Bariatric Surgery for Severe Obesity

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Abstract

Obesity is a chronic, relapsing, debilitating, lifelong disease. It is defined as a body mass index (BMI) of 30 kg/m² or more, affects 1.7 billion people worldwide. 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 systems 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 stream of surgical specialty and should be practiced in our context.

Introduction

Obesity is a chronic, relapsing, debilitating, lifelong disease, officially recognized by the World Health Organization (WHO) as a global pandemic. 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 steatohepatitis, asthma, back and lower limb degenerative problems, cancer and depression. These cause more than 2.5 million premature deaths per year worldwide. Traditional approaches to weight loss including diet, exercise and medication achieve no more than 5-10% reduction in body weight, with high recidivism rates. Bariatric surgery achieves sustained, long-term weight loss to at least 15 years and causes remarkable improvements in comorbidity.

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 worldwide. The epidemic is worst in the US, where more than 30% of adults are obese. 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

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

**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 perceptive to the understanding of obesity.

**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).

**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/m² as the national ideal BMI with success generally defined as >50% excess weight loss or BMI < 35 kg/m². Reduced medication usage is a relatively quantitative end point and is taken to indicate improvement in co-morbid disease.

**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/m² or a BMI of greater than 35 kg/m² 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 approach. 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 al. 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 more. The procedure is shown in figure-2.

Adjustable gastric banding
Adjustable gastric banding is the most common Bariatric Procedure and is performed in Europe, Australasia 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 bands. The procedure includes the following
- Lateral 75% gastrectomy, resulting in a tubular stomach
- Duodenum divided past the pyloric valve
- Ileum divided
- Distal end anastomosed to proximal duodenum
- Common channel created distally with Y-anastomosis
- Optional appendectomy and cholecystectomy

All procedures are 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 stumped vertically along the lesser curve up to the angle of His and the outlet is bordered by a silastic ring to prevent enlargement. 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 lead to more weight loss than the restrictive procedures. A meta-analysis from University of California, Los Angeles resurts the following weight loss at 36 months\(^4\):

- 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 operating\(^18\). Bariatric surgery should be considered a mainsteam surgical speciality and there needs to be surgical training programmes put in place to meet the need\(^19\).

**References**

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