

What an anaesthetist should know about bariatric surgery

B. DILLEMANS (*), S. VAN CAUWENBERGE (*) and J.P. MULIER (**)

EVOLUTION OF BARIATRIC SURGERY

Bariatric surgery is a rapidly evolving subdiscipline in the wide field of general surgery. Since bariatric surgery becomes more and more accepted by the general public, more and more obese patients consider bariatric surgery as a definitive solution for their obesity problem. With this growing number of bariatric patients every general surgeon wants to offer those 'bariatric tools' to their patients.

Various factors contribute to the general acceptance and success of bariatric surgery.

Firstly, obesity is a growing general health problem. Obesity is a chronic disease that is increasing in prevalence in the United States and worldwide. The lifetime risk of developing overweight in the United States is significant. Using the data from the Framingham Heart Study, the calculated four-year risk of becoming overweight (BMI > 25 kg/m²), for men and women at ages 30, 40 and 50 who had a normal BMI at each age was 14 to 19 percent in women and 26 to 30 percent in men. The four-year risk for developing a BMI > 30 kg/m² (if BMI was normal at baseline) was 5 to 7 percent for women and 7 to 9 percent for men. Over the longer 30-year interval, the risks were similar in men and women, and varied somewhat with age, being lower if you were under 50 years of age. The 30-year risk was one in two (50 percent) of developing overweight (BMI > 25 kg/m²), was one in four (25 percent) of developing a BMI > 30 kg/m² and 1 in ten (10 percent) of developing a BMI > 35 kg/m² (1).

Secondly, public awareness for obesity related health problems and comorbidities is substantially growing. Obese people start realizing they are really suffering of a disease, now called metabolic syndrome. The surgery is not only bariatric anymore but named metabolic surgery. Diabetes, hypertension, hypercholesterolemia, and obstructive sleep apnea have been proven to be associated with morbid obesity. There is even an increasing evidence of an association between obesity and the development, morbidity and mortality of different types of cancer.

The third contributing factor to the increased popularity of bariatric surgery is the intrinsic long-term success of surgery in contrast to conservative treatment options. The successful results in terms of weight loss, improvement or disappearance of comorbid diseases and even in gain in quantity of life are well documented (2-6). In the SOS study, the effect of conventional measures on metabolic and cardiovascular risk profiles was compared with the effect of bariatric surgery. After 10 years of conventional treatment – which varied from intensive lifestyle advice and guidance to no treatment at all – the weight had increased by 1.6% (2). Moreover, surgery reduces medication use, outpatient visits, and hospitalizations over time. Ultimately surgery seems to be less costly than the current, less effective nonsurgical treatments of obesity (7).

Since the introduction of laparoscopy in the field of bariatric surgery, the perioperative morbidity and postoperative recovery time could be substantially improved (8). Patients and the general public became more and more aware of those enhanced surgical techniques. The threshold for the obese patient to opt for surgical treatment has been dramatically reduced.

Although various types of procedures have been developed throughout the years, there is not a 'one and only' bariatric procedure. Every single surgical weight loss procedure has its own advantages and disadvantages. Patients and general physicians should be aware of that and adequate information should be provided, not only by surgeons but also by the public media. There is general consensus to tailor the final operative procedure to the type of the patient, taken into account not only the BMI of the patient, but also his comorbidities, age and his eating and drinking behaviour.

B. DILLEMANS ; S. VAN CAUWENBERGE ; J. P. MULIER.
(*) Dep. of general surgery, (**) Dep. of anaesthesiology, Sint Jan Brugge-Oostende, Bruges, Belgium.

TYPES OF BARIATRIC SURGICAL PROCEDURES : A BRIEF OVERVIEW

Bariatric surgical techniques are divided into three groups : restrictive procedures, pure mal-absorptive procedures, and mixed restrictive/mal-absorptive procedures.

Restrictive operations reduce the storage capacity of the stomach and as a result early satiety arises, leading to a decreased caloric intake. In general, restrictive procedures are easier to perform and are accompanied by less procedural complications than the other types of procedures. The vertical banded gastroplasty (VBG) and the laparoscopic adjustable gastric band represent the current most frequently performed restrictive procedures. More recently, the sleeve gastrectomy has been introduced as restrictive procedure although it is generally accepted to have a hormonal working mechanism as well by reducing the ghrelin-producing stomach mass.

Pure malabsorptive procedures induce decreased absorption of nutrients by shortening the functional length of the small intestine. The created short-bowel syndrome leads to a negative energy balance and weight loss. Currently used

malabsorptive techniques are the biliopancreatic diversion and the biliopancreatic diversion with duodenal switch. Although excellent weight loss can be achieved with those procedures, the postoperative quality of life can be disturbed by important protein malnutrition, vitamin/mineral deficiencies and diarrhoea.

In contrast, the Roux-en-Y gastric bypass (RYGB) has both restrictive and malabsorptive features. A (restrictive) gastric pouch is created and separated

from the remainder of the stomach. The continuity is then restored by a Roux-en-Y limb, which is connected to the jejunum. As the gastric pouch fills during eating, a sensation of satiety is created. Food then enters the jejunum via the Roux-en-Y limb. The length of the Roux-en-Y is inversely related to the length of the common limb and determines the degree of malabsorption. RYGB is nowadays being performed laparoscopically. By reducing the size of the surgical incision and the trauma associated with the operative exposure, the surgical insult has been shown to be less after laparoscopic compared to open RYGB. The RYGB has been proven in numerous studies to result in durable weight loss and an improvement in weight-related medical illnesses. Half of the weight loss often occurs during the first six months after surgery ;

weight loss usually peaks at 18-24 months. The obesity-related comorbidities that may be improved or cured with the RYGB include diabetes mellitus of the adult onset type (so-called insulin resistant), hypertension, high cholesterol, arthritis, venous stasis disease, bladder incontinence, GERD, liver disease, certain types of headaches, heartburn, sleep apnea and many other disorders. Furthermore, the RYGB has resulted in marked improvements in quality of life (9-11). RYGB is therefore considered as the 'golden standard' bariatric procedure. Moreover, in Belgium there is since a few years a marked shift from the pure restrictive procedures to the RYGB. Reasons for this shift are the rather moderate long-term results of the VBG and the band regarding weight loss and the sometimes substantial impairment in quality of life related to those procedures. In the United States however, there is a tendency to less invasive surgical procedures (e.g. adjustable gastric band) despite the less favorable outcomes with those operations published in literature. The increasing popularity in the United States of the laparoscopic adjustable gastric band procedure could in part be related to the lower cost and lower morbidity compared with laparoscopic gastric bypass (12).

ROLE OF THE ANAESTHETIST IN THE BARIATRIC PROCESS

Although RYGB is the most frequently performed bariatric procedure at this moment, it still remains a complex intervention with a substantial morbidity and mortality. In controlled trials, the 30 day mortality rate for the RYGB was 1% and 0.3% for case series data (13). Flum *et al* concluded that advancing age, male sex, and lower surgeon volume are associated with a higher risk of early death after bariatric surgery (14). Various techniques of laparoscopic Roux-en-Y gastric bypass have been described. We completely standardized this procedure to minimize its morbidity and mortality. The mortality rate in our series is 0.04% and is less than other published series. Our approach also significantly reduces operative time and turns the technically demanding laparoscopic RYGB procedure into an easy reproducible operation, effective for training (15). Due to the inverse relationship between patient volume and mortality and morbidity, bariatric surgery should only be performed in experienced centers. Bariatric surgery requires a multidisciplinary approach by an internist, a surgeon, a psychologist, a dietician, and other specialists if necessary (10). However, the anaesthetist has

not been actively involved in this multidisciplinary evolution. As the number of weight loss procedures grows, more active involvement and interest of anaesthetists will be mandatory. Anaesthetists can and will play a more active role in the bariatric program since obese patients are more susceptible to complications during and post-surgery.

In the preoperative evaluation patients at risk should be identified. A clinically useful tool is the obesity surgery mortality risk score to predict the mortality risk for patients undergoing RYGB. In this scoring system five independent variables (BMI ≥ 50 kg/m², male gender, hypertension, pulmonary embolus risk and age ≥ 45) correlate with mortality. It is a validated scoring system for risk stratification in bariatric surgery and is anticipated to aid informed consent discussions, guide surgical decision-making, and allow standardization of outcome comparisons between treatment centers (16-17). Anaesthetists should also focus on the cardiorespiratory status and the airway of the obese patient. Peripheral and central venous access and arterial cannulation sites should be evaluated during the preoperative examination, and the possibility of invasive monitoring should be discussed with the patient.

Intra-operatively close collaboration between surgeon and anaesthetist is a must and contributes to the final outcome of the procedure. The bariatric anaesthetist should first of all have proper knowledge of the various surgical procedures and also of his bariatric surgeon in order to adapt the anaesthesia regarding timing and procedural technical aspects. One of the major disadvantages of laparoscopy in the obese patient is the sometimes limited intra-abdominal workspace where the surgeon is confronted with. The anaesthetist can help the surgeon to optimize this workspace by patient positioning and by adequate muscle relaxation. In our bariatric unit, active research has been done regarding those aspects, with beneficial effects for both surgeons and patients (18-20).

The anaesthetist can help facilitate proper placement of a nasogastric (NG) tube during surgery to help the surgeon size the gastric pouch. After a RYGB pouch is created, the anaesthetist should not blindly insert the NG tube; in this situation, the monitor should be watched carefully while the NG tube is advanced, to avoid disruption of the anastomosis (21). They also help perform leak tests with saline and methylene blue to ensure anastomotic integrity.

Postoperatively the anaesthetist should help in preventing pulmonary complications by adequate

oxygenation (e.g. CPAP) and should initiate adequate postoperative analgesia although laparoscopic bariatric surgery induces less postoperative pain and is less likely to interfere with pulmonary mechanics (22). Since the growing number of revisional bariatric procedures (e.g. conversion from a failed restrictive or malabsorptive procedure to a RYGB), anaesthetists should be familiar with possible metabolic changes and possible drug malabsorption in these patients. Common long-term nutritional abnormalities include vitamin B₁₂, iron, calcium, and folate deficiencies. With rapid weight loss, patients may also be protein depleted (21). The anaesthesia induction and maintenance is also different when a patient with a previous bariatric procedure need a surgical intervention.

The above described examples may seem evident to most of the anaesthetists but out of daily practice we know this is not always true. Only when bariatric surgeons and anaesthetists act as a team in close collaboration with each other, the most optimal end-point will be achieved. A well-established cooperation is necessary and some simple tips and tricks can really contribute to a better patient-outcome. Since a lot of bariatric patients are predominantly young, at working ages, and do not consider themselves as 'ill', their acceptance of postoperative complications is less. An anaesthetist should therefore consider each obese patient as a challenge. This requires full commitment and dedication to both the patient and the surgery in order to minimize postoperative morbidity and mortality.

CONCLUSION

Bariatric surgery is gaining wide acceptance among both physicians and patients. It not only offers the most adequate and durable form of weight loss but also results in substantial improvement of obesity-related comorbidities including diabetes type 2. The role of the anaesthetist in the multidisciplinary approach to the management of the obese patient is crucial and invaluable.

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