

BARIATRIC SURGERY IN DIABETES – FOR AND AGAINST

Should surgery for weight loss be the last resort in managing obesity-related issues, including Type 2 diabetes? **Dr Rob Andrews**, Consultant Senior Lecturer in Diabetes & Endocrinology and Clinical Director, R & D, Taunton NHS, looks at the pros and cons of bariatric surgery

Usually bariatric surgery is carried out laparoscopically

The reasons why weight loss should be a goal for all patients who have, or are at risk of, Type 2 diabetes are compelling. Each kilogram of weight gained annually over 10 years is associated with a 49 per cent increased risk of developing the condition over the subsequent 10 years. Furthermore, the amount of excess weight that patients with Type 2 carry affects their risk of dying, while a 10 per cent weight loss often puts diabetes into remission.

Bariatric surgery is the most effective therapy for inducing significant weight loss. The Swedish Obese Subjects study showed 15–25 per cent weight loss, dependent on the type of surgery, with accompanying improvements in glucose tolerance, hypertension, lipid profile, cardiovascular risk factors and mortality compared with obese individuals who elected for medical treatment alone¹.

This, and other studies, have led the National Institute for Health and Care Excellence to state that bariatric surgery should be offered to patients with a body mass index (BMI) of 35–40kg/m² who have obesity-related conditions, such as Type 2 diabetes or obstructive sleep apnoea, or in those with a BMI of 40 kg/m² or greater, regardless of weight-related co-morbidities. More recently the International Diabetes Federation has recommended surgery for patients with a BMI < 35 kg/m² whose Type 2 is poorly controlled, despite best medical care.

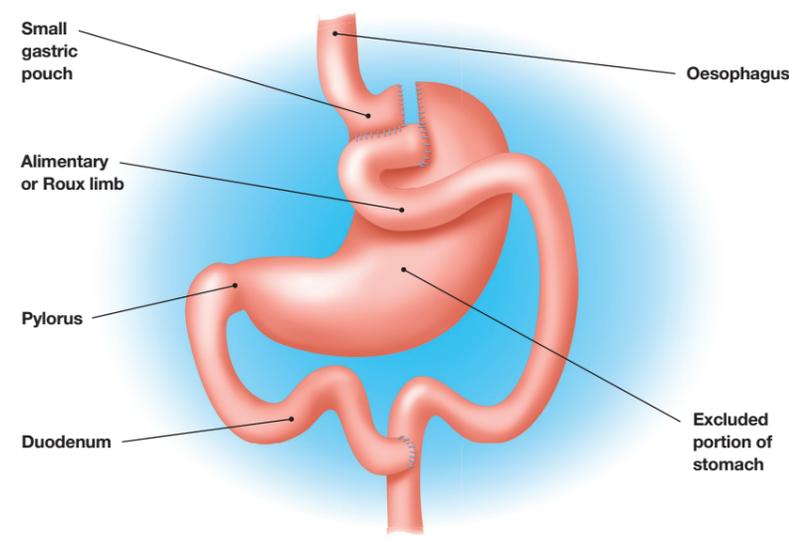
Before offering surgery, the procedures need to be discussed with the patient and surgery only offered if both the diabetes specialist team and the patient feel that the benefits outweigh the risks.

Types of surgery

The three most commonly performed bariatric surgeries on the NHS are the laparoscopic adjustable gastric band (LAGB), Roux-en-Y gastric bypass (RYGB) and laparoscopic sleeve gastrectomy (LSG).

For the LAGB, a silastic band is applied around the stomach just below the gastro-oesophageal junction. Tightening of the band by saline injection ►

The gastric bypass procedure



leads to less hunger and early and prolonged fullness after eating. Regular band adjustment allows for adequate food intake while maintaining optimal intraluminal pressure to ensure continuous weight reduction. In the RYGB, the stomach is divided into an upper gastric pouch of 15–30ml and a lower gastric remnant. The pouch is anastomosed to the jejunum and the excluded biliary limb, including the gastric remnant, connected to the bowel. After this surgery, patients report reduced appetite and early and prolonged fullness after eating. Whether these changes are brought about by the rise in gut hormone concentrations, a rise in bile acid concentrations or the change in gut flora, all of which are induced by the surgery, is unknown. Finally, in LSG the stomach is transected vertically, creating a high-pressure gastric tube and leaving a pouch of up

“Significant weight loss is best induced by bariatric surgery”

to 200ml. Initially, the LSG was thought to have its effect by delaying gastric emptying, but it is now recognised to have metabolic effects comparable to the RYGB.

Risks

Increased rates of bariatric surgery and the introduction of laparoscopic techniques mean that risks of this kind of surgery are relatively low, comparing favourably with that of having a cholecystectomy (gall bladder removal). The LAGB is the safest of the three operations, having a mortality rate of one in 2,000, compared with around one in 1,000 for LSG and one in 500 for RYGB. Surgical morbidity is also relatively low for these procedures, but over the 10 years following surgery, one in five LAGB patients will need an additional operation to replace their band, tubing or port. Long-term metabolic risks of bariatric surgical procedures need to be looked for and, for this reason, lifelong follow-up is recommended. Calcium absorption is reduced after all bariatric procedures,

putting patients at risk of metabolic bone disease and secondary hyperparathyroidism. Therefore, calcium replacement and monitoring is normally recommended for all bariatric patients. Patients who have had RYGB and LSG are at high risk for micronutrient deficiencies, especially vitamins D, B1, B6, and B12, folate and iron, and supplementation will be needed. Similar vitamin deficiencies may occur, although less frequently, among LAGB patients.

Severe protein calorie malnutrition may develop, necessitating nutritional support or surgical revision in around five per cent of RYGB patients. Other issues include changes in the absorption of certain solutes, enhanced ethanol absorption and an increased rate of kidney stones from increased oxalate absorption, which leads to renal failure in a small subset of patients.

Many RYGB patients experience symptoms, including abdominal pain, diarrhoea, nausea, facial flushing, palpitations, hypotension and syncope if they eat high glycaemic foods (dumping syndrome). This is thought to be due to low glucose, induced by an exaggerated insulin response to the glucose load. For the majority of patients, taking small regular low glycaemic index meals can control this. However, a minority (two per cent) have significant hypoglycaemic events, resulting in confusion, agitation or loss of consciousness.

Benefits

After bariatric surgery, weight loss is accompanied by improvements in

glycaemic control, reduction in cardiovascular risk and an improvement in general health and wellbeing. Early studies suggested that diabetes remission rates, arising from better glycaemic control, were as high as 80 per cent, but this has been revised downwards, with more stringent definitions of remission, to 40–50 per cent. Each year, around 10 per cent of those in remission will experience a recurrence of their diabetes. All patients can expect a reduction in the amount of diabetes medication they need, even if they do not go into remission, and most see a prolonged improvement in glycaemic control, with more than 80 per cent achieving an ideal HbA1c.

Only a few studies have looked at the role of bariatric surgery in treating patients with Type 1 diabetes. The largest to date involved 10 patients and found significant weight loss and improvement in HbA1c, with patients needing 40 per cent less insulin².

Initially, when patients are in the stage of weight loss, both blood pressure and lipid profiles can improve significantly. In some patients, all blood pressure medication needs to be stopped, due to hypotension. When weight stabilises, both blood pressure and lipid profiles tend to return to near pre-operative levels, so anti-hypertensive and lipid therapy should not be routinely discontinued.

Finally, bariatric surgery improves functional status, with patients able to do more daily activities. There is also some limited evidence of improved

quality of life and perceived health status in the short and medium term.

Which patients will do well?

Predicting who will lose weight with bariatric surgery is seen as a key question for research. As yet, there is no reliable predictor. However, as data accumulates, we may find serum markers, or genotypes, that are of clinical use in predicting individual response to bariatric surgery. Similarly, predicting which individuals will see an improvement in glycaemic control can be difficult. Shorter duration of Type 2 diabetes, lower fasting blood glucose and HbA1c levels pre-operatively, younger age at time of surgery and higher BMI make diabetes remission more likely. The pre-operative use of insulin, or the use of high amounts of oral hypoglycaemic agents, reduces the chances of remission. Female patients also have lower rates of remission. Interestingly, the amount of weight loss following surgery has only a small association with Type 2 remission.

Bariatric surgery vs conventional treatment for Type 2 diabetes

Four small studies have attempted to compare bariatric surgery with usual diabetes treatment. In one, 60 patients with recently diagnosed Type 2 diabetes were randomised to either conventional therapy or LAGB surgery, with a primary end point of diabetes remission³. At two years of follow-up, remission was seen in 73 per cent of the LAGB group compared with only 13 per cent of the conventional treatment group. In another study, 60 patients were randomised to intensive medical therapy, RYGB, or a biliary pancreatic diversion (BPD)⁴. After two years of follow-up, diabetes remission was observed in 15 of 20 subjects and 19 of 20 subjects randomised to RYGB and BPD, respectively. None of the medically treated subjects achieved remission. Meanwhile, a study of 150 patients, randomised to intensive medical therapy, RYGB or LSG, achieved target HbA1c in 12 per cent, 42 per cent and

37 per cent of subjects respectively⁵. In the final study⁶, a triple end point of HbA1c less than seven per cent, low density lipoprotein less than 100mg/dl and systolic blood pressure less than 130mm Hg was set for a comparison of RYGB with intensive medical therapy in 120 patients. At one year follow-up, 49 per cent of the surgery group achieved the end point, compared with 19 per cent of those in the medication group.

Which operation, which patients?

Prospective evidence has suggested that RYGB produces greater weight loss compared with LSG which, in turn, produces greater weight loss than LAGB. Similar findings have been seen for diabetes remission rates. A systematic review of weight loss in the medium term (3–10 years) found no

difference in the weight loss seen with RYGB and LAGB. Medium-term data for the LSG do not as yet exist. The By-Band study⁷ a large randomised study, comparing band to bypass, is currently aiming to clarify the issue of which operation is to be preferred.

While there is no doubt that bariatric surgery does improve diabetes control, the procedures are also associated with risk and complications, and we do not know yet what impact it has on diabetic complications. For these reasons, bariatric surgery should not be considered as a first line treatment for Type 2 diabetes, but it should be offered to obese patients with Type 2 who are otherwise unable to meet their goals for control of their diabetes. The patients that may benefit the most from surgery include those with greater BMI (> 35 kg/m²), younger age and shorter duration of Type 2 diabetes.

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