



PATIENT RESOURCES

Bariatric Surgery

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Bariatric surgery helps people who have **severe obesity** lose a lot of weight and improve their health. Most weight-loss surgeries change the anatomy of your stomach, reducing the amount of food your stomach can hold and making you feel full after just a small meal (called restriction). Weight-loss surgeries change how the stomach empties into the upper part of the intestine. They sometimes also limit the calories and nutrients your body can absorb (called malabsorption). In

addition, the surgery changes the signals which tell your brain when you are full and when it is time to eat.

It is important to recognize that bariatric surgery is not a “quick fix” and takes substantial effort to change patterns of eating and activity – and long-term monitoring by your health care team – to achieve healthy weight loss.

Endocrine Connection

Studies show that bariatric surgery also changes the action of certain **hormones** made by the stomach and intestine, such as ghrelin, “the hunger hormone,” and GLP1, a hormone which reduces appetite and regulates glucose metabolism. People have these types of surgery if other methods of weight loss have not worked for them and/or if they have serious health problems caused by obesity, such as type 2 diabetes.

Bariatric surgery could have both benefits and risks for your endocrine system—the network of glands that produce, store, and release hormones. Hormones play a part in your body’s energy balance, reproductive system, growth and development, and reactions to stress and injury. Different types of bariatric surgery vary in the kind and degree of risks and benefits.

► Types of Bariatric Surgery

Although new techniques are always evolving, the most common types of bariatric surgery today are:

Vertical sleeve gastrectomy (VSG): This is the most common form of

bariatric surgery in the United States today. VSG greatly reduces the size of the stomach to lower food intake. It also changes how quickly food leaves your stomach and causes changes in intestinal hormones such as GLP1.

Roux-en-Y gastric bypass (RYGB): RYGB reduces the size of the stomach, causes hormonal changes, and can lower the amount of nutrients that are absorbed from food. The digestive tract is rerouted, bypassing most of the stomach and part of the small intestine. Although most studies show it is somewhat more effective for both weight loss and benefits for metabolism and type 2 diabetes than VSG, it is a more complex surgery.

Adjustable gastric band (AGB): In AGB surgery, a band is placed around the top of the stomach to create a very small pouch that can hold only a small amount of food. Doctors can later adjust the size of the opening that lets food pass into the rest of the stomach. This procedure is not commonly used at present as weight loss is less than either VSG or RYGB.

You should ask your surgeon and endocrinologist about the potential risks for the procedure you are considering. If you are already experiencing any of these problems, or have a strong family history of these problems, it is very important to let your surgeon know, as it could help to guide which surgical procedure is best for you. If you have diabetes, you should discuss the impact of available procedures on diabetes control and likely changes in medications postoperatively. If you have a history of low blood sugar, you may be at higher risk for developing more severe hypoglycemia after surgery. Be sure to discuss options with both your surgeon and your other caregivers!

► **Benefits of Surgery**

Bariatric surgery and the weight loss that results can:

- › Improve **type 2 diabetes**. RYGB can improve diabetes within days, even before weight loss occurs. Some patients with type 2 diabetes, especially those with diabetes for a short time, can have a reduction in glucose which allows reduction or elimination in diabetes medication use.
- › Help bring **blood fat** levels back to normal—lowering LDL (bad) cholesterol and triglycerides, and raising HDL (good) cholesterol.
- › Improve **fertility** in women who are obese, especially women with **polycystic ovary syndrome (PCOS)**. PCOS is a common condition in women of reproductive age. It can result in diabetes, high blood pressure, and unhealthy blood fat levels
- › Increase **testosterone levels** in men who are very obese
- › Improve or eliminate **high blood pressure**
- › Some studies show that individuals who decide to have bariatric surgery have a reduction in cardiovascular disease, such as heart attack and stroke, and improvements in fatty liver disease.

► **Complications of Surgery**

Endocrine-related and other complications can occur with any type of bariatric surgery. Most complications are often linked to the surgery which changes how food is routed through the intestine or how the stomach empties. Risks include:

- › Macronutrient deficiency—a lack of protein and calories caused by reduced absorption, in severe cases, can cause swelling, diarrhea, dehydration, and heart problems
- › Micronutrient deficiency—a lack of vitamins and minerals which are essential for many functions in the body
- › Bone loss leading to weak bones (osteoporosis)
- › Low blood sugar (glucose) levels after eating, also called hypoglycemia
- › Peripheral neuropathy—a form of nerve damage to feet, legs, or hands, causing pain, numbness, or tingling
- › Sometimes people who have surgery need to have revisional surgery due to scar tissue or hernias.

Some of these surgical effects take a long time to develop, and symptoms may only occur many years after surgery. You can prevent some of these complications by getting enough protein in your diet, taking daily vitamin and mineral supplements for life as recommended by your doctor. You should also follow up with your primary physician and surgeon for lifelong monitoring. The effects on other hormonal systems are still unknown and are areas of active research.

› **Hypoglycemia After Bariatric Surgery**

Hypoglycemia can be a complication of bariatric surgery, due to metabolic changes that cause excess insulin production after meals. It is often challenging to recognize as symptoms of hypoglycemia are similar to other disorders, such as heart rhythm problems, generalized anxiety disorder or adrenal insufficiency.

Some individuals develop hypoglycemia more than 1 year after bariatric surgery. In this situation, eating can trigger release of hormones which then causes a rapid drop in glucose 1-3 hours later. The problem is not typically the pancreas, but with the signals which instruct the pancreas to release insulin. Pancreas surgery is not recommended for post-bariatric hypoglycemia as it is not “cured” by removal of the pancreas. Some individuals also develop hypoglycemia with exercise.

We do not understand why some individuals have hypoglycemia as a complication of surgery, whereas others do not. This is an area of active research. If you have a history of hypoglycemia and are considering bariatric surgery, please let your surgeon know, as this may increase your risk for this complication and influence decision making about the type of surgery.

► **Questions For Your Healthcare Provider**

- › What kind of bariatric surgery is best for me?
- › How do I choose a bariatric surgeon?
- › What are the benefits and risks of the type of surgery I choose?
- › Could my symptoms be hypoglycemia?
- › How can I keep from gaining weight after my surgery?
- › What else can I do to keep myself healthy after surgery?
- › Should I see an endocrinologist for my care after surgery?