years later, following significant weight loss. The weight loss can increase the diameter of the defects within the mesenteries, thus facilitating internal herniation of bowel loops. Internal hernias can appear with both antecolic and retrocolic gastro-enterostomies and less frequently in one-anastomosis gastric bypass (figure 3).<sup>29</sup>

Typically, the internal hernia can be transmesocolic, in Petersen's defect (between

the mesentery of the alimentary limb and the transverse mesocolon), or at the level of the entero-enterostomy (figure 4).<sup>30</sup>

In internal hernia, the dominant clinical picture comprises abdominal pain, with a variable degree of abdominal distension. Air-fluid levels may be absent in traditional radiology because the biliopancreatic limb and the excluded stomach do generally not contain any air.

Obstruction of the biliopancreatic limb leads to a closed-loop obstruction. In this scenario, the evolution towards ischemia and necrosis is rapid (figure 5).

The increase in intraluminal pressure is transmitted to the bile duct and the pancreas, with the onset of cholestasis and hyperamylasaemia,

which can be mistakenly confused with acute pancreatitis.<sup>31</sup> The progressive increase in pressure cannot be relieved with vomiting, and ischemia and perforation can occur rapidly.

Urgent abdominal CT scan is the most reliable diagnostic investigation, and typical signs comprise dilatation of the duodenum and gastric remnant, bile duct dilatation, thickening of the intestinal wall, clustering of jejunal loops in the left upper quadrant, as well as distortion and rotation of mesenteric vessels.<sup>32</sup>

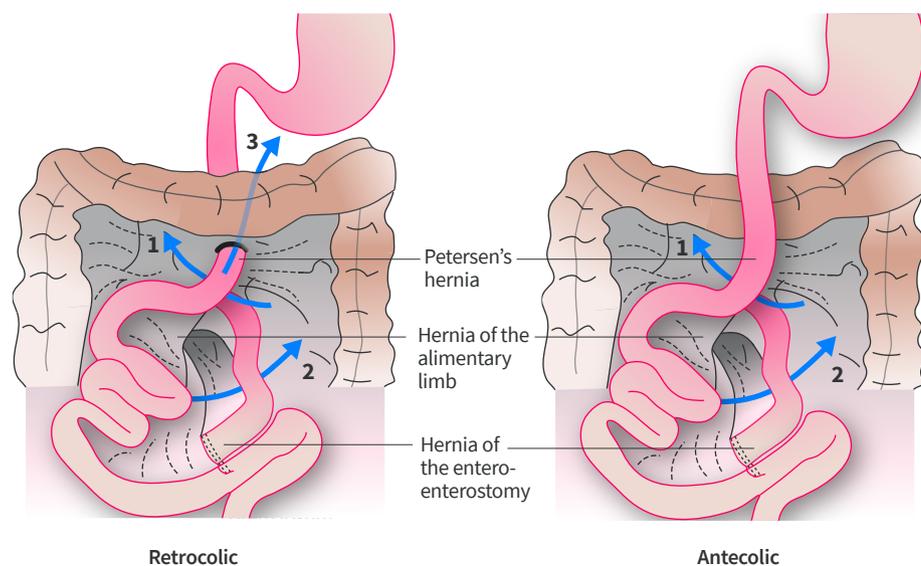
In no case is a conservative treatment advisable (infusion therapy and nasogastric decompression). The patient should be surgically explored: unless proven otherwise, an internal hernia should be suspected in patients submitted to derivative bariatric surgery with acute abdominal pain.<sup>3</sup>

The herniated small bowel must be identified at surgery, and the hernia reduced. The mesenteric defect should be closed with a non-absorbable suture.<sup>34</sup>

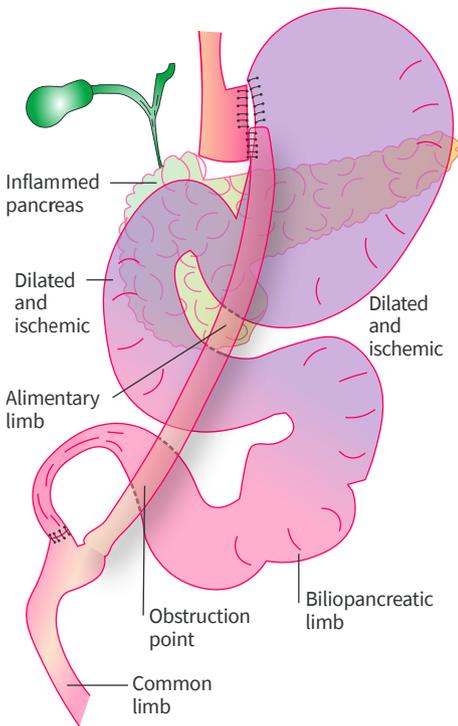
**Mistake 6 Failing to identify invalidating or potentially fatal nutritional deficiencies.**

Despite the widespread acceptance of bariatric surgery, diagnosis of long-term nutritional complications is often elusive, and patients are frequently referred to non-bariatric speciality consultation by their treating physician.

Specific signs and symptoms of protein deficiency include hair loss, fatigue, and lower limbs oedema.<sup>35</sup> Patients should be assessed for adequate protein and calorie intake, and diarrhoea should be ruled out. Serum total protein albumin and transferrin are the most used indicators of clinical nutrition. Anaemia of



**Figure 4** | Internal hernia after gastric bypass.



**Figure 5** | Closed-loop obstruction of the biliopancreatic limb after Roux-en-Y gastric bypass.

varying severity is also frequently encountered. This complication often occurs after derivative or malabsorptive procedures and rarely after restrictive gastric surgery.

Signs and symptoms of common vitamin and mineral deficiencies comprise bone pain (indicative of chronic vitamin D and calcium deficiency, and regularly associated with secondary hyperparathyroidism), anaemia (of multifactorial origin), dermatologic signs like eczema or brittle nails (zinc deficiency), hemeralopia or night blindness (vitamin A deficiency), and sensory-motor peripheral neuropathy (vitamin E deficiency).

A mention is needed for vitamin B1 (thiamine) deficiency. Diplopia or ophthalmoplegia after vomiting (and prolonged vomiting) is an early sign of Wernicke's encephalopathy due to thiamine deficiency. It should be addressed immediately to avoid permanent neurological damage via parenteral (initially intravenous, subsequently intramuscular) vitamin B1 administration. This sign is often overlooked.<sup>37,38</sup>

Supplementation with 100 mg/day of vitamin B1 for patients with a clinical history of rapid and substantial weight loss or vomiting is sufficient to prevent Wernicke's encephalopathy. If clinical suspicion of Wernicke's encephalopathy is already present, intravenous treatment can be initiated with 500 mg every 8 hours for 48 hours and subsequently 250 mg for five days. Vitamin B1 supplementation should be continued in every case, with intramuscular administration of 100 mg/day for three months.<sup>39</sup>

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## Your bariatric surgery briefing

### UEG Week

- 'GERD after bariatric surgery' session at UEG Week Virtual 2021 [<https://ueg.eu/library/gerd-after-bariatric-surgery/248350>].
- 'Ursodeoxycholic acid for the prevention of symptomatic gallstone disease after bariatric surgery: a multicentre, double-blind, randomised, placebo-controlled superiority trial' session at UEG Week Virtual 2021 [<https://ueg.eu/library/ursodeoxycholic-acid-for-the-prevention-of-symptomatic-gallstone-disease-after-bariatric-surgery-a-multicentre-double-blind-randomised-placebo-controlled-superiority-trial/248417>].
- 'Bariatric interventions: Endoscopic procedures' session at UEG Week Virtual 2021 [<https://ueg.eu/library/bariatric-interventions-endoscopic-procedures/248202>].
- 'Stenoses and angulations after sleeve gastrectomy: Which role...' session at UEG Week Virtual 2021

[<https://ueg.eu/library/stenoses-and-angulations-after-sleeve-gastrectomy-which-role/248349>].

- 'Bariatric and metabolic endoscopy management of fatty liver disease' session at UEG Week Virtual 2021 [<https://ueg.eu/library/bariatric-and-metabolic-endoscopy-management-of-fatty-liver-disease/248081>].

### Standards and Guidelines

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