

BARIATRIC SURGERY: CURE FOR MORBID OBESITY

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Abstract: Once considered simply a condition of caloric intake exceeding energy expenditure, obesity has come to be known as a complex disease influenced by the interaction of genetic, endocrine, metabolic, and environmental factors. Management of obesity includes life style changes with calorie restriction and vigorous exercise. All patients with morbid obesity do not respond to life style modifications and medical therapy. There is group of patients especially with morbid obesity who in addition to medical management need surgical intervention and bariatric surgery is the answer. Bariatric surgery is the most effective therapy available for the morbidly obese population. It markedly lowers body weight, reverses or ameliorates the myriad of obesity co morbidities, and improved quality of life. Four operative procedures are currently in general use worldwide. These surgical procedures can be divided in to Restrictive (Laparoscopic adjustable gastric banding; vertical banded gastroplasty), Malabsorptive (Biliopancreatic diversion and duodenal switch) and combined restrictive and malabsorptive (Roux en Y Gastric bypass). There is an ever-increasing effort to match a particular patient to a particular operation. In this review we will discuss various surgical procedures available for morbid obesity and their success rates.

INTRODUCTION

Obesity has become a health problem worldwide encompassing 1.7 billion people. According to World Watch Institute, the number of overweight people is approximately equal to the number of under weight people in the world. Prevalence of obesity is particularly high in many ethnic minority women, such as African, Mexican and Pacific Islander American women.

Obese patients are at increased risk of illness from coronary artery disease, hypertension, type II diabetes, respiratory insufficiency, venous stasis or thromboembolic disease, debilitating arthritis of weight bearing joints, depression, as well as from uterine, ovarian, colon, breast, and prostate carcinoma. Obesity, in particular morbid obesity, is also a social and economic problem. Practical social implications of morbid obesity are manifold, e.g., inability to ambulate, limited selection in clothing, stress incontinence, difficulty in personal hygiene and depression.

The impact of obesity on longevity has been well documented. In the world, over 2.5 million deaths annually can be attributed to obesity. There is direct relationship between increasing BMI and relative risk of dying prematurely as evidenced in the Nurses Health Study with a > 100% increase in relative risk as BMI increased from < 19 Kg/m² to > 32 kg/m². In the morbidly obese populations, average life expectancy is reduced by 9 years in women and 12 years in men. The financial burden of obesity is more the \$117 billion annually in the United States. Bariatric surgery is the most effective therapy available for the morbidly obese population. It markedly lowers body weight, reverses or ameliorates the myriad of obesity co morbidities, and improved quality of life.

DEFINITIONS AND RISK FACTORS

In 1998, the NIH established federal guidelines for identification, evaluation and treatment of overweight obese adults. Whereas being overweight is having a body mass index

(BMI) greater than 25 kg/m² Obesity is having a BMI greater than 35 kg/m². Severe obesity is having a BMI greater than 30 kg/m², and morbid obesity is having a BMI greater than 40 kg/m², or a BMI greater than 35 kg/m² with concomitant obesity related morbidity. (Figure)

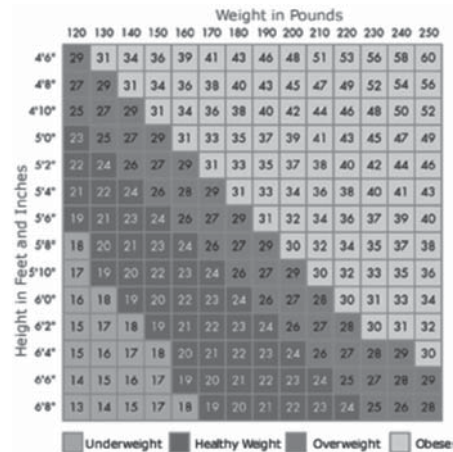


Fig.1 : Obesity evaluation

BMI is only one measurement technique of obesity and has limitation. Other techniques such as waist-to-hip ratio of 1.0 or higher in males and 0.8 or higher in females defines upper body obesity and in an independent predictor of disease risk. Obese patients have an increased risk of coronary artery disease. Complications related to obstructive sleep apnea are 12 to 30 fold higher in the morbidly obese than in the general population. Morbidly obese patients may experience 12-fold reduction in life expectancy in comparison with age-matched controlled subjects.

ETIOLOGY OF OBESITY

Once considered simply a condition of caloric intake exceeding energy expenditure, obesity has come to be known as a complex disease influenced by the interaction of genetic, endocrine, metabolic, and environmental factors. Mutations in human obesity gene and leptin receptor gene have been identified in obese family members.

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CONSEQUENCES OF MORBID OBESITY

Hypertension is the most common co-morbidity of obesity. The risk of coronary artery disease is higher in obese population. Obesity itself increases metabolic and mechanical load on the heart, predisposing the heart to left ventricular hypertrophy and congestive failure. Venous stasis disease cause significant chronic morbidity in obese patients. Obese patients have an increased incidence of IDDM. Obesity with NIDDM is susceptible to coronary artery disease, renal insufficiency, and cerebral vascular disease.

Adipose tissue acts as endocrine organ, converting 17- beta-hydroxysteroid to androstenedione and estradiol. The hormones lead to feminization in men and masculinization, polycystic ovarian disease, amenorrhoea and infertility in women. The incidence of obstructive sleep apnea is 12-30 folds higher in morbidly obese patients. Obese patients are also at higher risk for hypoventilation syndrome and restrictive lung disease.

A relative hyperandrogenism and elevated estrogen blood levels are hypothesized to be the reason for an increased risk towards the development of hormonally sensitive tumor (e.g., breast, ovary, endometrial, and prostate cancer) in obese patient.

NONOPERATIVE TREATMENT OF MORBID OBESITY

Nonoperative treatment includes *caloric restriction, exercise, behaviour modification, and drug therapy*. Weight lost on low caloric diets of approximately 800 calories per day is typically regained within 18 months to 4 years after initiation if weight loss program. Exercise programs without some type of caloric restrictions are generally ineffective beyond the loss of 6 to 10 pounds. Long-term success with behavior modification program is also lacking. Pharmacologic programs use appetite-suppressing medications, inhibition of lipase, and metabolic enhancers, though popular but are equally ineffective as a treatment for morbid obesity.

OPERATIVE TREATMENT FOR MORBID OBESITY

Bariatric surgery is the most effective therapy available for the morbidly obese population. It markedly lowers body weight, reverses or ameliorates the myriad of obesity co morbidities, and improves quality of life.

Patient selection

The 1991 NIH Consensus Conference weight criteria for bariatric surgery of a BMI > 40 kg/m² or a BMI of 35.0 kg/m² to 39.9 kg/m² in the presence of severe comorbidities are still reasonable today. High-risk comorbid conditions that can justify reducing the BMI to 35 kg/m² include type 2 diabetes, life-threatening cardiopulmonary problems (e.g. severe sleep apnea, Pickwickian syndrome, obesity-related cardiomyopathy), obesity-induced physical problems

interfering with a normal lifestyle (eg, joint disease treatable but for the obesity), and body size problems precluding or severely interfering with employment, family function, and ambulation. Certain data demonstrate that bariatric surgery can ameliorate obesity co-morbidities (e.g. type 2 diabetes) in patients with a BMI > 35 kg/m².

Four operative procedures are currently in general use worldwide. These surgical procedures can be divided in to *Restrictive* (Laparoscopic adjustable gastric banding; vertical banded gastroplasty) *Malabsorptive* (Biliopancreatic diversion and duodenal switch) and *combined restrictive and malabsorptive* (Roux en Y Gastric bypass). There is an ever-increasing effort to match a particular patient to a particular operation.

LAPAROSCOPIC ADJUSTABLE GASTRIC BANDING

Gastric banding is the least invasive of the purely restrictive bariatric surgery procedures. It consists of a small pouch and a small stoma created by a band high on the stomach. Laparoscopic adjustable gastric banding was first introduced in the early 1990s. Today, there are six adjustable bands available worldwide and one approved by the FDA (June 2001) for use in the United States. Laparoscopic adjustable gastric banding is the most common procedure performed outside of the United States, primarily in continental Europe, Australia, and South America. It is the second most commonly performed procedure worldwide.

Current techniques: (Fig.2) The upper gastric pouch is made very small (the “virtual pouch”), approximately 15 mL in volume, and placed primarily anteriorly. The dissection on the lesser curvature of the stomach includes the neurovascular bundle of the lesser omentum—the *pars flaccada* approach. Suture fixation of the anterior wall of the stomach, with at least four gastrogastic sutures, completely imbeds the anterior band. The system is assembled and the port for inflation and deflation of the band is secured onto the rectus fascia of the anterior abdominal wall. Adjustment of the band through the access port is an essential part of laparoscopic adjustable gastric banding therapy.

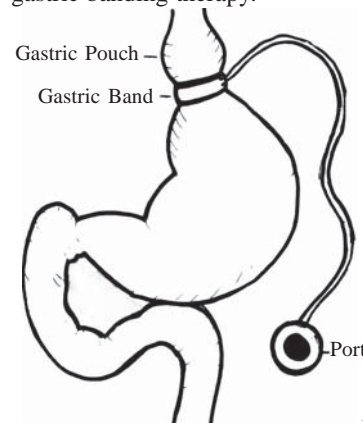


Figure 2: Gastric Banding

Weight loss: Weight loss after laparoscopic adjustable gastric banding is about 50% of the EBW and about 25% of the BMI at 2 years.

Operative mortality and morbidity: Operative (30-day) mortality for laparoscopic adjustable gastric banding when performed by skilled surgeons is about 0.1%. Operative morbidity is about 5%.

Longterm complications: There are unique longterm complications of laparoscopic adjustable gastric banding, which include gastric prolapse, stomal obstruction, esophageal and gastric pouch dilation, gastric erosion and necrosis, and access port problems. Experience has markedly reduced the incidence of these complications.

Reversal and revision: Laparoscopic adjustable gastric banding can be completely reversed with removal of the band, tubing, and port. For failed weight loss, revision procedures include removal of the device and performance of a restrictive-malabsorptive procedure (eg, gastric bypass) or a primarily malabsorptive procedure (eg, biliopancreatic diversion and duodenal switch).

GASTRIC BYPASS

It is a combined restrictive and malabsorptive procedure and is currently the most popular procedure performed in the United States and worldwide. The restrictive element of operation consists of the creation of a small gastric pouch with a small outlet. The intestine tract bypassed consists of the distal stomach, entire duodenum and 40 cm proximal jejunum. The Roux limbs vary from 75 cm – 150 cm.

Current Techniques: (Fig.3) RYGB can be performed by either open or laparoscopic techniques. The upper pouch (15-25 ml) is constructed horizontally with distal stomach separated from this pouch by four rows of staples of totally divided from the upper gastric pouch. Gastrojejunostomy can be performed with the end-to-end circular stapler, linear stapler or hand sewn.

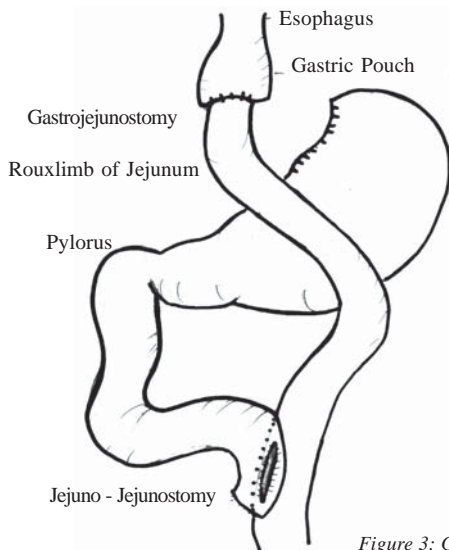


Figure 3: Gastric Bypass

Weight loss: Weight loss after a standard 75 cm Roux gastric bypass usually exceeds 100 lb, or about 65% to 70% of the excess body weight (EBW) and about 35% of the BMI.

Operative mortality and morbidity: Operative (30-day) mortality for gastric bypass when performed by skilled surgeons is about 0.5%. Operative morbidity (eg, pulmonary emboli, anastomotic leak, bleeding, wound infection) is about 5%.

Longterm complications: Gastric bypass can be associated with the dumping syndrome, stomal stenosis, marginal ulcers, staple line disruption, and internal hernias. Life-long oral or IM vitamin B12 supplementation, and iron, vitamin B, folate, and calcium supplementation is recommended to avoid specific nutrient deficiency conditions, such as anemia.

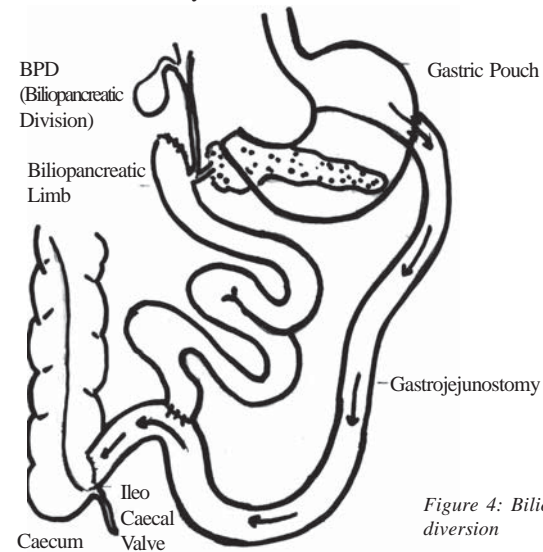


Figure 4: Biliopancreatic diversion

BILIOPANCREATIC DIVERSION AND DUODENAL SWITCH

Biliopancreatic diversion and duodenal switch are primarily malabsorptive procedures. The biliopancreatic diversion originated in Genoa, Italy and is widely used in Europe and sparingly in the United States. Both procedures involve a partial gastrectomy leaving a gastric pouch of 100 to 150 mL, which is considerably larger than that of gastric bypass or the restrictive procedures and, thereby, allows larger meals in comparison with those of the other bariatric operations. Both procedures avoid leaving a nonfunctioning intestinal segment by dividing the intestine into a long enteric limb joining a long biliopancreatic limb to form a common channel 50 to 150 cm from the ileocecal valve. This modification avoids the toxic problems seen with the old jejunoileal bypass procedure

WEIGHT LOSS

Weight loss after biliopancreatic diversion and duodenal switch is about 70% of the EBW and about 35% of the BMI. Weight loss with these procedures is at the upper end of the

efficacy range. Weight loss may be sustained without a rise from the weight nadir.

OPERATIVE MORTALITY AND MORBIDITY

Operative mortality for biliopancreatic diversion and duodenal switch when performed by skilled surgeons is about 1%. Operative morbidity is about 5%.

LONGTERM COMPLICATIONS

On occasion, these procedures are associated with diarrhea. Some patients report malodorous stools and flatus. Long-range complications can consist of vitamin, mineral, and nutrient deficiencies, in particular, protein deficiency. These contingencies need to be anticipated and properly managed by dietary supplements with about 75 to 80 g of dietary protein and B vitamins, calcium, and iron. Biliopancreatic diversion may be associated with postoperative dumping; the duodenal switch is not.

PREOPERATIVE CARE

The bariatric surgery patient needs to be well-informed, motivated, willing to participate in longterm care, change dietary patterns, and embrace a revised lifestyle. The bariatric patient is best evaluated and subsequently cared for by a team approach involving the surgeon, a nurse practitioner or nurse, a dedicated dietician, office personnel (scheduling and triage), and other specialists when needed. Availability of a support group is recommended, as is distribution of literature describing procedures, postoperative diets, exercise, and so forth. Availability of a full spectrum of expert consultants (eg, cardiologists, pulmonologists, psychiatrists and psychologists) is mandatory.

PERIOPERATIVE CARE

Expert anesthesiology support, knowledgeable in the specific problems of the bariatric patient, is necessary. The anesthesiology support includes an understanding of patient positioning, blood volume and cardiac output changes, airway maintenance, and drug pharmacokinetics in the morbidly obese. It is advisable to have preoperative, intraoperative, and

postoperative written protocols. The bariatric surgeon must be able to manage, and have coverage to manage, the postoperative patient and any problems and complications that may occur. A facility that practices bariatric surgery must be equipped with appropriate operating room equipment, including operating tables that can handle large patients; bariatric instruments, including large retractors, special staplers, long laparoscopic instruments; special equipment to transfer the patient; extra-large beds, commodes, chairs, and wheelchairs; and diagnostic facilities and equipment that can accommodate the morbidly obese patient.

POSTOPERATIVE CARE

Care of the postoperative bariatric surgery patient is recommended for the lifetime of the patient with at least three followup visits with the bariatric surgery team within the first year. Laparoscopic adjustable gastric banding will require more frequent visits for band adjustment. Postoperative dietary (including vitamin, mineral, and possibly liquid protein supplementation), exercise, and lifestyle changes should be reinforced by counseling, support groups, and working with the family physician. Favorable outcomes of bariatric surgery can lead to socioeconomic advancement, which may require patient guidance. Postoperative care may include planning for reconstructive operations after weight stabilization for certain patients.

CONCLUSION

Bariatric surgery, involving either open or laparoscopic techniques, is the most effective weight loss therapy available for patients with morbid obesity. Bariatric surgery results in marked and long-lasting weight loss and elimination or improvement of most obesity-related medical complications.

RECOMENDED READING

1. *Bussen DH. Update on obesity. J Clin Endocrinol Met 2008; 248: review*
2. *Cunneen. Review of meta analysis of comparison of bariatric surgery with a focus on laparoscopic adjustable gastric banding. Sur Obstet Realt Dis 2008; 4(3 supplement) S47-55.*
3. *Khalileh A, Malot I, Schwirger C et al. Laparoscopic Roux-en-Y gastric bypass for treatment of morbid obesity; experience with 50 patients. Isr Med Assoc J 2008; 10(50):350-5.*
4. *Gonzalez-Sanchez JA et al. Bariatric surgery patients: reasons to visit emergency department after surgery. Bol Asoc Med P R. 2007 Oct-Dec;99(4):279-83.*
5. *Hutter MM et al. Laparoscopic versus open gastric bypass for morbid obesity: a multicenter, prospective, risk-adjusted analysis from the National Surgical Quality Improvement Program. Ann Surg. 2006 May;243(5):657-62; discussion*

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