

# Gastrointestinal Surgery for Severe Obesity



National Institute of Diabetes and Digestive and Kidney Diseases

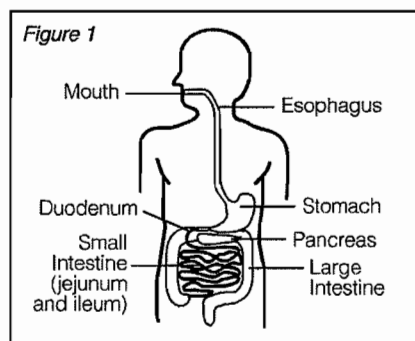
NATIONAL INSTITUTES OF HEALTH

**WIN** *Weight-control Information Network*

Severe obesity is a chronic condition that is difficult to treat through diet and exercise alone. Gastrointestinal 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 by restricting food intake and, in some operations, interrupting the digestive process. As in other treatments for obesity, the best results are achieved 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 (see figure 1). 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 foods 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.

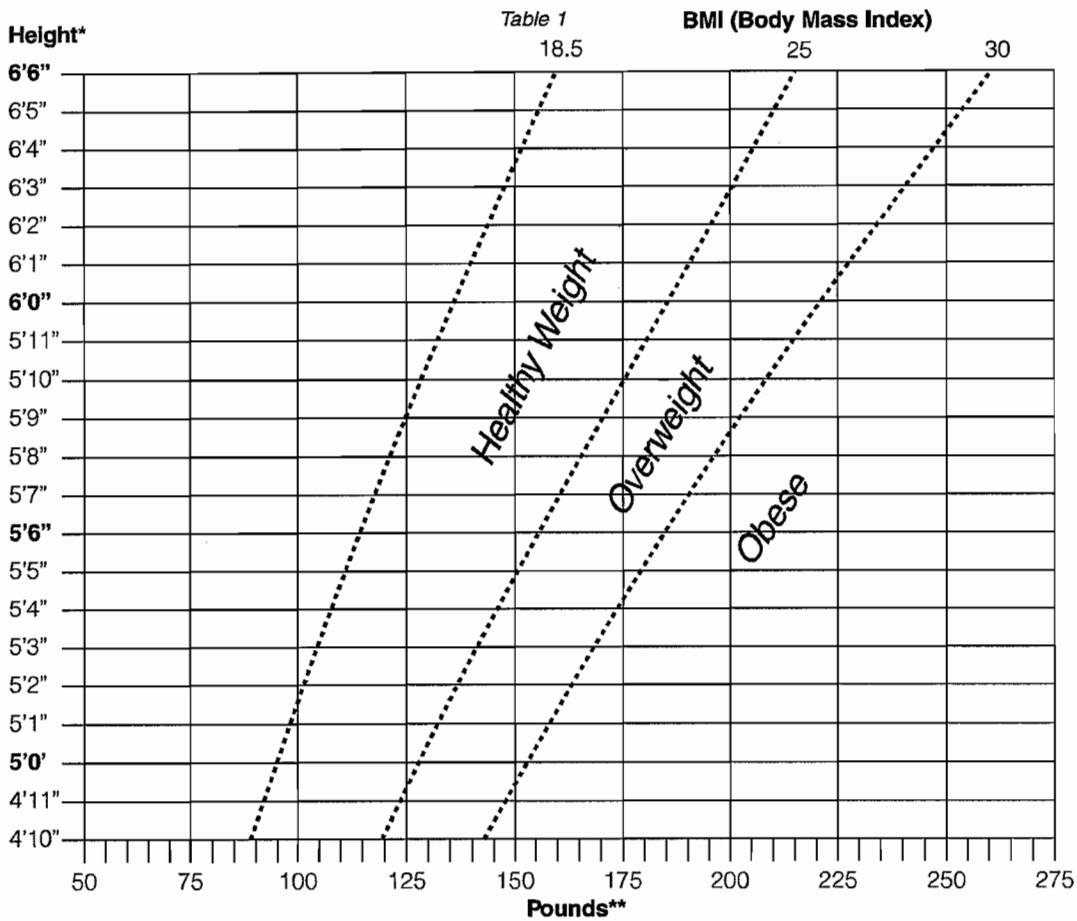


## How Does Surgery Promote Weight Loss?

Gastrointestinal surgery for obesity, also called bariatric surgery, alters the digestive process. The operations can be divided into three types: restrictive, malabsorptive, and combined restrictive/malabsorptive. Restrictive operations limit food intake by creating a narrow passage from the upper part of the stomach into the larger lower part, reducing the amount of food the stomach can hold and slowing the passage of food through the stomach. Malabsorptive operations do not limit food intake,

You may be a candidate for surgery if you have:

- a body mass index (BMI) of 40 or more—about 100 pounds overweight for men and 80 pounds for women (see BMI chart on page 2)
- a BMI between 35 and 39.9 and a serious obesity-related health problem such as type 2 diabetes, heart disease, or severe sleep apnea (when breathing stops for short periods during sleep)
- an understanding of the operation and the lifestyle changes you will need to make.



Find your weight on the bottom of the graph. Go straight up from that point until you come to the line that matches your height. Then look to find your weight group.

- \* Without shoes
- \*\* Without clothes

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but instead exclude most of the small intestine from the digestive tract so fewer calories and nutrients are absorbed. Malabsorptive operations, also called intestinal bypasses, are no longer recommended because they result in severe nutritional deficiencies. Combined operations use stomach restriction and a partial bypass of the small intestine.

### What Are the Surgical Options?

There are several types of restrictive and combined operations. Each one has its own benefits and risks.

#### Restrictive Operations

Purely restrictive operations only limit food intake and do not interfere with the normal digestive process. To perform the operation, doctors create a small pouch at the top of the stomach where food enters from the esophagus. At first, the pouch holds about 1 ounce of food and later may stretch to 2-3 ounces. The lower outlet of the pouch is usually about 1/2 inch in diameter or smaller. This small outlet delays the emptying of food from the pouch into the larger part of the stomach and causes a feeling of fullness.

After the operation, patients can no longer eat large amounts of food at one time. Most patients can eat about 1/2 to 1 cup of food without

discomfort or nausea, but the food has to be soft, moist, and well chewed. Patients who undergo restrictive procedures generally are not able to eat as much as those who have combined operations.

Purely restrictive operations for obesity include adjustable gastric banding (AGB) and vertical banded gastroplasty (VBG).

■ **Adjustable gastric banding.** In this procedure, a hollow band made of silicone rubber is placed around the stomach near its upper end, creating a small pouch and a narrow passage into the rest of the stomach (figure 2). The band is then inflated with a salt solution through a tube that connects the band to an access port placed under the skin. It can be tightened or loosened over time to change the size of the passage by increasing or decreasing the amount of salt solution.

■ **Vertical banded gastroplasty.** VBG uses both a band and staples to create a small stomach pouch, as illustrated in figure 3. Once the most common restrictive operation, VBG is not often used today.

**Advantages:** Restrictive operations are easier to perform and are generally safer than malabsorptive operations. AGB is usually done via laparoscopy, which uses smaller incisions, creates less tissue damage, and involves shorter operating time and hospital stays than open procedures. (See page 5 for more information on laparoscopy.) Restrictive operations can be reversed if necessary, and result in few nutritional deficiencies.

**Disadvantages:** Patients who undergo restrictive operations generally lose less weight than patients who have malabsorptive operations, and are less likely to maintain weight loss over the long term. Patients generally lose about half of their excess body weight in the first year after restrictive procedures. However, in the first 3 to 5 years after VBG patients may regain some of the weight they lost. By 10 years, as few as 20 percent of patients have kept the weight off. (Although there is less information about long-term results with AGB, there is some evidence that weight loss results are better than with VBG.) Some patients regain weight by eating high-calorie soft foods that easily pass through the opening to the stomach. Others are unable to change their eating habits and do not lose much weight to begin with. Successful results depend on the patient's willingness to adopt a long-term plan of healthy eating and regular physical activity.

**Risks:** One of the most common risks of restrictive operations is vomiting, which occurs when the patient eats too much or the narrow passage into the larger part of the stomach is blocked. Another is slippage or wearing away of the band. A common risk of AGB is breaks in the tubing between the band and the access port. This can cause the salt solution to leak, requiring another operation to repair. Some patients experience infections and bleeding, but this is much less common than other risks. Between 15 and 20 percent of VBG patients may have to undergo a second operation for a problem related to the procedure. Although restrictive operations are the safest of the bariatric procedures, they still carry risk—in less than 1 percent of all cases, complications can result in death.

Figure 2  
Adjustable gastric banding

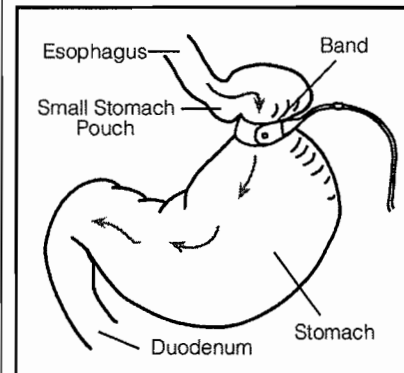


Figure 3  
Vertical banded gastroplasty

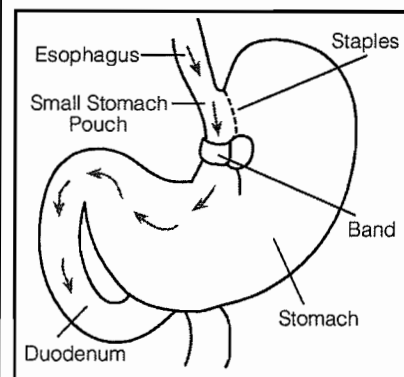


Figure 4  
Roux-en-Y gastric bypass

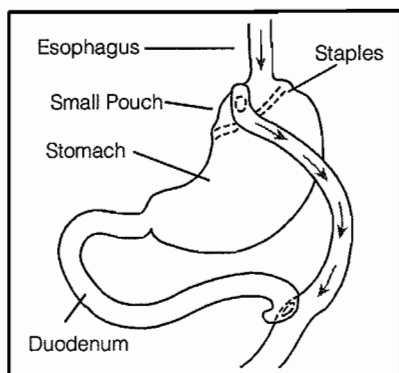


Figure 5  
Extensive gastric bypass

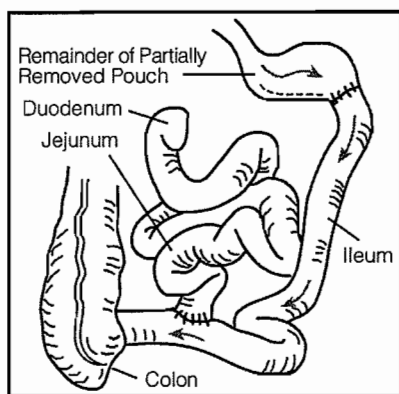
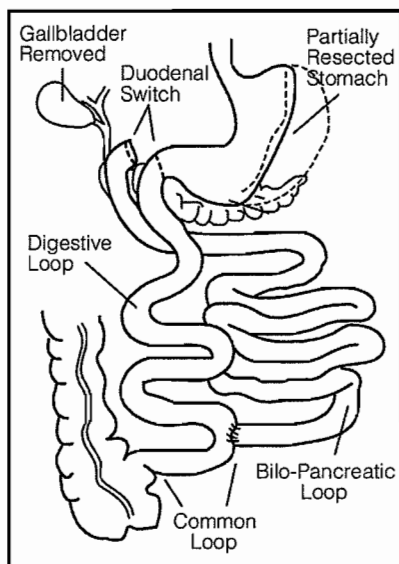


Figure 6  
BPD/duodenal switch



## Combined Restrictive/Malabsorptive Operations

Combined operations are the most common bariatric procedures. They restrict both food intake and the amount of calories and nutrients the body absorbs.

■ **Roux-en-Y gastric bypass (RGB).** This operation, illustrated in figure 4, is the most common and successful combined procedure in the United States. First, the surgeon creates a small stomach pouch to restrict food intake. Next, a Y-shaped section of the small intestine is attached to the pouch to allow food to bypass the lower stomach, the duodenum (the first segment of the small intestine), and the first portion of the jejunum (the second segment of the small intestine). This reduces the amount of calories and nutrients the body absorbs. Rarely, a cholecystectomy (gall bladder removal) is performed to avoid the gallstones that may result from rapid weight loss. More commonly, patients take medication after the operation to dissolve gallstones. (See WIN's fact sheet *Dieting and Gallstones* for more information.)

■ **Biliopancreatic diversion (BPD).** In this more complicated combined operation, the lower portion of the stomach is removed (see figure 5). The small pouch that remains is connected directly to the final segment of the small intestine, completely bypassing the duodenum and the jejunum. Although this procedure leads to weight loss, it is used less often than other types of operations because of the high risk for nutritional deficiencies. A variation of BPD includes a "duodenal switch" (see figure 6), which leaves a larger portion of the stomach intact, including the pyloric valve that regulates the release of stomach contents into the small intestine. It also keeps a small part of the duodenum in the digestive pathway. The larger stomach allows patients to eat more after the surgery than patients who have other types of procedures.

**Advantages:** Most patients lose weight quickly and continue to lose for 18 to 24 months after the procedure. With the Roux-en-Y gastric bypass, many patients maintain a weight loss of 60 to 70 percent of their excess weight for 10 years or more. With BPD, most studies report an average weight loss of 75 to 80 percent of excess weight. Because combined operations result in greater weight loss than restrictive operations, they may also be more effective in improving the health problems associated with severe obesity, such as hypertension (high blood pressure), sleep apnea, type 2 diabetes, and osteoarthritis.

**Disadvantages:** Combined procedures are more difficult to perform than the restrictive procedures. They are also more likely to result in long-term nutritional deficiencies. This is because the operation causes food to bypass the duodenum and jejunum, where most iron and calcium are absorbed. Menstruating women may develop anemia because not enough vitamin B<sub>12</sub> and iron are absorbed. Decreased absorption of calcium may also bring on osteoporosis and related bone diseases. Patients must take nutritional supplements that usually prevent these deficiencies. Patients who have the biliopancreatic diversion procedure must also take fat-

soluble (dissolved by fat) vitamins A, D, E, and K supplements, and require life-long use of special foods and medications.

RGB and BPD operations may also cause “dumping syndrome,” an unpleasant reaction that can occur after a meal high in simple carbohydrates, which contain sugars that are rapidly absorbed by the body. Stomach contents move too quickly through the small intestine, causing symptoms such as nausea, bloating, abdominal pain, weakness, sweating, faintness, and sometimes diarrhea after eating. Because the duodenal switch operation keeps the pyloric valve intact, it may reduce the likelihood of dumping syndrome.

*Risks:* In addition to risks associated with restrictive procedures such as infection, combined operations are more likely to lead to complications. The risk of death associated with these types of procedures is lower for the gastric bypass (less than 1 percent of patients) than for the biliopancreatic diversion with duodenal switch (2.5 to 5 percent). Combined operations carry a greater risk than restrictive operations for abdominal hernias (up to 28 percent), which require a follow-up operation to correct. The risk of hernia, however, is lower (about 3 percent) when laparoscopic techniques are used.

## Laparoscopic Bariatric Surgery

In laparoscopy, the surgeon makes one or more small incisions through which slender surgical instruments are passed. This technique eliminates the need for a large incision and creates less tissue damage. Patients who are super-obese (more than 350 pounds) or have had previous abdominal operations may not be good candidates for laparoscopy, however.

Adjustable gastric banding is routinely performed via laparoscopy. This technique is often used for Roux-en-Y gastric bypass, and although less common, biliopancreatic diversion can also be performed laparoscopically. The small incisions result in less blood loss, shorter hospitalization, a faster recovery, and fewer complications than open operations. However, combined laparoscopic procedures are more difficult to perform than open procedures and can create serious problems if done incorrectly.

## Bariatric Surgery for Adolescents

With rates of overweight among youth on the rise, bariatric surgery is sometimes considered as a treatment option for adolescents who are severely overweight. However, there are many concerns about the long-term effects of this type of operation on adolescents’ developing bodies and minds. Experts in pediatric overweight 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 severely overweight (BMI of 40 or more), have reached their adult height (usually 13 or older for girls, 15 or

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older for boys), **and** have serious weight-related health problems such as type 2 diabetes or heart disease. In addition, potential patients and their parents should be evaluated to see how emotionally prepared they are for the operation and the lifestyle changes they will need to make. Patients should also be referred to a team of experts in adolescent medicine and bariatric surgery who are qualified to meet their unique needs.

## Medical Costs

Bariatric procedures cost from \$20,000 to \$35,000. Medical insurance coverage varies by state and insurance provider. If you are considering bariatric surgery, contact your regional Medicare or Medicaid office or 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, or for people who 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 weight off long-term with nonsurgical 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 for serious complications, dietary restrictions, and occasional failures?
- committed to lifelong 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 [www.niddklabs.org](http://www.niddklabs.org).

## Additional Reading

*Active at Any Size.* NIH Publication No. 04-4352. This booklet explains how physical activity can improve your health and describes different types of activities that very large people can do safely. Available from WIN.

*Dieting and Gallstones.* NIH Publication No. 02-3677. 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 from WIN.

*Weight Loss for Life.* NIH Publication No. 04-3700. This booklet describes how we lose weight, healthy eating habits, the importance of physical activity, and behavior change. Available from WIN.

## Additional Resource

American Society for Bariatric Surgery  
100 SW 75<sup>th</sup> Street, Suite 201  
Gainesville, FL 32607  
Phone: (352) 331-4900  
Fax: (352) 331-4975  
Website: [www.asbs.org](http://www.asbs.org)

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# Weight-control Information Network

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The Weight-control Information Network (WIN) is a national information service of the National Institute of Diabetes and Digestive and Kidney Diseases 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; David Flum, M.D., Clinical Instructor, Department of Surgery, University of Washington School of Medicine; 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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