



Review

Diagnosis and management of the postoperative surgical and medical complications of bariatric surgery



Philippe Montravers^{*}, Pascal Augustin, Nathalie Zappella, Guillaume Dufour, Konstantinos Arapis, Denis Chosidow, Pierre Fournier, Lara Ribeiro-Parienti, Jean-Pierre Marmuse, Mathieu Desmard

AP-HP, CHU Bichat–Claude-Bernard, Département d'Anesthésie Réanimation, 46, rue Henri-Huchard, 75018 Paris, France

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ABSTRACT

Perioperative complications following bariatric surgery (BS) have been poorly analysed and their management is not clearly assessed. The associated frequency of ICU admission is difficult to estimate. Among surgical complications, digestive perforations are the most frequent. The most common postoperative complications of sleeve gastrectomy are fistulas, but bleeding on the stapling line is also commonly reported. Complication rates are higher after Roux-en-Y gastric bypass, mainly due to anastomotic leaks. Medical complications are mainly thromboembolic or respiratory complications. All these surgical and medical complications are not easily detected; clinical signs can be atypical or insidious, often resulting in delayed management. Respiratory signs can be predominant and lead erroneously to pulmonary or thromboembolic diseases. Diagnostic criteria are based on minor clinical signs, tachycardia being probably the most frequent one. Lately, complications are revealed by haemodynamic instability, respiratory failure or renal dysfunction and radiographic findings. Management decision according to these abnormal signs is based on a combined multidisciplinary approach including surgical and/or endoscopic procedures and medical care, depending on the nature and severity of the surgical complication. Medical management is based on supportive ICU care of organ dysfunctions, curative anticoagulation if required, nutritional support, and appropriate anti-infective therapy. Pharmacological data are limited in morbidly obese patients and the appropriate doses are debated, especially for anti-infective agents. Complicated BS cases have a poor outcome, probably largely related to delayed diagnosis and reoperation.

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1. Introduction

Bariatric surgery (BS) is very commonly used for the treatment of morbid obesity [1]. Most studies have demonstrated these procedures to be safe and well tolerated in the vast majority of cases, with decreased overall mortality and morbidity rates [2,3]. As usual, however, the benefits of a new treatment must be weighed against the possible associated risks. BS has been reported to be associated with a growing number of perioperative complications and postoperative or short-term adverse outcomes over recent years.

From the anaesthesiologist's perspective, these morbidly obese patients represent a new population that was extremely rare thirty

years ago. While the intraoperative period has been well described and is uneventful in most cases, challenging issues may occur during the postoperative course that deserve specific attention and require intensive care unit (ICU) admission. This article is designed to review the postoperative surgical and medical complications reported after the most commonly performed BS procedures. We describe the clinical conditions and management of these high-risk patients according to the specificities of the procedure performed.

2. Surgical procedures

Many techniques have been proposed for the surgical management of morbid obesity. These operations can be divided into restrictive and malabsorptive procedures [1] that are designed to reduce caloric intake by dramatically modifying the upper mesocolic gastrointestinal tract.

^{*} Corresponding author. Tel.: +33 1 40 25 83 55; fax: +33 1 40 25 63 09.
E-mail address: philippe.montravers@bch.aphp.fr (P. Montravers).

2.1. Restrictive procedures

Several surgical techniques that decrease food intake by creating a small gastric pouch and result in rapid satiety after food intake have been described. Adjustable gastric banding was the first technique to become widely popular. An adjustable silicone ring is placed around the stomach, to create a small gastric pouch with a narrow outlet to induce delayed emptying. The degree of gastric stricture and consequent food restriction is adjusted by means of saline injections into a subcutaneous port. The procedure is usually well tolerated and is now frequently proposed as day-only surgery in patients with no concomitant disease.

Vertical restrictive (sleeve) gastrectomy is now frequently proposed as a first-line treatment in replacement of adjustable gastric banding due to its better efficacy in terms of weight loss [4]. The procedure removes two-thirds of the gastric volume and leaves a gastric tube by stapling the entire length of the greater curvature.

2.2. Malabsorptive operations

Malabsorptive procedures bypass various portions of the small intestine and reduce jejunal absorption. Proximal Roux-en-Y gastric bypass (RYGB) combines restrictive and malabsorptive procedures and is often considered to be the gold standard because of its excellent efficacy and good safety. RYGB comprises stapling the stomach to create a small upper gastric pouch and division of the small intestine at the mid-jejunum level, while the distal portion (the alimentary, or Roux limb) is anastomosed to the gastric pouch. Intestinal (jejunal) absorption is progressively decreased with increasing length of the Roux limb. Two anastomoses (gastrointestinal and jejuno-intestinal anastomoses) are performed.

Other malabsorptive procedures have been proposed, but are often responsible for severe or extreme malabsorption. This is the case of biliopancreatic diversion and duodenal switch (BPD/DS) procedures, sometimes proposed in super-obese patients (BMI > 50 kg/m²) or after failure of previous BS. This procedure comprises sleeve gastrectomy and a short duodeno-ileal circuit with duodeno-ileal and ileo-ileal anastomoses.

3. Epidemiology of surgical complications

Descriptions of postoperative surgical complications are based on reports of general or surgical site complications. Very few data are available concerning the incidence and clinical characteristics of complications requiring ICU management [5–7].

Although most surgical complications occur during the procedure, the time to diagnosis usually peaks during the early postoperative period, in the first days or weeks following surgery [8–11]. Surgical complications can be divided into two entities: septic complications, mainly fistula and anastomotic leak, and nonseptic complications, mostly due to haemorrhage. The vast majority of these complications are treated in surgical units and never require ICU management.

Anastomotic leaks are a very common complication and are more common than pulmonary embolism in some series [12,13]. In a series of 107 autopsies following BS, anastomotic leak was the leading cause of death among the 97 deaths directly related to surgical complications, observed in 36% of cases, while only 13% of deaths were due to pulmonary embolism [14].

3.1. Complications of restrictive procedures

3.1.1. Complications of adjustable gastric banding

The most recent meta-analysis, comprising more than 850 patients included in randomised control trials (RCT) and

36 000 patients from observational studies (OS), estimated the complication rate of adjustable gastric banding to be 13% in RCTs, while a lower rate was observed in OS (7.8%) [3] (Fig. 1A).

Although the procedure appears to be safe, many early complications have been described which can be life-threatening if the diagnosis is delayed.

- Gastric or oesophageal perforation is a rare complication that is sometimes diagnosed intraoperatively and constitutes a contraindication to foreign body insertion. In an analysis conducted by the French ANAES agency, the incidence of gastric perforation was 0.3% (15/5237 patients) [15].
- Early gastric band erosion and perforation of the gastric pouch have been reported during the first postoperative weeks [16]. Erosion is usually related to a technical problem and unrecognized intraoperative gastric perforation. Early postoperative infection or gastric wall ischaemia secondary to a tight band could also account for these erosions. An initially unrecognized perforation can also be revealed by early ring or port suppuration.
- Ring or port infection, observed in 1.5% of cases, may lead to suppuration at the port site [17]. Interestingly, port infection is not systematically associated with ring infection, and the ring can be left in place in the case of isolated port infection.
- Ring malposition and band slippage are early but rare postoperative complications [17].

3.1.2. Complications of sleeve gastrectomy

The sleeve gastrectomy complication rate has been estimated to be 13% in RCTs and 8.9% in OSs [3] (Fig. 1B). The most common complications during the postoperative course of sleeve gastrectomy are fistulas, reported in 0 to 20% of cases after gastric banding removal [18]. Parikh et al. [19] reported a fistula rate of 2.2% in a meta-analysis of almost 10 000 sleeve gastrectomies. These leaks usually occur in the upper part of the gastric tube, in the proximal third of the stomach, close to the angle of His, in up to 89% of cases [20,21].

Bleeding is the most frequent nonseptic complication of sleeve gastrectomy. The most common source of bleeding is the stapling line, observed in approximately 3.5% of cases [22].

3.2. Complications of malabsorptive procedures

Complication rates are higher after malabsorptive procedures than after restrictive surgery. A meta-analysis by Chang et al. [3], based on more than 600 patients included in RCTs and 71 000 patients from OSs, demonstrated an estimated complication rate of 21% in RCTs and 12% in OSs. Anastomotic leaks are the most common complications of RYGB, with a reported incidence ranging from 0 to 8% [12,13]. A fistula can arise at each segment of the RYGB. The fistula rates reported in the literature are presented in Fig. 1C and Table 1 [8–11,23,24].

The bleeding rate after RYGB is significantly higher than after other BS procedures and is reported in 1 to 4.4% of cases [25,26], requiring a complex diagnostic process to identify the source. The site of bleeding may be situated in the abdominal cavity from one of the staple lines. Another source of bleeding is intraluminal bleeding (gastric or intestinal), which may be difficult to detect [25].

Complications following BPD/DS comprise all of the complications reported following sleeve gastrectomy and gastric bypass. Single-centre studies have reported discordant results following BPD/DS, with either similar complication rates to those observed after other procedures or higher overall complication rates with a trend towards higher bleeding rates [2,27].

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