

# Bariatric Surgery for Severe Obesity

U.S. Department of Health  
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NATIONAL INSTITUTES OF HEALTH

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DIABETES AND DIGESTIVE  
AND KIDNEY DISEASES

## WIN *Weight-control Information Network*

Severe obesity is a chronic condition that is difficult to treat through diet and exercise alone. Bariatric surgery is an option for people who are severely obese and cannot lose weight by traditional means or who suffer from serious obesity-related health problems. The operation promotes weight loss and reduces the risk of type 2 diabetes by restricting food intake and, in some operations, interrupting the digestive process to prevent the absorption of some calories and nutrients. Recent studies suggest that bariatric surgery may even have a favorable impact on mortality (death) rates in severely obese patients. The best results are achieved when bariatric surgery is followed with healthy eating behaviors and regular physical activity.

### The Normal Digestive Process

Normally, as food moves along the digestive tract, digestive juices and enzymes digest and absorb calories and nutrients. After we chew and swallow our food, it moves down the esophagus to the stomach, where a strong acid continues the digestive process. The stomach can hold about 3 pints of food at one time. When the stomach contents move to the duodenum, the first segment of the small intestine, bile and pancreatic juice speed up digestion. Most of the iron and calcium in the food we eat is absorbed in the duodenum. The jejunum and ileum, the remaining two segments of the nearly 20 feet of small intestine, complete the absorption of almost all calories and nutrients. The food particles that cannot be digested in the small intestine are stored in the large intestine until eliminated.

### How does surgery promote weight loss?

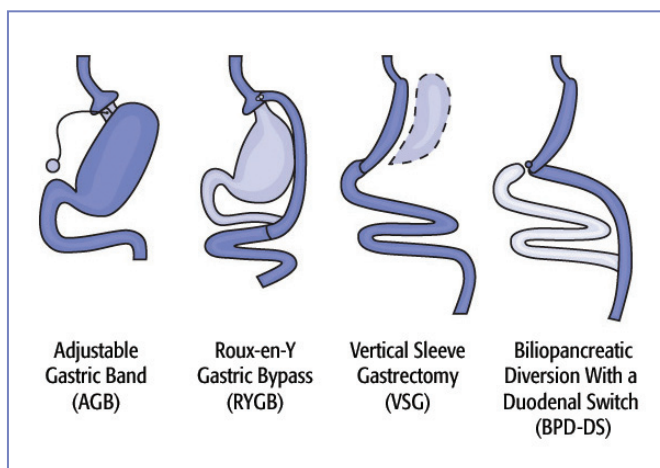
Bariatric surgery produces weight loss by restricting food intake and, in some cases, interfering with nutrition through malabsorption. Patients who undergo bariatric surgery must also commit to a lifetime of healthy eating and regular physical activity. These healthy habits help ensure that the weight loss from surgery is successfully maintained.

You may be a candidate for surgery if you are an adult with:

- A body mass index (BMI) of 40 or more (about 100 pounds overweight for men and 80 pounds for women) or a BMI between 35 and 39.9 and a serious obesity-related health problem such as type 2 diabetes, coronary heart disease, or severe sleep apnea (when breathing stops for short periods during sleep).
- Acceptable operative risks.
- An ability to participate in treatment and long-term follow-up.
- An understanding of the operation and the lifestyle changes you will need to make.

## What are the surgical options?

There are four types of operations that are commonly offered in the United States: adjustable gastric band (AGB), Roux-en-Y gastric bypass (RYGB), biliopancreatic diversion with a duodenal switch (BPD-DS), and vertical sleeve gastrectomy (VSG). Each has its own benefits and risks. To select the option that is best for you, you and your physician will consider that operation's benefits and risks along with many other factors, including BMI, eating behaviors, obesity-related health conditions, and previous operations.



**Figure 1**

Diagram of Surgical Options. Image credit: Walter Pories, M.D. FACS.

### Adjustable Gastric Band

AGB works primarily by decreasing food intake. Food intake is limited by placing a small bracelet-like band around the top of the stomach to produce a small pouch about the size of a thumb. The outlet size is controlled by a circular balloon inside the band that can be inflated or deflated with saline solution to meet the needs of the patient.

### Roux-en-Y Gastric Bypass

RYGB works by restricting food intake *and* by decreasing the absorption of food. Food intake is limited by a small pouch that is similar in size to the adjustable gastric band. In addition, absorption of food in the digestive tract is reduced by excluding most of the stomach, duodenum, and upper

intestine from contact with food by routing food directly from the pouch into the small intestine.

### Biliopancreatic Diversion With a Duodenal Switch

BPD-DS, usually referred to as a “duodenal switch,” is a complex bariatric operation that principally includes 1) removing a large portion of the stomach to promote smaller meal sizes, 2) re-routing of food away from much of the small intestine to partially prevent absorption of food, and 3) re-routing of bile and other digestive juices which impair digestion.

In removing a large portion of the stomach, a more tubular “gastric sleeve” (also known as a vertical sleeve gastrectomy, or VSG) is created.

The smaller stomach sleeve remains connected to a very short segment of the duodenum, which is then directly connected to a lower part of the small intestine. This operation leaves a small portion of the duodenum available for food and the absorption of some vitamins and minerals.

However, food that is eaten by the patient bypasses the majority of the duodenum. The distance between the stomach and colon is made much shorter after this operation, thus promoting malabsorption. BPD-DS produces significant weight loss. However, there is greater risk of long-term complications because of decreased absorption of food, vitamins, and minerals.

### Vertical Sleeve Gastrectomy

VSG historically had been performed only as the first stage of BPD-DS (see above) in patients who may be at high risk for complications from more extensive types of surgery. These patients' high risk levels are due to body weight or medical conditions. However, more recent information indicates that some patients who undergo a VSG can actually lose significant weight with VSG alone and avoid a second procedure. It is not yet known how many patients who undergo VSG alone will need a second stage procedure. A VSG operation restricts food intake and does not lead to

decreased absorption of food. However, most of the stomach is removed, which may decrease production of a hormone called ghrelin. A decreased amount of ghrelin may reduce hunger more than other purely restrictive operations, such as gastric band.

## What are the complications of these operations?

Early complications of these operations can include bleeding, infection, leaks from the site where the intestines are sewn together, and blood clots in the legs that can progress to the lungs and heart.

Examples of complications that may occur later include malnutrition, especially in patients who do not take their prescribed vitamins and minerals. In some cases, if the malnutrition is not addressed promptly, diseases such as pellagra, beri beri, and kwashiorkor may occur along with permanent damage to the nervous system. Other late complications include strictures (narrowing of the sites where the intestine is joined) and hernias.

Two kinds of hernias may occur after a patient has bariatric surgery. An incisional hernia is a weakness that sticks out from the abdominal wall's fascia (connective tissue) and may cause a blockage in the bowel. An internal hernia occurs when the small bowel is displaced into pockets in the lining of the abdomen. These pockets are created when the intestines are sewn together. Internal hernias are considered more dangerous than incisional ones and need prompt attention to avoid serious complications.

Research indicates that about 10 percent of patients who undergo bariatric surgery may have unsatisfactory weight loss or regain much of the weight that they lost. Some behaviors such as frequent snacking on high-calorie foods or lack of exercise can contribute to inadequate weight loss. Technical problems that may occur with the operation, like a stretched pouch or separated stitches, may also contribute to inadequate weight loss.

Some patients may also require emotional support to help them through the postoperative changes in body image and personal relationships.

## Open and Laparoscopic Bariatric Surgery

Bariatric surgery may be performed through “open” approaches, which make abdominal incisions in the traditional manner, or by laparoscopy. With the laparoscopic approach, sophisticated instruments are inserted through 1/2-inch incisions and guided by a small camera that sends images to a television monitor. Most bariatric surgery today is performed laparoscopically because it requires a smaller cut, creates less tissue damage, leads to earlier discharges from the hospital, and has fewer complications, especially postoperative hernias.

However, not all patients are suitable for laparoscopy. Patients who are extremely obese, who have had previous abdominal surgery, or have complicating medical problems may require the open approach.

## Bariatric Surgery for Adolescents

Rates of obesity among youth are on the rise. Bariatric surgery is sometimes considered as a treatment option for adolescents who have developed extreme obesity. Although it is becoming clear that adolescents can lose weight following bariatric surgery, there are numerous unanswered questions about the long-term effects of these operations on adolescents' developing bodies and minds.

Experts in pediatric obesity and bariatric surgery recommend that surgical treatment only be considered when adolescents have tried for at least 6 months to lose weight and have not been successful. Candidates should be extremely obese (typically with BMI greater than 40), have reached their adult height (usually 13 or older for girls and 15 or older for boys), and have serious weight-related health problems, such as type 2 diabetes, sleep apnea, heart disease, or significant functional or psychosocial impairment. In addition, potential patients and their parents should be evaluated to see how emotionally prepared they

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are for the operation and the lifestyle changes they will need to make. Patients should be referred to specialized adolescent bariatric surgery centers with a team of experts qualified to meet their unique needs.

A growing body of research suggests that both weight and health of extremely obese youth can be favorably changed by bariatric surgery. Over the years, gastric bypass surgery has been the predominant operation used to treat adolescent extreme obesity. An estimated 2,700 adolescent bariatric surgeries were performed between 1996 and 2003 (*Arch Pediatr Adolesc Med.* 2007;161:217–221). A review of short-term data from the national inpatient sample (the largest inpatient database in the United States) suggests that these operations are at least as safe for adolescents as adults. As yet, the adjustable gastric band has not been approved for use in the United States for people younger than age 18, but favorable weight-loss outcomes following adjustable gastric banding for adolescents have been reported internationally.

### Medical Costs

Bariatric procedures, on average, cost from \$20,000 to \$25,000. Medical insurance coverage varies by state and insurance provider. In 2004, the U.S. Department of Health and Human Services reduced barriers to obtaining Medicare coverage for obesity treatments. Bariatric surgery may be covered if it is medically appropriate and if it is performed to correct an obesity-related illness. If you are considering bariatric surgery, contact your regional Medicare or Medicaid office or health insurance plan to find out if the procedure is covered.

### Is surgery for you?

Bariatric surgery may be the next step for people who remain severely obese after trying nonsurgical approaches, especially if they have an obesity-related disease. Surgery to produce weight loss is a serious undertaking. Anyone thinking about undergoing this type of operation should understand what it involves. Answers to the following questions may help you decide whether weight-loss surgery is right for you.

Are you:

- Unlikely to lose weight or keep it off over the long term with non-surgical measures?
- Well informed about the surgical procedure and the effects of treatment?
- Determined to lose weight and improve your health?

- Aware of how your life may change after the operation (adjustment to the side effects of the operation, including the need to chew food well and inability to eat large meals)?
- Aware of the potential risk for serious complications, dietary restrictions, and occasional failures?
- Committed to lifelong healthy eating and physical activity habits, medical follow-up, and vitamin/mineral supplementation?

*Remember:* There are no guarantees for any method, including surgery, to produce and maintain weight loss. Success is possible only with maximum cooperation and commitment to behavioral change and medical follow-up—and this cooperation and commitment must be carried out for the rest of your life.

## Research

In 2003, the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health (NIH) formed a partnership with researchers called the Longitudinal Assessment of Bariatric Surgery, or LABS. LABS researchers are experts in bariatric surgery, obesity research, internal medicine, behavioral science, and related fields. Their mission is to plan and conduct studies that will lead to better understanding of bariatric surgery and its impact on the health and well-being of patients with extreme obesity. For more information on LABS, visit <http://www.niddklabs.org>.

To help determine if bariatric surgery is appropriate for adolescents, NIH launched a prospective study called Teen-LABS in 2007. Over the next 5 years, the multicenter study will collect data from adolescents who are scheduled for surgery to evaluate bariatric surgery's benefits and risks. Researchers will collect data about obesity-related medical problems, other health risk factors, and quality of life from the patients before they undergo surgery and 2 years after surgery. Researchers will then compare the adolescent outcomes to data collected from adults. For more information about Teen-LABS, visit <http://www.nih.gov/news/pr/apr2007/niddk-16.htm> and <http://www.cincinnatichildrens.org/teen-LABS>.

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## Additional Reading

**Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults.** National Heart, Lung, and Blood Institute, NIH. September 1998. Available at [http://www.nhlbi.nih.gov/guidelines/obesity/ob\\_gdlns.pdf](http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.pdf).

**Dieting and Gallstones.** This fact sheet explains what gallstones are, how they are formed, and the roles obesity and rapid weight loss play in the development of gallstones. Available from WIN.

**Gastrointestinal Surgery for Severe Obesity.** Consensus Statement, NIH Consensus Development Conference, March 25–27, 1991; Public Health Service, National Institutes of Health, Office of Medical Applications of Research. This publication, written for health professionals, summarizes the findings of a conference discussing treatments for severe obesity. Available at <http://consensus.nih.gov/1991/1991GISurgeryObesity084html.htm>.

**Pharmacological and Surgical Treatment of Obesity: Evidence Report/Technology Assessment: Number 103.** Shekelle PG, Morton SC, Maglione M, et al. Agency for Healthcare Research and Quality (AHRQ). AHRQ Publication Number 04–E028–1; 2004. Rockville, MD. This report reviews the scientific evidence on weight-loss drugs and bariatric surgery among children, adolescents, and adults. Available at <http://www.ahrq.gov/downloads/pub/evidence/pdf/obespharm/obespharm.pdf>.

**Weight Loss for Life.** This booklet describes ways to lose weight and encourages healthy eating habits and regular physical activity. Available from WIN.

## Additional Resource

### **American Society for Metabolic and Bariatric Surgery**

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The Weight-control Information Network (WIN) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health, which is the Federal Government's lead agency responsible for biomedical research on nutrition and obesity. Authorized by Congress (Public Law 103–43), WIN provides the general public, health professionals, the media, and Congress with up-to-date, science-based health information on weight control, obesity, physical activity, and related nutritional issues.

Publications produced by WIN are reviewed by both NIDDK scientists and outside experts. This fact sheet was also reviewed by Walter Pories, M.D., FACS, Professor of Surgery and Biochemistry, Brody School of Medicine at East Carolina University; and Thomas Inge, M.D., Ph.D., FACS, FAAP, Assistant Professor of Surgery and Pediatrics and Surgical Director, Comprehensive Weight Management Center, Cincinnati Children's Hospital Medical Center.

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