Anaesthesia for obesity surgery

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Abstract

The aim of this article is highlight the anaesthetic management of patients undergoing bariatric (weight loss) surgery. There are different types of commonly performed procedures each of which requires careful perioperative and postoperative management. Those principles can successfully be extrapolated to obese patients undergoing non-obesity 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

At the end of 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. This advice included use of bariatric surgery for patients with a body mass index (BMI) of 40 kg/m^2 or more, or those with BMI between 35 kg/m^2 and 40 kg/m^2 and other significant disease that could be improved if they lost weight. Surgery should only be considered after non-surgical measures have been tried but failed to achieve clinically beneficial weight loss for at least 6 months. Surgery is recommended as first-line treatment for adults with a BMI of more than 50 kg/m^2.

Types of obesity surgery

Bariatric surgery is now mostly performed laparoscopically and can be classified as follows.

Restrictive surgery, which decreases the size of the stomach, for example reversible adjustable gastric banding (AGB) and irreversible sleeve gastrectomy.

Restrictive plus malabsorptive surgery also involves shortening the digestive tract, thus creating malabsorption. The classical Roux-en-Y gastric bypass (RYGB) works mainly by restriction with a modest element of malabsorption, and is considered the 'gold standard'. Other procedures exist but have less of an evidence base. These include **gastric stimulation** and the **intragastric balloon**, an **endoscopically placed silicone balloon** inflated in the stomach to promote a feeling of satiety.

Safety of bariatric surgery is increasing owing to increased surgical experience and experience of perioperative management of this cohort of patients.

Anaesthetic management

Preoperative

Preoperative functional assessment can be a challenge due to reduced mobility and patients commonly describe rapid onset exercise-induced dyspnoea through the movement of their own body weight.

The biggest challenge is to identify high-risk patients for perioperative morbidity and choose the appropriate investigations, which help stratifying their risk.

Preoperative assessment should include history, examination and appropriate investigations for different organ systems that might be affected by obesity.

Respiratory assessment: smoking is an independent risk factor for postoperative complications after bariatric surgery; history of smoking should be sought.

Investigations range from chest X-ray, arterial blood gas analysis and pulmonary function tests (PFTs).

Obstructive sleep apnoea (OSA) is an important concern. Screening is important; using polysomnography is ideal, but may be logistically difficult. Instead questionnaires (Epworth/STOP-BANG/ASA/Berlin) with OSA scoring systems might be more applicable (Table 1). These patients then go on to have formal testing if screening is positive, either with overnight oximetry or full polysomnography. This guides the perioperative use of continuous positive airway pressure (CPAP) or non-invasive positive pressure ventilation (NIPPV) that has recently shown an impact on postoperative cardiopulmonary complications in patients with OSA.

STOP-BANG risk score for obstructive sleep apoea

• 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

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Cardiovascular assessment: obesity is an important risk factor for perioperative cardiovascular morbidity due to cardiovascular diseases associated with obesity including accelerated atherosclerosis, ischaemic heart disease, systemic and pulmonary hypertension and increased risk of cerebrovascular accidents and deep venous thrombosis (DVT).

Identifying those patients requiring further cardiac testing is important and can be achieved using cardiac risk tools such as the Revised Cardiac risk Index and following the European Society of Cardiology/European Society of Anaesthesia (ESC/ESA) guidelines on perioperative cardiovascular examination.

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

Functional assessment using cardiopulmonary exercise testing addresses both the cardiac and respiratory systems together under physiological stress. Peak VO_2 less than 15.8 ml/kg predicts the majority of at-risk obese patients. For those unable to exercise either through their weight or through orthopaedic issues, pharmacological stress testing may be necessary.

Functional assessment can be done using metabolic equivalents, 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.

More objective assessment is required for patients with active cardiac conditions to assess their coronary perfusion (stress perfusion scan or coronary angiography), cardiac function with echocardiogram, and coronary intervention (stents or bypass) if there is significant reversible ischaemia.

Thromboprophylaxis: obesity is associated with increased risk of DVT and PE compared to non-obese with reported incidence of 2.5–4.5% in bariatric surgery. A strategy for prophylaxis should be developed and standardized for obese patients to minimize this risk. This includes both pharmacologic and non-pharmacologic measures.

DVT formation can start intraoperatively so low-molecular-weight heparin (LMWH) should be given perioperatively. This should be combined with good hydration and the use of mechanical calf compression devices until the patient mobilizes. Early mobilization postoperatively should be encouraged to minimize risk of DVT, pressure areas and respiratory morbidity.

Intraoperative

Monitoring: The Association of Anaesthetists of Great Britain and Ireland (AAGBI) monitoring standards should be adhered to in all cases. Measuring blood pressure using an automated cuff can be technically difficult when applied on the upper arm due to the conical nature of the upper arm in obese patients. An alternative site would be the forearm, but sometimes insertion of an arterial line is necessary for accurate recording of BP.

Venous access as well can be difficult, particularly in women, because their fat distribution is peripheral, and the anterior aspect of the forearm is often a useful site. Central venous catheter insertion is rarely required.

Induction and maintenance of anaesthesia: sedative premedications are rarely required but because acid reflux is common in this group of patients, antacid prophylaxis is frequently advisable preoperatively. Positioning is a very important issue. It is a common practice to anaesthetize patients in theatre on the operating table especially super-obese patients. The weight limit of the table should be confirmed and it should be an electrically powered table. Ideally patients should be allowed to position themselves, this minimizes risk to patients and staff but sometimes hover mattress transfer devices may be used. Sufficient staff trained in handling and mobilization should be available. Obese patients are prone to complications related to positioning such as pressure sores, compartment syndrome and nerve palsy through the pressure of their own weight so there should be vigilance with appropriate positioning, padding and checking of pressure areas and regular review during and after the procedure. Once asleep, the patient is placed in lithotomy with specialized boots and support under the buttocks (Figure 1).

The pharmacodynamic and pharmacokinetic properties of different anaesthetic medications are altered in the morbidly obese and sound knowledge of the effect of obesity on different medications is important but outside the scope of this article.

It is the authors' practice to induce with propofol/rocuronium. It is advisable to use short-acting agents such as desflurane/remifentanil, to maintain anaesthesia. Intraoperative opioids are used as deemed appropriate and supplemented with paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs). Local infiltration by surgeons of port sites is also very helpful.

Airway: difficulties with obese airways in anaesthesia are well recognized, although the reported incidence of difficult intubation has been lowered. The authors' experience is that difficult intubation mirrors the general population, with around 10% generally found to be difficult to hand-ventilate. This is related to increased facial and neck soft tissue. Male sex, large neck

Figure 1 Patient positioned for laparoscopic bariatric surgery.

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