Bariatric surgery

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Abstract

Obesity and metabolic syndrome is considered an epidemic in Western societies. An adult is considered to be obese with a BMI of 30 or above. Obesity imposes a significant human burden of disease, mortality, social exclusion and poor quality of life. It is closely associated with multiple comorbidities including type 2 diabetes, coronary heart disease, and poor health status, and has a substantial human cost by contributing to the onset of disease and premature mortality. Surgical interventions are significantly more effective than non-surgical therapies for the treatment of severe obesity, reduction of cardiovascular morbidities, prevention of some cancers, type 2 diabetes and improved quality of life. Although there are various surgical options, Roux-en-Y gastric bypass is considered the gold standard; sleeve gastrectomy is now the second most common procedure having replaced gastric banding with mini-gastric bypass the third worldwide. Endoscopic procedures are also growing in popularity but are still under research. A robust hospital infrastructure with multidisciplinary approach is crucial for a bariatric service including appropriate staffing and facilities to provide pre- and perioperative care. As the bariatric practice is increasing worldwide, it is essential to safeguard the standard of bariatric training to ensure surgical competence and patient safety.

Keywords Bariatric; metabolic syndrome; obesity; Roux-en-Y gastric bypass; weight loss

Introduction

Obesity and metabolic syndrome is considered an epidemic in Western societies and has become more prevalent in developing countries over the last two decades. An adult is considered to be overweight with a Body Mass Index (BMI) of 25–29.9 and obese with a BMI of 30 or above. In 2008, an estimate of 205 million men and 297 million women worldwide were obese.[1] In 2014, more than 1.9 billion adults, i.e. 18 years and older, were overweight; 600 million of those were obese.[2] The Health Survey for England data showed that the prevalence of adult obesity rose from 14.9% in 1993 to 26.9% in 2015, where 67.8% of men and 58.1% of women were overweight or obese.[3] According to the Foresight report, 60% of men, 50% of women and 25% of children are estimated to become obese by 2050.[4]

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Obesity imposes a significant human burden of disease, mortality, social exclusion and poor quality of life. It is closely associated with multiple comorbidities including type 2 diabetes, hypertension, coronary heart disease, hypercholesterolaemia, asthma, sleep apnoea, osteoarthritis and poor health status, and has a substantial human cost by contributing to the onset of disease and premature mortality. Obesity also carries serious financial implications for health services and the economy. In England, the direct costs to the NHS for treating overweight, obesity and related diseases has increased from £479.3 million in 1998 to £4.2 billion in 2007; the indirect costs, in other words, the costs arising from the impact of obesity on the society, increased from £2.6 billion to £15.8 billion.[4]

Surgical interventions have proven to be significantly more effective than non-surgical therapies for the treatment of severe obesity, reduction of cardiovascular morbidities, prevention of some cancers, glycaemic control for patients with type 2 diabetes and improved quality of life.[5,6] The long-running Swedish Obese Subjects (SOS) Study demonstrated favourable results for surgery with long-term weight loss and improvement in obesity-related disease resulting in a mortality benefit compared to conventional therapy at more than 15 years.[5] In 2009, Picot conducted a literature review to assess the clinical effectiveness and cost-effectiveness of bariatric surgery,[7] confirming the benefits in moderately to severely obese patients compared to non-surgical interventions.

Financially, the first health-economic report of obesity surgery in England by the independent Office of Health Economics in September 2010, estimated around 140,000 people qualified for bariatric surgery under National Institute for Health and Care Excellence (NICE) guidelines (Box 1), while the number of surgeries performed was only 3607 in 2009–10. If only 5% of NICE-eligible patients were to receive bariatric surgery, the total net gain to the economy within 3 years would be £382 million.[8]

In the UK, although there has been a thirtyfold increase in bariatric cases in the last decade, the knowledge of bariatric surgeries is still not widely disseminated to all general surgeons

Obesity: NICE guideline

Bariatric surgery is a treatment option if ALL of the following criteria are fulfilled:

- BMI $\geq$ 40, or 35 $\leq$ BMI $<$40 with significant disease that could be improved by weight loss
- Failure to achieve or maintain adequate and clinically beneficial weight loss despite all appropriate non-surgical measures for at least 6 months
- The patient has been receiving or will receive intensive management in a specialist obesity service
- The patient is generally fit for anaesthesia and surgery
- The patient commits to long-term follow up
- Consider an expedited assessment for BMI of 30–34.9 who have recent onset type 2 diabetes
- Consider an assessment for people of Asian family origin with recent onset type 2 diabetes at a lower BMI than 30

Box 1

Please cite this article in press as: Tsai AY-C, Osborne A, Bariatric surgery, Surgery (2017), http://dx.doi.org/10.1016/j.mpsur.2017.09.002

and trainees. This article outlines the commonly practised bariatric procedures and discusses the latest theories and development.

Bariatric operations and techniques

The ideal bariatric operation would achieve and maintain 100% excess weight loss with zero complications; it would reverse all the comorbidities associated with the metabolic syndromes, be easy to follow up and financially cost-effective. Unfortunately, there is not yet a perfect operation; each technique has its advantages and disadvantages, which are described below.

Roux-en-Y gastric bypass

Roux-en-Y gastric bypass (RYGB) is the most commonly performed bariatric operation in the UK and USA. The Roux-en-Y type of gastrointestinal anastomosis was introduced in the 19th century by the Swiss surgeon, César Roux. Roux was the first Professor of External Pathology and Gynaecology at the University of Lausanne and was well recognized throughout Europe as a surgical innovator and educator. He published several articles on gastroenterostomy, which was mostly performed for gastric outlet obstruction at that time. The Y connection was published in 1897 but subsequently abandoned by surgeons due to high rate of marginal ulcers and mortality.[9] In 1950, Mason and colleagues modified the Roux procedure into the current anti-obesity gastric bypass based on the weight loss observed among patients undergoing partial stomach removal for ulcers with a horizontal transection of the proximal stomach as a pouch.[10] In 1994, Wittgrove reported the first five cases using a laparoscopic approach.[11] This was achieved through 5–6 small abdominal incisions with an induced pneumoperitoneum. Studies comparing clinical outcomes of open and laparoscopic procedures have shown that laparoscopic gastric bypass is associated with lower overall postoperative complications and mortality, shorter length of stay, and lower hospital costs.

The procedure consists of:

1) Creating a small gastric pouch of no more than 6 cm that is separated from the fundus. As the original horizontal loop gastric bypass was associated with the significant complication of pouch dilatation, major advances in technique were made using vertical stapling to construct a lesser curvature based pouch.
2) Reconstructing the GI tract in which the jejunum, between 15 and 100 cm from the ligament of Treitz, is divided and rearranged into a Y-configuration. The 'Roux limb' is the section from the gastrojejunostomy to jejunojejunostomy anastomosis, which enables the outflow of food from the gastric pouch into the jejunum, bypassing the duodenum (Figure 1). The gastrojejunostomy can be created by linear- or circular-stapling or hand-sewn techniques. When applying the circular stapling technique, the anvil of the stapler can be inserted transorally or transabdominally. The biliary limb is anastomosed to the alimentary limb to form the common channel where food mixes with the digestive enzymes. Lengthening of the Roux limb and biliary limb leads to shortening of the common limb. The biliary limb has been commonly kept short in the existing literature, leaving the length of the Roux limb open to more debate. However, recent animal models are focused on the biliary limb length. Old Studies in the early 1990s demonstrated an increase in excess body weight loss in patients with extended Roux limb of around 100–150 cm, comparing to 40 cm–75 cm.[12] A Roux limb of equal or greater than 150 cm or more is performed in superobese patients (BMI $>$ 50 kg/m^2) with limited evidence.[13] Metabolic complications and nutritional deficiency are likely to occur in patients with short common channels.

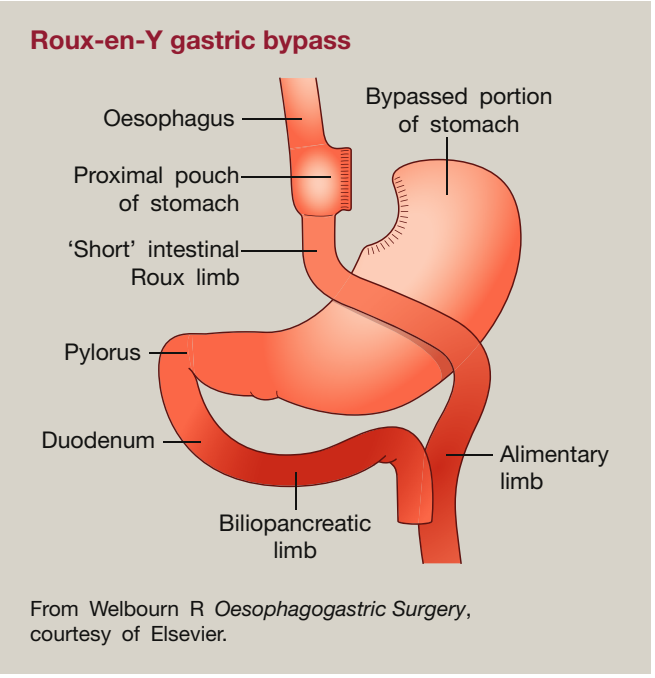

Figure 1

Early postoperative complications include anastomotic leak, gastrointestinal bleed from the staple line, deep vein thrombosis, pulmonary embolism, and respiratory failures. Late complications include bowel obstruction, internal hernia, stomal stenosis, marginal ulcer, and vitamin/micronutrient deficiencies.

Gastric banding

Belachew et al. first described the technique for laparoscopic adjustable gastric band (LAGB) in 1995. Since then, modified techniques and different types of gastric bands have been developed. The perigastric pathway was the traditional approach for tunnelling the band posteriorly. However, there was a tendency for the posterior wall of the stomach to prolapse through the band and therefore has been replaced by the pars flaccida approach. A retrospective multicentre study compared the two approaches with more than 1200 patients in each treatment group. This showed a significantly higher rate of gastric pouch dilatation, intragastric migration and conversion to laparotomy in the peri-gastric group.[14]

Five or six ports are used in the gastric band procedure including the site for the liver retractor. The dissection begins at the left crus where an opening is made. Dissection continues through the retrogastric tunnel towards the angle of His. The band is introduced through a large port and placed at the top of the stomach, above the lesser sac, including the fat and vagus

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