Obesity: surgical management

Obesity surgery is the most cost-effective form of treatment for morbid obesity. Unfortunately the NHS has failed to provide widespread comprehensive assessment and obesity surgical services. As a result we are lagging behind many developed countries to the detriment of our patients.

Surgery for obesity has been around for many years but has undergone a rediscovery in the UK following the publication of the National Institute for Clinical Excellence (NICE) guidelines supporting its use in selected patients (National Institute for Clinical Excellence, 2002). Coupled with increasing specialism in general surgery, obesity surgery (aka bariatric surgery) has developed rapidly with the bulk of it now being undertaken, like so much other gastrointestinal surgery, laparoscopically. It requires very skilled surgery coupled with an interdisciplinary approach as complex as that for cancer surgery. The need for long-term follow up and occasional revisional procedures requires that no patient is ever discharged completely from the obesity surgery team.

Why do the surgery?

A non-surgical approach to morbid obesity is the most desirable providing it is effective and sustainable long term. Unfortunately when patients lose a lot of weight after non-surgical treatment they invariably put it back on over the ensuing years. Even with the better antiobesity drugs that are now available the failure rate of non-surgical treatment for morbidly obese patients is >95%. Thus, surgery offers the only real hope for these patients.

The principal aim of surgery is to reduce weight and thus prevent the development of or ameliorate any established co-morbidities. There are ample data in the literature attesting to the positive effects of surgery on the metabolic syndrome (type 2 diabetes, hypertension, hyperlipidaemia) which many of these patients suffer from. In addition there is also good evidence from the literature that patients have an improved quality of life and reduced costs to the health service (Sjostrum, 2000; Buchwald et al, 2004). Whether life expectancy is actually increased as a result of surgery has not been proven beyond doubt although the expectation is that it will. The long-term outcome data, including mortality rates from the Swedish Obese Subjects (SOS) study due to report later this year, are awaited with great interest (Sjostrum et al, 2004).

Some surgeons and patients are of the view that prolongation of longevity is not the ultimate aim of surgery but improvement in quality of life and general health – all of which has been demonstrated after obesity surgery. A number of the co-morbidities that these patients suffer from are improved by surgery (*Table 1*).

Who qualifies for surgery?

Surgeons in the UK follow the NICE guidelines, often with some modifications (*Table 2*). At present it has been estimated that there are 500 000 morbidly obese patients in the UK who might satisfy the NICE guidelines for surgery. However, what is not known is how many of these would actually want surgery. Assuming a modest fraction of eligible patients would have surgery if offered it, the number of surgeons and available resources to deliver it are woefully inadequate. This situation pertains in many countries especially those with a socialized health-care system. It has also been suggested that because of the startling benefits of obesity surgery the thresholds for surgery should be reduced, especially for obese patients with type 2 diabetes. If a move in this direction takes place the health-care system would be more stressed than it currently is. Many commissioners of obesity surgery in the UK are rationing the service by ignoring NICE guidelines and only funding those who have the most severe co-morbidities.

What are the surgical options?

In practical terms the choice of operation will depend on the skills and experience of the surgeon in the obesity surgery team. All obesity surgeons should be able to offer laparoscopic gastric banding and either open or preferably a laparoscopic bypass procedure (Baxter, 2006).

Gastric banding

Gastric banding is the routine standard pure restrictive operation, which aims to reduce food intake by constrict-

Table 1. Co-morbidities in obese patients which are improved by surgery

Type 2 diabetes
High blood pressure
High blood lipids
Obstructive sleep apnoea
Respiratory failure
Skeletal pain
Stress incontinence
Asthma
Poor mobility
Quality of life

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Table 2. Indications for surgery

Body mass index (BMI) >40 kg/m^2
BMI 35–39 kg/m^2 with associated significant co-morbidity which can be improved by weight loss, i.e. type 2 diabetes, severe arthritic pain,
Age >18 years but less than 60 years
Have good evidence of failed non-surgical treatment, i.e. they must have seen dieticians, been to Weight Watchers or Slimming World, tried orlistat and/or sibutramine. In addition the surgeon must be convinced that they have also seriously tried to adhere to diets and other lifestyle advice
Fit enough for the surgery (a relative indication)
No history of alcoholism or untreated psychotic disorders
Females (80% of those requesting surgery) must not get pregnant within 18 months of surgery
Agreement to lifelong follow up after surgery

ing the upper stomach and thus allowing the patient only to eat small portions of food (*Figure 1*). The band is inserted then partially closed 6 weeks after surgery by injecting saline into a reservoir which is usually implanted in the presternal position. The patient has to be well motivated to undergo this type of surgery which requires a lot of effort in changing their eating patterns and adhering to the associated diet. Essentially this type of operation restricts what the patient can eat because of the small gastric pouch (around 15 ml) proximal to the band. The band often requires two or three adjustments before the patient has satisfactory constriction and weight loss.

Gastric bypass

Gastric bypass involves an element of restriction by leaving a small gastric pouch of around 25–30 ml, which is anastomosed to a Roux-en-Y jejunal limb (*Figure 2*). The Roux limb bypasses the stomach and thus creates some degree of malabsorption in addition to the restriction. The degree of malabsorption depends on the alimentary and biliopancreatic limb lengths (*Figure 2*). Typically for a superobese patient (body mass index (BMI) >50 kg/m^2 the alimentary and biliopancreatic limbs would be 1–1.5 m in length. The patient will need added vitamin B_{12} as well as other vitamins in addition to careful monitoring of their iron and calcium status. The distal stomach is inaccessible for further investigation but this rarely poses a problem.

Standard biliopancreatic diversion

Standard biliopancreatic diversion is a form of gastric bypass that involves a half to two thirds distal gastrectomy with Roux limb lengths that result in largely a malabsorptive procedure being performed (*Figure 3*). The alimentary limb is 200 cm and the common channel only 50 cm long – the rest of the small bowel comprising the biliopancreatic limb (usually around 2–3 m). This procedure requires very close follow up for micronutrient deficiencies and should not be undertaken lightly if the patient is likely to be reluctant to attend the clinic after surgery. In addition they need to take added vitamins as for a gastric bypass but also need to be placed on low dose proton pump inhibitors for 2 years to avoid a stomal ulcer. They also need to take a high protein diet to avoid protein-calorie malnutrition.

Biliopancreatic diversion with a duodenal switch

Biliopancreatic diversion with a duodenal switch is a variant of the standard procedure where the stomach is divided vertically (around a 34–40 Ch bougie) instead of

Figure 1. Gastric banding.

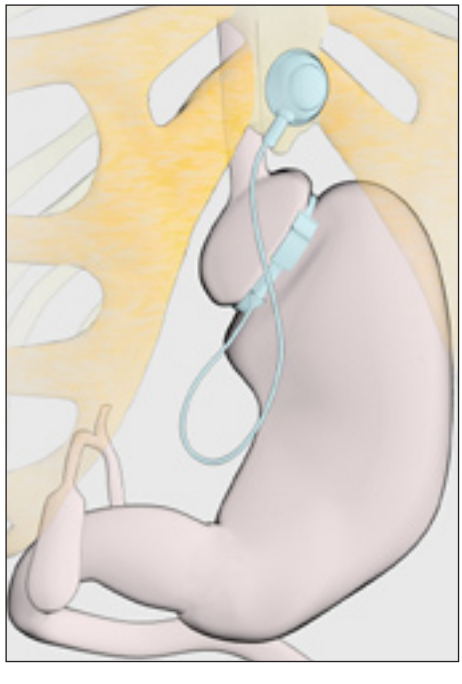


Figure 2. Gastric bypass. A = alimentary limb (1.0–1.5 m); B = biliary limb (1.0–1.5 m).

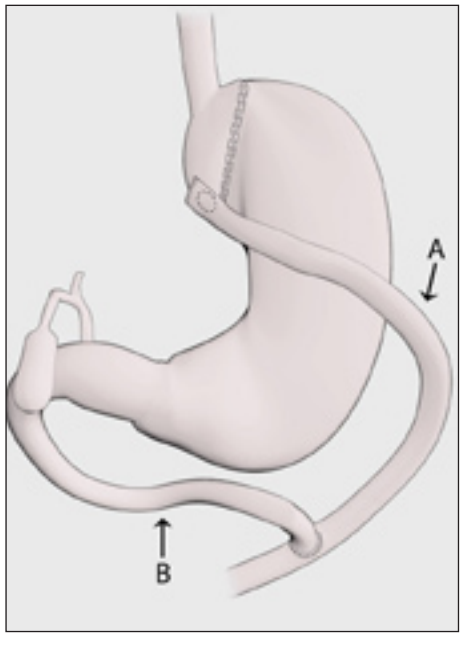
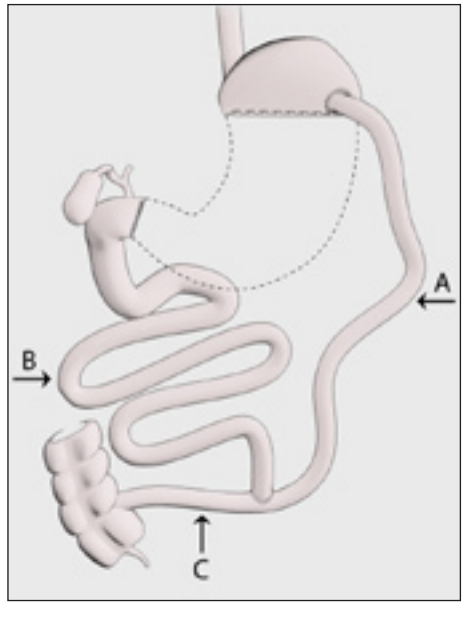


Figure 3. Standard biliopancreatic diversion. A = alimentary limb (200 cm); B = biliary limb (2.0–2.5 m); C = common channel (50 cm).

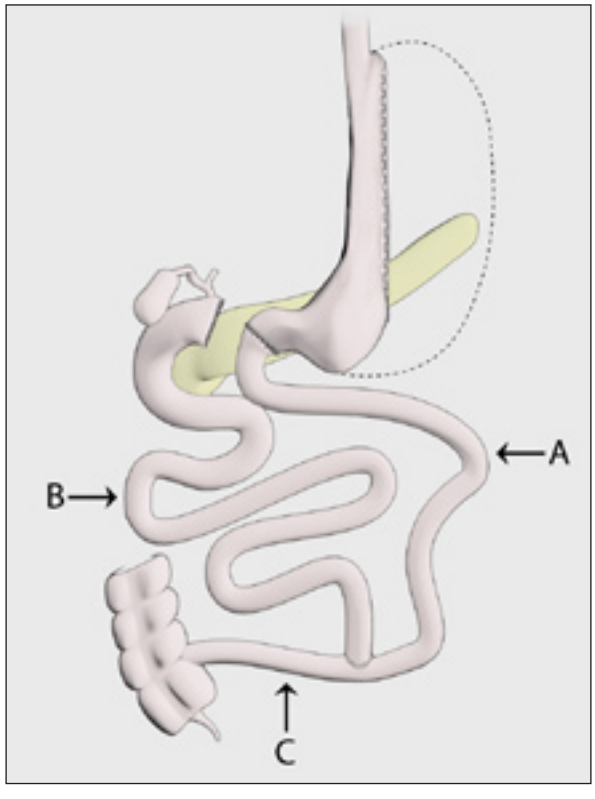


horizontally and the Roux limb anastomosed to the first part of the duodenum instead of the stomach (*Figure 4*). Keeping the antrum prevents the need for vitamin B_{12} supplements and the duodenal anastomosis prevents the likelihood of a stomal ulcer (since most of parietal cells have been removed). The Roux limb lengths are different from the standard procedure with the alimentary limb being 175 cm long and the common channel 75 cm long. This procedure when undertaken laparoscopically in the superobese patient is often done in two stages with the vertical gastrectomy (sleeve gastrectomy) being performed as a first stage then when the patient has lost weight the operation is completed by doing the duodenal switch as a second stage. It is claimed that this is safer than doing the whole procedure as a single stage. If a two-stage approach is favoured the second stage could be a gastric bypass rather than a duodenal switch.

What are the risks of surgery?

In general as a blanket statement most patients are told there is around a 1% risk of perioperative mortality, although this will vary widely according to age and co-morbidities. In general terms it is thought that gastric banding has less perioperative mortality than bypass procedures but much of this may be the result of patient selection. There is no evidence that open surgery is more dangerous than laparoscopic surgery – the latter possibly being more dangerous during the surgeon's learning curve. The main cause of death is pulmonary embolus which still occurs despite taking all possible standard precautions. Morbidity is also common with a 10% revision rate for gastric bands and around a 25% incidence of wound problems after open surgery. Despite all of this, most patients feel the advantages outweigh the disadvantages associated with perioperative mortality and morbidity.

Figure 4. Biliopancreatic diversion with a duodenal switch. A = alimentary limb (175 cm); B = biliary limb (2.0–2.5 m); C = common channel (75cm).



What are the results?

The definition of success after an obesity surgery procedure is often debated. The usual definition of success is loss of >50% of excess body weight (current weight minus ideal body weight). Some surgeons prefer to measure success in resolution or improvement of co-morbidities.

Table 3 shows the average weight loss results for all the procedures described above, although there is some variation from unit to unit depending on patient selection and adequacy of follow up (Buchwald et al, 2004). As with most series of obesity surgery follow ups, the longer patients are followed up the less often they report back to the unit resulting in a high drop-out rate. As a consequence there is always a suspicion that long-term results from obesity are poor because of the inadequate follow-up. There are certainly some good series reported in the literature with >90% follow up for more than 10 years which show that by and large the results are sustained although there is often a trend for some weight to be regained in patients – especially after restrictive surgery. Pure restrictive surgery has always a poorer result compared to other more invasive bypass procedures. This is perhaps unsurprising given that the average band revision rate is about 10% and also that the patient has to learn to alter their eating pattern and lifestyle to a greater degree than after bypass procedures.

Cure or improvement of co-morbidities is expected if the patient loses sufficient weight, although often they do not need to lose 50% of their excess body weight to notice considerable improvement in co-morbidities.

Choosing the right operation

This is not an exact science but some opinions are emerging which although not universally agreed do have some evidence base to support them. Patients with a BMI of <49 kg/m^2 can often lose sufficient weight after gastric banding providing they are well motivated. Binge eating disorders are thought by some surgeons to not do

Table 3. Results from surgery (expressed as % reduction of excess weight)

Gastric banding	50–55
Gastric bypass	60–65
Biliopancreatic diversion	70–75
Biliopancreatic diversion with a duodenal switch	70–75

well after gastric banding. Those patients with a 'sweet tooth' are sometimes thought to do better after a gastric bypass type procedure rather than pure restrictive surgery since hyperosmolar intake of sugar will lead to early dumping and thus avoidance of eating sweets.

The best evidence for patient selection involves the use of a gastric bypass or biliopancreatic diversion procedure in those patients who have type 2 diabetes (Poiries et al, 1995). The diabetes is often cured within days of the surgery before significant weight loss has occurred. The reason for this remarkable outcome is still being investigated but probably has something to do with the effects of very high levels of distal peptide gut hormones on insulin resistance.

It is hotly debated at present what to do with the superobese patients (BMI >50 kg/m^2). Some surgeons suggest banding them all and then only doing a bypass on the failures while others, including the author, try to suggest to the patient they may do better with some form of bypass since they are uniformly more effective in producing a greater weight loss. Other surgeons suggest doing a two-stage biliopancreatic diversion with duodenal switch (Milone et al, 2005), knowing that in around 40% of cases the second stage will be unnecessary because of good results from the sleeve gastrectomy alone. Only long-term follow up by surgeons performing all these various options will finally settle the matter.

Revisional surgery

This is not for the faint hearted. While challenging technically, especially if carried out laparoscopically which many are, redo surgery represents a higher risk for the patient compared with the index procedure. Thorough preoperative assessment and a good operative strategy is needed. Discussion with an experienced obesity surgery colleague is also desirable as many of the problems may be unfamiliar to the surgeon. Failed gastric bands can be replaced or more often converted laparoscopically to a bypass. The rare failed gastric bypass may need revision of limb lengths. Very rarely patients may lose too much weight and need a revision to prevent protein-calorie malnutrition.

KEY POINTS

- Obesity surgery has proven effectiveness – especially for the metabolic syndrome and far exceeds the results of medical treatment.
- Choosing the right operation for a particular patient is not yet an exact science.
- Bypass surgery invariably has better weight loss results than restrictive surgery.
- Nearly all obesity surgery will eventually be performed laparoscopically.
- A multidisciplinary approach to patient selection and postoperative management is mandatory – lifelong follow up is necessary.
- It may never be possible to provide enough obesity surgical services to meet the demand.

Is there anything new on the horizon?

There are some intriguing devices being tested at the moment that are not yet widely available or of proven value. However, over time they may find a place in the surgical management of obesity. The intragastric stimulator, which is somewhat similar to a pacemaker, has an electrode that is easily inserted into the stomach wall – the pacemaker unit is then placed subcutaneously (Favretti et al, 2004). This device in well-chosen patients may have some benefit but the results of controlled studies are awaited.

Gastric bands are constantly being modified and improved. One of the problems that surgeons would like to resolve is the constant risk of introducing infection by needle access to the reservoir. A device is being developed which can avoid this by using a powered band containing a small motor – the band constriction can be altered by using non-invasive external electromagnetic radiation.

There are a constant stream of technological improvements to laparoscopic surgery, with improvements in staplers, instruments, retractors, use of robots etc, which are all being trialed by surgeons to make surgery easier and safer.

Conclusions

Obesity surgery is here to stay with a rapidly increasing demand. The challenge is to expand the service with well trained multidisciplinary team members. The laparoscopic revolution has resulted in most surgery now being undertaken by this means. There is still debate about what operation to do for an individual patient but some facts are emerging which make the decision making easier. Perhaps the greatest challenge is to get sufficient funding to allow the NHS to deliver the service equitably to patients. **BJHM**

Conflict of interest: Professor Baxter is President of the British Obesity Surgery Society.

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