

BARIATRIC SURGERY

INTRODUCTION

Obesity has become an enormous nationwide health problem. During the past 20 years, there has been a dramatic increase in the numbers of Americans who are obese. It is currently estimated that among adults aged 20-74 years, approximately 32.9% of this population is obese,¹ the incidence of obesity in children has risen by a factor of more than 3,² and approximately 4.8% of Americans are morbidly obese. It's most common in minorities, low-income groups, and women. Given the range of health problems associated with obesity (e.g., type II diabetes, hypertension, stroke, some cancers, etc.), it is clear that obesity is a huge health care challenge for the country. Unfortunately, many of the traditional approaches to treating obesity such as behavioral modification or diet counseling appear to be ineffective³, and for many obese or morbidly obese people, bariatric surgery is the only effective treatment option.⁴

Obesity: Definition, Diagnosis, Pathogenesis, and Complications

Obesity is defined as excess fat tissue, but it is more commonly defined by using the body mass index (BMI). The BMI is a formula that is used to indirectly calculate body fat:

$$\text{Weight(lb)/[height(in)]}^2 \times 703$$

Thus, weight in pounds is divided by height in inches squared and multiplied by 703. People with a BMI under 18.5 are considered underweight, while those with a BMI > 30 are considered obese. People with a BMI > 40 are considered morbidly obese. The formula is fairly accurate for adults, although its accuracy can vary according to age, sex, and race.⁵

The causes of obesity are not clearly understood, although the basis for the disease is an excess of caloric intake in relation to caloric expenditure. This may be due to excess caloric intake, inefficient utilization of calories, decreased energy expenditure, reduced physical and/or metabolic activity, an abnormally high set point for body weight, and other causes.⁶ However, although these are some of the causes of obesity, these do not explain why they occur – why obesity happens – and that is a much more complex issue. It is thought that obesity has both genetic and environmental causes. Research has shown that genetic factors account for approximately 50 to 70% of weight variation.⁷ Children of parents of normal weight have an approximately 10% chance of becoming obese, while children of obese parents have an approximately 80 to 90% of becoming obese, and humans as a species are strongly influenced by the need for promoting energy intake and protecting against weight loss. However, the sudden, rapid rise in the rate of obesity cannot be explained by a sudden, dramatic change in the gene pool. Societal changes have made access to energy sources easier than ever and the need for physical activity less and less important. Changes in eating habits – the popularity of fast food, increased

portion sizes, the preference for energy dense foods – have also contributed to the increase in obesity.⁸

Complications of obesity are numerous and serious:⁹

- Coronary heart disease: It had been thought that obesity and coronary heart disease were linked because of the effect of obesity on risk factors such as hypertension and dyslipidemia. However, it is now known that obesity itself is a separate risk factor for developing coronary heart disease. In the Nurse's Health Study, it was found that the risk of death from cardiovascular disease was four times higher for obese women than lean women.¹⁰
- Type II diabetes. More than 80% of individuals with type II diabetes are obese, and the Nurse's Health Study found that having BMI > 31 increased the risk of developing type II diabetes by 40 fold. The cause is most likely insulin resistance.
- Hypertension: Approximately 33% of all cases of hypertension in the United States are related to obesity.¹¹ Increased cardiac output, reduced venous compliance, and renal sodium retention may be the causes.
- Stroke: Evidence has shown that obesity increases the incidence of stroke, and in some studies, this has been independent of the presence of other risk factors for stroke.¹²
- Dyslipidemia: Lower high density lipoprotein levels and higher triglyceride levels are related to higher BMIs.¹³
- Altered pulmonary function: Obesity causes a decrease in lung compliance, a change in respiratory control, and increases the incidence of respiratory disease.¹⁴
- Other comorbidities: Obesity is associated with increases in degenerative joint disease, sleep apnea, gout, gallstones, deep vein thrombosis, hormone-dependent cancers such as breast and prostate cancer, asthma, depression, and impairment in immunity.^{15,16}

Bariatric Surgery: The Basics

The traditional treatment for obesity has been a prescription for increased physical activity, changes in diet, and behavior modification. Unfortunately, this approach has a high rate of failure.¹⁷ To date, the only effective therapy for people with morbid obesity and people who are obese and have comorbidities is bariatric surgery. The goal of bariatric surgery is to improve health through long-term reduction of intake or absorption of calories, and possible modification of eating behavior by encouraging intake of small portions.

Bariatric surgery (the word bariatrics means the study and treatment of obesity) was first performed in 1954 by the technique of jejunoileal bypass, connecting the proximal small bowel to the distal small bowel, but this technique had significant complications¹⁸ Gastric bypass was first performed in 1967, and this technique is still in use today. Bariatric surgery is becoming more popular: 140,000 cases were performed in the United States in 2004.¹⁹ Bariatric surgery appears to be effective²⁰ and many experts feel it is the only effective therapeutic choice for some people with obesity, but its relative effectiveness compared to medical treatment has still not been completely determined.²¹ However, the people who undergo bariatric surgery consistently experience an

improvement in the comorbid conditions of diabetes, sleep apnea, hypertension, and hyperlipidemia.²² And it has clearly been established that bariatric surgery results in significant weight loss (up to 67% in some cases) and that over a 10 year period, the patients maintain this weight loss. Traditionally, it has been recommended in patients with a BMI > 40, or in people with a BMI > 35 who have coexisting illnesses,²³ but given the documented improvement in comorbidities after bariatric surgery, it has been suggested that these guidelines be changed.²⁴ Patients must have attempted weight loss in the past using the traditional methods of diet, exercise, behavior therapy, and drugs. If the patient is unable or unwilling to comply with the required postoperative life style changes, has a substance abuse problem, or unstable mental illness, bariatric surgery is contraindicated

As mentioned previously, the basic technique/therapeutic goal of bariatric surgery is to reduce caloric intake by modifying the anatomy of the gastrointestinal tract, and there are two surgical approaches to this.

Restrictive

Restrictive procedures change caloric intake by decreasing the size of the gastric reservoir and narrowing the outlet to delay emptying.²⁵ There are several methods of restrictive bariatric surgery:

- **Gastric stapling:** This is also known as gastroplasty, or vertical banded gastroplasty, or stomach stapling. It can be done surgically or laparoscopically. In this procedure, the stomach is altered to create a 20-50 ml pouch, and the stomach outlet is altered. The efficacy of this technique has come into question in recent years, and this technique has become less popular in recent years.²⁶ Results of long-term follow up have been shown this technique to be inferior to Roux-en-Y. Many patients require revisions, and the technique has a greater rate of complications than other bariatric surgical techniques. It is technically easier to perform than Roux-en-Y, and the incidence of comorbidities is greatly reduced.
- **Laparoscopic adjustable gastric band:** In this procedure, a silicone band/cuff is placed around the gastric cardia, creating a 15 ml pouch that limits the amount of food that can be consumed. A reservoir is attached to the silicone band. It is accessed percutaneously and saline can be added or taken away from the cuff to change the amount of the restriction.²⁷ This technique is relatively simple to perform laparoscopically, the mortality rate is low, and it can be done on an outpatient basis. It is also the only bariatric procedure that is reversible. However, intermediate and long-term complications can be serious, it is inferior to the other techniques in terms of producing long lasting weight reduction, and it is less effective at reducing comorbidities.
- **Roux-en-Y gastric bypass:** This technique is both restrictive and malabsorptive, and many clinicians consider this to be the most effective technique of bariatric surgery.²⁸ It can be done surgically or laparoscopically. In this procedure, a small (30 ml or less) gastric pouch with a small (<1 cm) stoma is created at the proximal part of the stomach. The small intestine is then divided at the mid-jejunum and the distal portion – the Roux limb – is anastomosed to the gastric pouch. The distal

portion of the stomach and the proximal small intestine are anastomosed. Food will only come in contact with the gastrointestinal tract below this juncture, limiting absorption. It is probably the most effective technique for obtaining long-term weight loss, and it not only reduces the incidence of type II diabetes, but it reduces mortality from type II diabetes. The primary complication of the Roux-en-Y procedure is the dumping syndrome. The dumping syndrome is characterized by rapid emptying of hyperosmolar boluses into the small bowel, and patients experience nausea, vomiting, diarrhea, and abdominal pain. It is caused by ingestion of meals that are high in sugar or fat.

Malabsorptive

Malabsorptive techniques of bariatric surgery prevent the mixing of food with the pancreatic and hepatic digestive enzymes until they are relatively far down the digestive tract.²⁹ The result is that fatty foods are poorly digested.

- **Duodenal switch:** This technique is most often used for patients that are morbidly obese. It primarily malabsorptive, but there is a degree of restriction. This procedure is often carried out in conjunction with biliopancreatic diversion (BPD). The first portion of the duodenum is transected, and there is a resection of the greater curvature of the stomach. The result is a gastric sleeve with an intact antrum and pylorus. The proximal ileum is divided 250 cm from the ileocecal junction, and the biliopancreatic limb is anastomosed to the distal ileum. A duodenoileostomy is made by bring the Roux limb to the gastric sleeve.³⁰ The duodenal switch reduces stoma complications, does not cause dumping, and is excellent at producing long-term weight loss. The risks are micronutrient deficiencies and malnutrition. Intake of protein, calcium, and iron can be especially affected.

Complications of Bariatric Surgery

Although they are very safe, all of the bariatric surgical procedures do involve significant changes to the anatomy and physiology of the gastrointestinal tract and significant changes in eating patterns. The mortality rate from bariatric surgery is variable, but relatively low. The mortality rate combined for all procedures is 0.1% with the duodenal switch having the highest rate – 1.1% - of complications.³¹ Patients who are over the age of 60, who are male, or who have cardiac disease, hypertension, or pulmonary disease are especially at risk.

Complications (some short-term, some long-term) can be seen and they are, to some degree, unique to each procedure. The patient who has had bariatric surgery can develop many of the common postoperative complications, and they are at a greater risk for some, e.g., pulmonary embolism. Gastrointestinal complications include:³²

- Abdominal pain: This can be caused by rapid food consumption, incisional pain, herniation, the dumping syndrome, renal stones, musculoskeletal strains, and diverticulitis.
- Gallbladder disease: A significant number (10 to 40%) of patients will develop gallstones in the first year after surgery. Ursodiol has been used successfully to decrease the incidence of gallstones after bariatric surgery. Some surgeons routinely remove the gallbladder during bariatric surgery, but most do not.
- Gastrointestinal reflux disease: The incidence of this can increase after bariatric surgery.
- Intestinal obstruction: This complication is more likely to occur after duodenal switch or Roux-en-Y procedures. Intestinal hernia is the most common cause of bowel obstruction, it can occur years after the operation, and there is potential for developing a closed loop obstruction, which can be particularly dangerous.
- Anastomotic leaks: These usually occur early after the procedure, but they can be a late complication.
- Gastric slippage: In patients who have had gastric banding, the stomach may prolapse through the band, causing an obstruction.
- Erosion: Erosion of the gastric band through the gastric wall into the stomach lumen can occur.
- Anastomotic strictures: Stricture can result from inflammation, ulceration, swelling, or ischemia. The patients first cannot tolerate solid food, then liquid food can't be consumed, and they experience frequent, progressive vomiting. If uncorrected, dehydration and protein, calorie, and vitamin deficiency are possible.
- Ulcers: These can occur at the anastomosis or in the gastric antrum or duodenum, and they are more common in the first few months after the operation.
- Nutritional disorders: Bariatric surgery drastically changes the gastrointestinal tract and this affects the absorption of nutrients. This risk is decreased with the restrictive procedures, although inadequate intake and frequent vomiting can lead to nutrient loss. Iron deficiency is the most common nutritional problem following bariatric surgery. In the immediate postoperative period it occurs due to blood loss. Later, it occurs due to inadequate intake and malabsorption caused by the bypassing of the stomach and duodenum. Protein deficiency can also occur. Intake after bariatric surgery is very limited, making it difficult to obtain adequate amounts of protein. Thiamine deficiency with Wernicke encephalopathy is rare, but it has been reported as a long-term complication of bariatric surgery. Patients who have had a Roux-en-Y or duodenal switch procedure are particularly susceptible to calcium and vitamin D deficiencies, and osteomalacia, osteoporosis, and secondary hypoparathyroidism are possible. Folate and vitamin B₁₂ deficiencies may be seen with patients that have had the Roux-en-Y procedure: the section of the small intestine that is bypassed in this procedure is the primary site for absorption of these nutrients.

After the Surgery

The postoperative time for the patient who has had bariatric surgery is complex. There are physical, psychological, and nutritional issues to cope with.

Psychological Issues

Bariatric surgery is for most people, a very emotional experience. The patient frequently has significant psychological distress associated with his/her weight, and is eager for the changes the surgery will bring. Unfortunately, many patients have unrealistic expectations about what bariatric surgery can achieve, and what their diet and lifestyle will be like after the operation.³³

Significant psychiatric issues are common in people who seek bariatric surgery.³⁴ Mood and anxiety disorders are often present, with depression being the most common. These patients often have body image problems and they may be binge eaters. Unfortunately, although self-esteem, depressive symptoms, and quality of life issues dramatically improve in the first few years after surgery, these changes are often not lasting.^{35,36} As well, the excess skin folds that occur after bariatric surgery can cause a negative self image.

Another problem that is common after bariatric surgery is the development of maladaptive eating patterns. Whether or not patients who have a greater degree of psychological dysfunction preoperatively will develop maladaptive eating patterns postoperatively is unclear. A return to binge eating can happen, but the exact incidence of this problem is unknown: follow-ups that have examined this issue have only focused on the first six months after surgery.³⁷ Emotional and stress-related eating also occur. Patients will overeat in response to loneliness, depression, anxiety, and disappointment, and the choice of foods is often high calorie foods with high sugar or fat content. Anorexia, although uncommon among patients who have had bariatric surgery, is also possible.

Nutritional Issues

The patient who has had bariatric surgery will experience significant and drastic changes in their diet and eating behavior, and these changes start immediately after the operation. These changes can be difficult and most cases of failure of bariatric surgery are due to non-compliance.

The diet immediately after bariatric surgery should at first consist of water, ice chips, and clear, unsweetened liquids, and these amounts should be 1 ounce or less. Carbonated, caffeinated drinks, and drinks that have a high sugar content should be avoided. Within a day or so after surgery, the patient can be advanced to a full liquid diet. At about 2 to 3 weeks postoperatively, the patient can start to eat pureed or soft foods. Servings should be small: 1 ounce to start, advancing to no more than 4 ounces.

And not only will the types of food and the amounts be new and restrictive, the patient must learn new ways of eating and must learn what they can and can't eat. Patients must reduce food volume, chew their food thoroughly, and slow their pace of eating. If these steps are not followed, the patient may experience outlet obstruction, abdominal discomfort, and vomiting. Fluids should not be taken with meals. They should be taken 30 minutes prior to eating to avoid pouch filling, vomiting, or early satiety. Foods with high sugar content and high fat content should be avoided to maintain weight loss. Red meat and poultry may not be well tolerated. Protein-rich foods should constitute the

majority of the patient's intake, and these should be eaten before foods containing fats and carbohydrates. There must be a concentrated effort to consume adequate amounts of B₁₂, vitamin C, calcium, thiamine, and iron: a daily chewable multivitamin tablet is recommended.^{38,39}

Plastic Surgery After Bariatric Surgery

Hanging skin and hanging rolls of fat are problematic after bariatric surgery. The upper neck, anterior arms, breasts, low back, flans, mons pubis, and the thighs are the most common problem areas. These are obviously unsightly, and they can also cause ulcerations, rashes, dermatitis and wounds. The skin excess and loss of skin elasticity in these patients is so great that minimally invasive procedures can't be used, so plastic surgery – body contouring – must be used. Plastic surgery can help, but it must be deferred until the patient's weight is stable for 3 months,⁴⁰ and the nutritional status and protein intake must be optimal. Patients must be carefully informed of the risks and the realistic outcomes of plastic surgery/body contouring. Some patients have the mistaken belief that the surgery will change their body shape completely. They must be told that body contouring can remove excess fat and skin folds, but it frequently leaves large, visible scars, skin irregularities, and deformities. The procedure also has specific risks such hematoma, seroma, prolonged edema, and minor wound dehiscence.⁴¹ Also, multiple procedures are often necessary. The physician should spend time with the patient to learn the patient's expectations, and should be aware that approximately 40% of patients who have bariatric surgery are receiving psychiatric therapy.⁴²

REFERENCES

1. Overweight and obesity. www.cdc.gov. Accessed February 19, 2008.
2. Bray GA. The missing link – Lose weight, live longer. *New England Journal of Medicine*. 2007;357:818-820.
3. Matarasso A, Roslin MS, Kurian M. Bariatric surgery: An overview of obesity surgery. *Plastic and Reconstructive Surgery*. 2007;119:1357-1362.
4. Kendrick ML, Dakin GF. Surgical approaches to obesity. *Mayo Clinic Proceedings*. 2006;81:S18-S24.
5. Overweight and obesity. www.cdc.gov. Accessed February 19, 2008.
6. Schauer PR, Schirmer BD. The Surgical Management of Obesity. *Schwartz's Principles of Surgery Online*. Accessed February 20, 2008.
7. Conway B, Rene A. Obesity as a disease: No lightweight matter. *Obesity Reviews*. 2004;5:145-151.
8. DeMaria EJ. Bariatric surgery for the morbidly obese. *New England Journal of Medicine*. 2007;356:2176-2183.
9. Rippe JM, Crossley S, Ringer R. Obesity as a chronic disease: Modern medical and lifestyle management. *Journal of the American Dietetic Association*. 1998;10:S9-S15.
10. Manson JE, Willet WC, Stampfer MJ, et al. Body weight and mortality among women. *New England Journal of Medicine*. 1995;333:677-685.
11. Rexrode KM, Manson JE, Hennekens CH. Obesity and cardiovascular disease. *Current Opinions in Cardiology*. 1996;11:490-495.
12. Sacco RL, Adams R, Albers G, et al. Guidelines for the prevention of stroke in patients with ischemic stroke or transient ischemic attack. *Stroke*. 2006;37:577-617.
13. Rippe JM, Crossley S, Ringer R. Obesity as a chronic disease: Modern medical and lifestyle management. *Journal of the American Dietetic Association*. 1998;10:S9-S15.
14. Conway B, Rene A. Obesity as a disease: No lightweight matter. *Obesity Reviews*. 2004;5:145-151.
15. Rippe JM, Crossley S, Ringer R. Obesity as a chronic disease: Modern medical and lifestyle management. *Journal of the American Dietetic Association*. 1998;10:S9-S15.
16. Conway B, Rene A. Obesity as a disease: No lightweight matter. *Obesity Reviews*. 2004;5:145-151.
17. Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: A systematic review and meta-analysis. *Journal of the American Medical Association*. 2004;292:1724-1737.
18. Maggard M, Shugarman L, Suttorp M, et al. Meta-analysis: Surgical treatment of obesity. *Annals of Internal Medicine*. 2005;142:547-559.
19. Maggard M, Shugarman L, Suttorp M, et al. Meta-analysis: Surgical treatment of obesity. *Annals of Internal Medicine*. 2005;142:547-559.
20. Sjostrom L, Lindroos AK, Peltonen M, et al. Lifestyle, diabetes, and cardiovascular risk factors 10 years after bariatric surgery. *New England Journal of Medicine*. 2004;351:2683-2693.
21. Colquitt J, Clegg A, Loveman E, Royle P, Sidhu MK. Surgery for morbid obesity. *Cochrane Database System Review*. 2005;4:CD003461-CD003641.
22. Buchwald H, Avidor Y, Braunwald E, et al. Bariatric surgery: A systematic review and meta-analysis. *Journal of the American Medical Association*. 2004;292:1724-1737.
23. Consensus Development Conference Panel. NIH conference: Gastrointestinal surgery for severe obesity. *Annals of Internal Medicine*. 1991;115:956-961.

24. Bray GA. The missing link – Lose weight, live longer. *New England Journal of Medicine*. 2007;357:818-820.
25. DeMaria EJ. Bariatric surgery for the morbidly obese. *New England Journal of Medicine*. 2007;356:2176-2183.
26. Kendrick ML, Dakin GF. Surgical approaches to obesity. *Mayo Clinic Proceedings*. 2006;81:S18-S24.
27. Kendrick ML, Dakin GF. Surgical approaches to obesity. *Mayo Clinic Proceedings*. 2006;81:S18-S24.
28. DeMaria EJ. Bariatric surgery for the morbidly obese. *New England Journal of Medicine*. 2007;356:2176-2183.
29. Matarasso A, Roslin MS, Kurian M. Bariatric surgery: An overview of obesity surgery. *Plastic and Reconstructive Surgery*. 2007;119:1357-1362.
30. Kendrick ML, Dakin GF. Surgical approaches to obesity. *Mayo Clinic Proceedings*. 2006;81:S18-S24.
31. DeMaria EJ. Bariatric surgery for the morbidly obese. *New England Journal of Medicine*. 2007;356:2176-2183.
32. Elder KA, Wolfe BM. Bariatric surgery: A review of procedures and outcomes. *Gastroenterology*. 2007;132:2253-2271.
33. Bauchowitz A, Azarbad L, Day K, Gonder-Frederick. Evaluation of expectations and knowledge in bariatric surgery patients. *Surgery for Obesity and Related Diseases*. 2007;3:554-558.
34. Sarwer DB, Fabricatore AN. Psychiatric considerations of the massive weight loss patient. *Clinics in Plastic Surgery*. 2008;35:1-10.
35. Elder KA, Wolfe BM. Bariatric surgery: A review of procedures and outcomes. *Gastroenterology*. 2007;132:2253-2271.
36. Burgmer R, Petersen I, Burgmer M, de Zwaan M, Wolf AM, Herpetz S. Psychological outcome two years after restrictive bariatric surgery. *Obesity Surgery*. 2007;17:785-791.
37. Rusch MD, Andris D. Maladaptive eating patterns after weight-loss surgery. *Nutrition in Clinical Practice*. 2007;22:41-49.
38. Parkes E. Nutritional management of patients after bariatric surgery. *American Journal of Medical Sciences*. 2006;331:207-213
39. Tucker ON, Szomstein S, Rosenthal RJ. Nutritional consequences of weight loss surgery. *Medical Clinics of North America*. 2007;91:499-514.
40. Matarasso A, Roslin MS, Kurian M. Bariatric surgery: An overview of obesity surgery. *Plastic and Reconstructive Surgery*. 2007;119:1357-1362.
41. Borud LJ, Warren AG. Body contouring in the postbariatric surgery patient. *Journal of the American College of Surgeons*. 2006;203:82-93.
42. Sarwer DB, Fabricatore AN. Psychiatric considerations of the massive weight loss patient. *Clinics in Plastic Surgery*. 2008;35:1-10.

The information presented in this course is intended solely for the use of healthcare professionals taking this course, for credit, from NurseCe4Less.com.

The information is designed to assist healthcare professionals, including nurses, in addressing issues associated with healthcare.

The information provided in this course is general in nature, and is not designed to address any specific situation. This publication in no way absolves facilities of their responsibility for the appropriate orientation of healthcare professionals.

Hospitals or other organizations using this publication as a part of their own orientation processes should review the contents of this publication to ensure accuracy and compliance before using this publication.

Hospitals and facilities that use this publication agree to defend and indemnify, and shall hold NurseCe4Less.com, including its parent(s), subsidiaries, affiliates, officers/directors, and employees from liability resulting from the use of this publication.

The contents of this publication may not be reproduced without written permission from NurseCe4Less.com.