Anaesthesia for obesity surgery

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Abstract

The aim of this article is to give a brief but comprehensive overview of the current management of the patient undergoing bariatric (weight loss) surgery. This article will discuss the different types of obesity surgery commonly performed, and the practical aspects of how to manage these patients both perioperatively and postoperatively. The principles described can be utilised in the management of obese patients attending for other types of surgery.

Keywords Bariatric surgery; Epworth; gastric band; gastric bypass; obesity; obstructive sleep apnoea; STOP-BANG

Royal College of Anaesthetists CPD matrix: 1C01, 2A03, 3A13

Learning objectives

After reading this article you should be able to:

- list three different types of obesity surgery
- carry out a preoperative screening assessment for obstructive sleep apnoea (OSA)
- identify five risk factors that help determine which patients may require level II care postoperatively

Background

In 2006 the National Institute for Health and Clinical Excellence (NICE) issued recommendations to the NHS on the use of bariatric surgery for the treatment of obesity. Bariatric surgery is recommended as a treatment option for people with obesity if they have a BMI of 40 kg/m^2 or more, or between 35 kg/m^2 and 40 kg/m^2 and other significant disease that could be improved if they lost weight. In addition non-surgical measures should have been tried but failed to achieve clinically beneficial weight loss for at least 6 months, intensive management in a specialist obesity service should be available, and the person must commit to long-term follow-up and be generally fit for anaesthesia and surgery. Surgery is recommended as first-line treatment for adults with a BMI of more than 50 kg/m^2.

Types of obesity surgery

Weight loss surgery is now commonly performed laparoscopically and can be considered in three groups, as follows.

- *Restrictive surgery* limits the size of the stomach so the person feels full after eating a small amount of food. The most commonly performed are reversible adjustable gastric banding (AGB) and irreversible sleeve gastrectomy.
- *Restrictive plus malabsorptive surgery* also involves shortening the digestive tract, thus creating malabsorption. The length of small bowel bypassed determines potential weight loss. The classical Roux-en-Y gastric bypass (RYGB) works mainly by restriction with a modest element of malabsorption, and is considered the 'gold standard'. The biliopancreatic diversion involves more extensive bypass with the gastric pouch joined to the ileum, producing much greater malabsorption. This can be coupled with a duodenal switch leaving a short distal length of small intestine, more severely limiting caloric absorption.
- *Other procedures* are more experimental. These include gastric stimulation, using an implanted pacemaker-type device to produce electrical gastric stimulation, and the intragastric balloon, an endoscopically placed silicone balloon inflated in the stomach to promote a feeling of satiety.

Bariatric surgery is reasonably safe with 30-day mortality in the region of 0.1–0.5%. Recent evidence suggests that extreme values of BMI are associated with increased risk of major adverse outcomes, while age, sex, race, ethnicity and other co-morbid conditions are not. Risks are lower following an AGB than from a RYGB, however the latter offers superior long-term weight loss. The risk of complications appears to be reduced when the surgery is performed by an experienced surgeon, particularly for revision surgery. Guidelines suggest that surgery is carried out in dedicated bariatric centres.

Infrastructure

In 2007 the Association of Anaesthetists of Great Britain and Ireland (AAGBI) set out guidelines for the perioperative management of the morbidly obese patient. The AAGBI suggested that departments should initially provide a consultant lead for obesity anaesthesia to work closely with theatre staff in developing theatre set-up and provision of specialist equipment for obese patients.

Bariatric patients benefit from a dedicated surgical pathway with a multidisciplinary team approach that incorporates appropriate obesity patient assessment, anaesthesia, surgical management and postoperative care.

The conduct of bariatric anaesthesia

Preoperative assessment

The preoperative assessment is a vital part of the anaesthetic in obese patients. They can often be difficult to assess with reduced or poor mobility and commonly describe rapid onset exercise induced dyspnoea through the movement of their own body weight. The challenge is to correctly identify those patients at increased risk of perioperative morbidity and to carry out appropriate investigations to stratify this risk and allocate resources appropriately.

The preoperative assessment should combine all the usual history, examination and investigations in light of the nature of proposed surgery, and to look at specific areas in more detail as described below.

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Respiratory assessment

Baseline respiratory function should be established from the patient history and physical examination. Smoking is an independent risk factor for postoperative complications after bariatric surgery. Chest X-ray, arterial blood gas analysis and pulmonary function tests (PFTS) should be selectively performed where clinically indicated.

Screening of all obese patients for OSA with polysomnography is ideal, but may not be feasible. Instead questionnaires (Epworth/STOP-BANG/ASA/Berlin) with OSA scoring systems are used to identify patients with potentially significant OSA (Table 1). These patients then go on to have formal testing either with overnight oximetry or full polysomnography to determine the need for continuous positive airway pressure (CPAP) or non-invasive positive pressure ventilation (NIPPV) postoperatively.

These two scores indicate risk, such that if you answer yes for two or more STOP questions you are at risk of OSA. The more positive answers to the BANG questions the more likely it is that moderate to severe OSA is present, and formal referral for polysomnography preoperatively should be made.

Cardiovascular assessment

Scoring patients using cardiac risk tools such as the Revised Cardiac risk index and following the American Heart Association/American College of Cardiology (AHA/ACC) guidelines on perioperative cardiovascular examination will highlight those requiring provocative cardiac testing. Obesity risk can be further stratified using the Obesity Surgery Mortality Risk Score, comprising:

- BMI greater than 50
- male
- hypertension
- pulmonary embolism (PE) as a co-morbidity
- Age over 45.

Patients with a total score of 0–1 are classified as lowest risk, score 2–3 are intermediate risk, and score 4–5 are highest risk.

Patients with active cardiac conditions are at higher risk and need objective assessment of their coronary perfusion (stress perfusion scan or coronary angiography), assessment of their cardiac function with echocardiogram, and coronary intervention (stents or bypass) if there is significant reversible ischaemia. Transoesophageal echocardiography is often superior to transthoracic in this population.

Functional assessment can be made using cardiopulmonary exercise testing. This provides a composite of cardiac and respiratory function, with peak VO_2 <15.8 ml/kg predicting the majority of at-risk obese patients. It has been shown that exercise performance in the severely obese is inversely proportional to BMI. For those unable to exercise either through their weight or through orthopaedic issues, pharmacological stress testing may be necessary.

Patients with functional capacity greater than four metabolic equivalents (METS) and no risk factors undergoing bariatric surgery are considered to be at low risk of cardiovascular complications, and can usually proceed to surgery without further investigation.

STOP-BANG risk score for obstructive sleep apoea (OSA)

Snoring	Body mass index >28
Tiredness during daytime	Age>50
Observed apnoea	Neck circumference >16 inches women >17 inches men
Pressure (high BP)	Gender — male

Table 1

Thromboprophylaxis

Obesity is a prothrombotic state and more than doubles the relative risk over non-obese patients for deep vein thrombosis (DVT) and PE. The incidence of DVT in bariatric surgery is reported to be as high as 2.5–4.5%. To help minimize risk, thromboprophylaxis measures need to be standardized within the obese patient surgical pathway.

DVT formation can begin intraoperatively and low-molecular-weight heparin (LMWH) should be given perioperatively. This should be combined with good hydration with goal-directed therapy where appropriate, and the use of mechanical calf compression devices. Some advocate the continuation of mechanical compression devices postoperatively until the patient mobilizes. Early postoperative mobilization is paramount for obese patients to help minimize their increased risk of DVT, pressure areas and respiratory morbidity.

Monitoring

AAGBI monitoring standards should be adhered to in all cases. The conical nature of the upper forearm in obese patients makes measurement using automated devices unreliable, particularly in women. Use of the forearm for BP measurement has gained widespread acceptance in bariatric anaesthesia practice and appears to be reliable. Arterial lines and central venous cannulation are rarely necessary. Venous access can be difficult, particularly in women, because their fat distribution is peripheral, and the anterior aspect of the forearm is often a useful site.

Induction and maintenance of anaesthesia

Consideration should be given to anaesthetizing patients, especially the super-obese, in theatre, on the operating table that should be electrically powered. Weight limits should be confirmed before commencing the case. The patient positions themselves on the theatre table, and this helps minimize risk to both the patient and theatre staff during transfer. Alternatively hover mattress transfer devices may be used. Care must be taken with intraoperative body positioning and relief of pressure areas as obese patients are particularly prone to complications such as pressure sores, compartment syndrome and nerve palsy through the pressure of their own weight. Once asleep, the patient is placed in lithotomy with specialized boots and support under the buttocks (Figure 1).

The pharmacodynamic and pharmacokinetic principles in the morbidly obese that should be considered have been outlined in the previous article. It is the authors' practice to induce with propofol and maintain anaesthesia with desflurane. Muscle relaxation is achieved using rocuronium. Intraoperative opioids are used as deemed appropriate and supplemented with