



Review Article

Bariatric Surgery for Severe Obesity

P K Biswas¹, I Mahmood²

Abstract

Obesity is a chronic, relapsing, debilitating, life-long disease. It is defined as a body mass index (BMI) of 30 kg/m² or more, affects 1.7 billion people world-wide. It is a complex, multifactorial chronic disease. Its medical treatment is not effective, and costly. Obesity is the harbinger of many diseases that affects many organ system of the body. Bariatric surgery is long lasting, cost-effective, and reduces co-morbidity efficiently. The procedures are, adjustable gastric banding, Roux-en-Y gastric bypass, biliopancreatic diversion with duodenal switch, and vertical banded gastroplasty, of which Roux-en-Y gastric bypass is the gold standard. Indications are BMI >40 kg/m² or BMI >35 kg/m² with co-morbidity. Life long follow-up is required for appropriate weight loss. Bariatric surgery should be considered as a main steam of surgical specialty and should be practiced in our context.

TAJ 2009; 22(2): 319-323

Introduction

Obesity is a chronic, relapsing, debilitating, lifelong disease, officially recognized by the World Health Organization (WHO) as a global pandemic¹. Evidence continues to accumulate that obesity is a major risk factor for many diseases and is associated with significant morbidity and mortality. Severe obesity is associated with harmful co-morbidity, including type 2 diabetes mellitus, hypertension, dyslipidaemia, obstructive sleep apnoea, polycystic ovarian syndrome, non-alcoholic steatohepatosis, asthma, back and lower limb degenerative problems, cancer and depression². These cause more than 2.5 million premature deaths per year world-wide³. Traditional approaches to weight loss including diet, exercise and medication achieve no more than 5-10% reduction in body weight, with high recidivism rates⁴. Bariatric surgery achieves sustained, long-term weight loss to at least 15 years⁵ and causes remarkable improvements in comorbidity⁶.

Definition

Obesity is defined as a BMI of 30 kg/m² or more. BMI (body mass index) is calculated by dividing a patient's mass (in kilograms) by his or her height (in meters, squared).

Bariatric surgery is the term derived from the Greek meaning 'the medicine and surgery of weight'.

Frequency

Obesity affects 1.7 billion people world-wide. The epidemic is worst in the US, where more than 30% of adults are obese⁶. The adult epidemic is paralleled by a childhood epidemic; because of this, it seems certain that the global prevalence will continue to rise for the foreseeable future.

Aetiology

Obesity is a complex, multifactorial chronic disease influenced by the interaction of several factors, such as genetic, endocrine, metabolic, social, cultural, behavioral, and psychological

¹ Assistant Professor, Department of Surgery, Rajshahi Medical College, Rajshahi

² Associate Professor, Department of Medicine, Rajshahi Medical College, Rajshahi

components. The main reasons appear to be a combination of less active life-styles and changes in eating patterns⁴.

Pathophysiology

Obesity occurs as a result of an imbalance between energy expenditure and caloric intake. These imbalance has been thought to be under genetic and environmental influence. The discovery of immunological abnormalities in obesity that are related to the leptin-proopiomelanocortin system and elevated tumor necrosis factor-alpha brought a new perceptiveness to the understanding of obesity⁷.

Presentation

Morbid obesity is the harbinger of many other diseases that affect essentially every organ system.

1. Cardiovascular (e.g. hypertension, atherosclerotic heart and peripheral vascular disease with myocardial infarction and cerebro-vascular accidents, peripheral venous insufficiency, thrombophlebitis, pulmonary embolism)
2. Respiratory (e.g. asthma, obstructive sleep apnea, obesity-hypoventilation syndrome)
3. Metabolic (e.g. type 2 diabetes, impaired glucose tolerance, hyperlipidemia)
4. Musculoskeletal (e.g. back strain, disc disease, weight bearing osteoarthritis of the hips, knees, ankles, and feet)
5. Gastrointestinal (e.g. cholelithiasis, gastroesophageal reflux disease, nonalcoholic fatty liver disease, hepatic cirrhosis, hepatic carcinoma, colorectal carcinoma)
6. Urologic (e.g. stress incontinence)
7. Endocrine and reproductive (e.g. polycystic ovary syndrome, increased risk of pregnancy and fetal abnormalities, male hypogonadism)
8. Cancer of the endometrium, breast, ovary, prostate, and pancreas
9. Dermatologic (e.g. intertriginous dermatitis)
10. Neurologic (e.g. pseudotumor cerebri, carpal tunnel syndrome)
11. Psychologic (e.g. depression, eating disorder, body image disturbance)⁷.

Aims of Bariatric Surgery

Bariatric surgery aims to reduce the excess mortality and morbidity of obesity. Percentage excess weight loss or BMI change is taken as the main measure of success using 25 kg/m^2 as the national ideal BMI, with success generally defined as $>50\%$ excess weight loss or $\text{BMI} < 35 \text{ kg/m}^2$.⁸ Reduced medication usage is a relatively quantitative end point and is taken to indicate improvement in co-morbid disease⁶.

Indications

Surgery for obesity should be considered as a treatment of last resort after dieting, exercise, psychotherapy, and drug treatments have failed. The generally accepted criteria for surgical treatment include a BMI of greater than 40 kg/m^2 or a BMI of greater than 35 kg/m^2 in combination with high-risk co-morbid conditions.

Contraindications

Contraindications to bariatric surgery include illnesses that greatly reduce life expectancy and are unlikely to be improved weight reduction, including cancer, end-stage renal, hepatic, or cardiopulmonary disease.

Patients who are unable to understand the nature of bariatric surgery or the behavioral change required afterward, including untreated schizophrenia, active substance abuse, and noncompliance with previous medical care, are also considered contraindications to bariatric surgery.

Investigations

Laboratory Studies

Complete blood count, a complete chemistry panel, liver function tests, renal function tests, thyroid function tests, a lipid profile, coagulation test, serum iron and total iron binding capacity, vitamin B-12, folic acid, blood typing, and urinalysis.

Imaging Studies

Chest radiography, Ultrasonography of the gallbladder.

Endoscopy

Upper GI endoscopy to rule out intrinsic upper gastrointestinal disease.

Treatment

Medical Therapy

A preoperative trial of weight loss is beneficial to ensure patient compliance with the postoperative diet protocol. Also, a preoperative liquid diet can shrink the liver, thus facilitating the surgical procedure.

Surgical Therapy

Types of Bariatric surgery include the following:

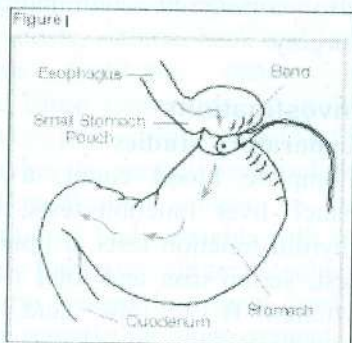
- Restrictive Procedures (e.g. adjustable gastric banding)
- Restrictive procedure with minimal malabsorption (e.g. Roux-en-Y gastric bypass, minigastric bypass)
- Malabsorptive procedure with some restriction (e.g., biliopancreatic diversion with duodenal switch)
- Other procedures (e.g. gastric stimulation, intragastric ballon and vertical banded gastroplasty).

Bariatric surgery can be performed by both an open and a laparoscopic technique. The laparoscopic technique has currently become the more popular approach⁶.

Adjustable gastric banding

Adjustable gastric banding is the most common Bariatric Procedure and is performed in Europe, Australia and US. It is a least-invasive operation with 50-60% excess weight loss over 5 years

but long-term results are unknown and the complication rate may be calculated. It appears accepted that even in the best centres there is a long-term failure rate of 20% or more from gastric



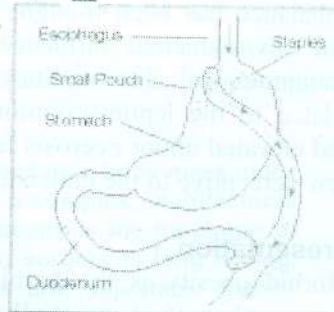
bands⁹. The operation can be performed laparoscopically, and is commonly referred to as a 'lap band'. In figure 1 diagram of an adjustable gastric banding has been shown.

Roux-en-Y gastric bypass

The most common form of gastric bypass surgery is Roux-en-Y gastric bypass. By sheer volume of cases combined with the volume of scientific research, the gastric bypass has become the 'gold standard'

for weight loss in the US. This operation can be reversed, though this is rarely required. Laparoscopic approach to roux-en-Y gastric bypass has been rapidly adopted since the landmark report In 1994 by Wittgrove et al¹⁰. The gastric bypass provides a substantial amount of dietary restriction. The restriction is created by the small stomach pouch, which gives the patient a feeling of satiety after eating a small meal. The optimal length of jejunal Roux limb is not known. Currently it is Roux-en-Y gastric bypass common practice for the roux limb lengths to be made 100 cm for BMI <50 kg/m² and 150 cm for BMI of 50 kg/m² or more¹¹. The procedure is shown in figure-2.

Figure 2

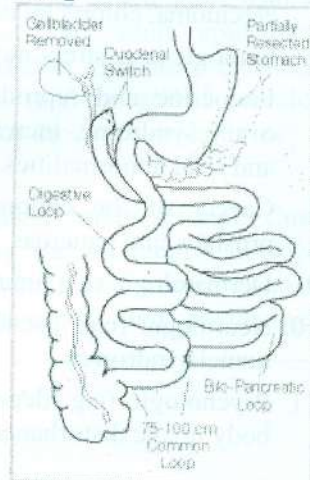


Biliopancreatic diversion with duodenal switch

The procedure includes the following

- Lateral 75% gastrectomy, resulting a tubular stomach
- Duodenum divided past the pyloric valve
- Ileum divided
- Distal end anastomosed to proximal duodenum

Figure 3



- Common channel created distally with Y-anastomosis
- Optional appendectomy and cholecystectomy

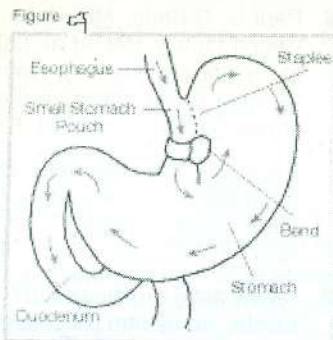
All procedure is shown in figure 3. This procedure has the best weight loss with least regain. The procedure is technically challenging and difficult to reverse.

Vertical Banded Gastroplasty

The stomach stapled vertically along the lesser curve up to the angle of His and the outlet is banded by a silastic ring to prevent enlargement¹².

These events are shown in figure 4.

Other operations like gastric stimulation, and intra-gastric balloon may be performed.



Effectiveness of surgery

Weight loss

In general, the malabsorptive procedures leads to more weight loss than the restrictive procedures. A meta-analysis from University of California, Los Angeles reports the following weight loss at 36 months¹³.

- Biliopancreatic diversion- 53 kg
- Roux-en-Y gastric bypass - 41 kg (open -42 kg, Laparoscopic -38 kg)
- Adjustable gastric banding - 35 kg
- Vertical banded gastroplasty -32 kg.

Reduced morbidity and mortality

Several recent studies report decrease in mortality and severity of medical conditions after bariatric surgery^{14,15,16}. Death rates were lower in the gastric bypass patients for all diseases combined, as well as diabetes, heart disease and cancer.

Adverse effects

Complications from weight loss surgery are frequent. A study of insurance claims of 2522 who had undergone bariatric surgery showed 21.9%

complications during the initial hospital stay and a total of 40% risk of complications in the subsequent six months. This was more common in those over 40 and lead to increased health care expenditure. Common problems were gastric dumping syndrome in about 20%, leaks at the surgical site 12%, incisional hernia 7%, infections 6% and pneumonia 4%. Mortality was 0.2%¹⁷.

Outcome and Prognosis

Care of the postoperative bariatric surgery patient is recommended for lifetime of the patient, with at least 3 follow-up visits with the bariatric surgery team within the first year. Laparoscopic adjustable gastric banding requires more frequent visits for band adjustment. Postoperative dietary changes (including vitamin, mineral, and possibly liquid protein supplementation), exercise, and lifestyle changes should be reinforced by counseling, support groups, and the patient's family physician.

Conclusions

The arguments in favour of Bariatric surgery due to its cost effectiveness, reduction in co-morbidity, improved quality of life and prolonged survival appear overwhelming. Thus, on a population level, there appears to be more risk for not operating¹⁸. Bariatric surgery should be considered a mainstream surgical speciality and there needs to be surgical training programmes put in place to meet the need¹⁹.

References

1. Friedrich MJ. Epidemic of obesity expands its spread to developing countries. *JAMA* 2002; 287: 1382-1386.
2. NIH Consensus Development Panel. Gastrointestinal Surgery for severe obesity. *Ann Intern Med* 1991;115:956-961.
3. Fontaine KR, Redden DT, Wang C, Westfall AO, Allison DB. Years of life lost due to obesity. *JAMA* 2003; 289: 187-193.
4. DeMeria EJ. Bariatric surgery for morbid obesity. *N Engl J Med* 2007; 356: 2176-2183.
5. Sjostrom L, Narbro K, Sjostrom D et al. Effects of bariatric surgery on mortality in Swedish obese subjects. *N Engl J Med* 2007; 357:741-752.

6. Buchwald H, Avidor Y, Braunwald e et al. Bariatric a systematic review and meta-analysis. JAMA 2004; 292: 1724-1737.
7. Saber AA, Jakson OJ. Bariatric Surgery. <http://emedicine.Medscape.Com/article/19701>. Updated:Apr 3. 2008.
8. MacLean LD, Rhode BM, Nohr CW,. Late outcome of isolated gastric bypass. Ann Surg 2000; 231: 524-528.
9. Angrisani L, Lorenzo M, Borrelli V. Laperoscopic adjustable gastric banding versus Roux-en-Y gastric bypass: %year results of a prospective randomized trial. SOARD 2007; 3: 127-133.
10. Wittgrove AC, Clark w, Tremblay LJ. Laperoscopic gastric bypass, Roux-en-Y: preliminary report of five cases. Obes Surg 1994; 4:353-357.
11. Brolin RE, Kenlar HA, Gorman JH Cody RP. Long limb gastric bypass in the super-obese: a prospective randomized study. Ann Surg 1992; 215: 387-395.
12. Meson EE, Doherty C, Cullen JJ, Scot D, Rodriguez EM, Mahe JW. Vertical gastroplasty: evaluation of vertical banded gastroplasty. World J Surg 1998; 22: 919-924.
13. Maggard MA, Shugarman LR, Suttorp M, et al. 2005. "Meta-analysis: surgical treatment of obesity(<http://www.annal.org/cgi/content/full/142/7/547>". Ann. Intern. Med. 142 (7):547-59.
14. Sjostrom L, Narbro K, Sjostrom CD, et al. (2007) "Effects of bariatric surgery on mortality in Swedish obese subjects". N Engl J Med. 357 (8):741- 52.
15. Adams TD, Gress RE, Smith SC, et al. (2007). " Long-term mortality after gastric bypass surgery". N Engl J Med. 357 (8): 753-61.
16. Paul E, O'Brien, MD; John B. Dixon, MBBS, PhD; Cheryl Laurie, RN, et al. (2006). "Treatment of mild to moderate obesity with laparoscopic gastric banding or an intensive medical program". Annals of Internal Medicine. 144: 625-43.
17. Encinosa WE, Bernard DM, Chen CC, Steiner CA.(2006). "healthcare utilization and outcomes after bariatric surgery", Medical Care 44 (8): 706-12.
18. <www.asbs.org/Newsite07/resources/asbms_items.htm.[Accessed 19 October 2007].
19. Buchwald H. Overview of bariatric surgery. J Am Coll surg. 2002; 194: 367-375.

All correspondence to:

P K Biswas

Assistant Professor

Department of Surgery

Rajshahi Medical College, Rajshahi.