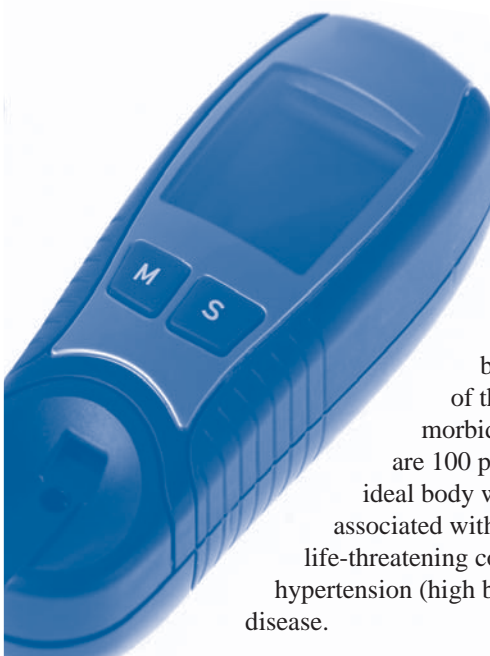


Diabetes

Bariatric Surgery as a Treatment for Type 2 Diabetes

By Tomasz Rogula, MD, PhD, Stacy Brethauer, MD, Bipan Chand, MD, and Philip Schauer, MD



Almost 25 percent of Americans are obese, and between 3 and 5 percent of the adult population is morbidly obese, meaning they are 100 pounds or more above their ideal body weight. Morbid obesity is associated with the development of multiple life-threatening conditions, such as diabetes, hypertension (high blood pressure) and heart disease.

Combating obesity has been approached through dieting, medications, behavioral modification and exercise. The only treatment for morbid obesity proven to be consistently effective in the long-run, however, is bariatric surgery.

Diabetes Linked to Obesity

Obesity is a very important factor in the development of type 2 diabetes. This disease is marked by high levels of sugar (glucose) in the blood and occurs when the body does not respond correctly to insulin, a hormone released by the pancreas. An obese person has double the risk of developing diabetes, and a severely obese person is at a tenfold increased risk.

The risk of developing diabetes also increases with age, family history and obesity localized more in the abdomen (central obesity). Consumption of fatty and high-carbohydrate foods leads not only to obesity, but also to a higher amount of fatty acids in the blood and a buildup of lipids in the liver and skeletal muscles, causing resistance to insulin and consequently diabetes.

Traditional Diabetes Therapy

Diabetes needs to be treated to improve or normalize blood glucose levels, thereby preventing long-term complications like eye and kidney disease and damage to nerves and blood vessels. Normalized blood glucose reduces the risk of death, stroke, heart failure and other complications.

Testing glycosylated hemoglobin (HbA1c) levels in the blood can determine one's risk for long-term complications. The test measures how much glucose has been sticking to red blood cells and other cells. Reduction of HbA1c by even 1 percent can decrease the risk for complications by 25 percent.

The traditional primary treatment for type 2 diabetes is diet and exercise. Appropriate meal planning includes choosing healthy foods and eating the right amount of food. Exercise also is important for effective treatment of diabetes. Regular exercise helps burn excess calories and manages weight, improving control of the amount of glucose in the blood.

When diet and exercise are not sufficient to maintain normal blood glucose levels, medications may be needed. They work by triggering the pancreas to make more insulin, by helping insulin work more efficiently, and by decreasing the absorption of carbohydrates from the gut or decreasing glucose production in the liver. If blood glucose levels are still not controlled through lifestyle changes and taking medication, insulin will need to be taken.

Some people with type 2 diabetes can stop taking their medications after losing weight. However, attempts to lose weight through dieting are frequently ineffective. Inducing weight-loss through bariatric surgery has proven to be the most effective way to lose a substantial amount of weight in the long-term.

Bariatric Surgery and its Impact on Diabetes

Bariatric surgery, including gastric banding, sleeve gastrectomy, Roux-EN-Y gastric bypass, and biliopancreatic diversion (*see illustrations on page 4*) have been shown to improve or resolve type 2 diabetes. Immediately after bariatric surgery, blood sugar levels improve and diabetic medications can be stopped, even before significant weight-loss.

Recent studies show that fat tissues change following bariatric surgery, which leads to improvement of insulin resistance. The most commonly performed type of bariatric surgery, Roux-EN-Y gastric bypass, improves diabetes not only through rapid weight-loss, but also by excluding (bypassing) a portion

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of the small intestine from the flow of nutrients. This means that gastric bypass surgery improves diabetes even before weight is lost. The production of various gut hormones is changed following gastric bypass, leading to improvement of insulin secretion.

Almost 90 percent of obese patients who undergo Roux-EN-Y gastric bypass are free from diabetes one year after surgery. These results are typically persistent for the rest of life, as long as a healthy body weight is maintained.

Patients who have a milder form of diabetes (controlled with diet) for less than five years, and who achieve greater weight-loss after surgery, are more likely to also achieve complete resolution of diabetes. Almost 20 percent of severely obese patients develop diabetes. However, weight-loss following gastric bypass in obese non-diabetic patients decreases their likelihood of developing diabetes by 60 percent over four years.

Research Confirms the Effectiveness of Bariatric Surgery

In one study of 1,025 morbidly obese patients treated with Roux-EN-Y gastric bypass, 15 percent of the participants had type

Resolution of diabetes is measured by normalized fasting blood sugar and glycosylated hemoglobin (HbA1c) concentrations.

Following surgery, 80 percent of patients do not need to take diabetic pills and are able to stop their insulin. Gastric banding operation carries a lower risk of complications compared to Roux-EN-Y gastric bypass and has also been shown to resolve type 2 diabetes in about 50-70 percent of patients³.

2 diabetes. One year after surgery, diabetes had resolved in 83 percent of the patients. At five to seven years, this figure had risen to 86 percent¹.

In a similar study of 1,160 patients in which 21 percent were pre-diabetic or had type 2 diabetes, surgery decreased their body mass index (BMI – a mathematical formula that factors a person's height and weight in determining obesity) from 50 to 34 for an average weight-loss of 97 pounds and 60 percent loss of excess weight². Blood sugar levels returned to normal for 83 percent of the patients. Following surgery, 80 percent of patients no longer needed

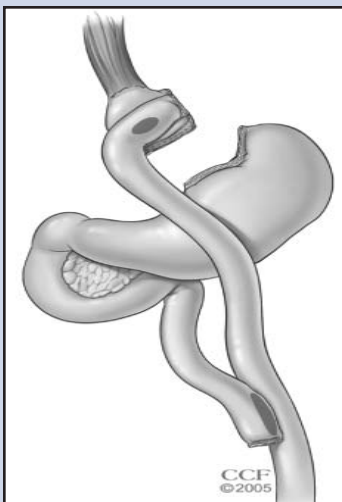
oral diabetes medications, and 79 percent were able to stop insulin injections.

Reduction of Diabetic Complications

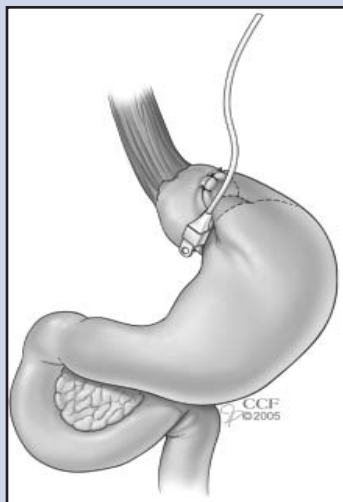
Gastric bypass surgery reduces one's risk of death primarily by decreasing the number of deaths from heart failure. Every year, diabetic patients who are treated with medication see their risk of dying from complications of the disease increase by 4.5 percent compared with a 0.5 percent chance of dying from

Surgical Treatment Options

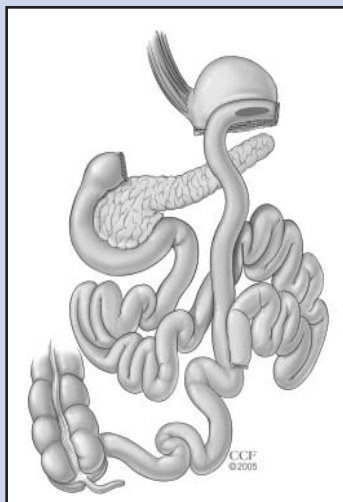
A look at what the bariatric chamber looks like post-surgery



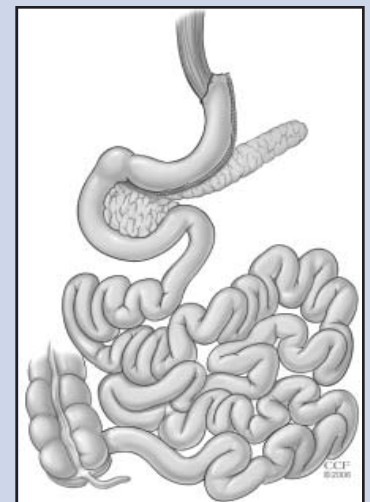
Roux-EN-Y Gastric Bypass



Gastric Banding



Biliopancreatic Diversion with Duodenal Switch



Gastric Sleeve

Photos courtesy of the Cleveland Clinic.

undergoing bariatric surgery. While the number of diabetic patients needing oral medication or insulin shots reaches almost 90 percent over time, the need for medical management falls to less than 8 percent for those who have gastric bypass surgery.

Controlling blood glucose levels with bariatric surgery may also decrease the risk of blindness and kidney failure associated with diabetes. Some studies show that every 1 percent drop in HbA1c causes a relative risk reduction of 25 percent to 45 percent.

Risks of Surgery vs. the Risks of Diabetes

Bariatric operations do carry some risk, but the risk of having major complications or dying from the surgery is 0.5 percent, a reasonable risk considering the tremendous benefits of minimizing the progression of type 2 diabetes in obese individuals.

Developing an intestinal leak is the most likely cause of death following gastric bypass surgery. Having diabetes does increase the risk of developing a leak; however, the patient's age and BMI, as well as the surgeon's experience, are more influential in determining the likelihood of developing a leak. Most leaks can be handled without additional surgery and have no major impact on long-term weight-loss or improvement of diabetes.

Those with diabetes are also more likely to develop wound infections. The infection rate, however, is low and strict control of blood glucose significantly decreases wound infections and other complications following bariatric surgery.

Taking into consideration the risks-to-benefits ratio, bariatric surgery is far more beneficial for patients than medical treatment and one is more likely to die from complications from diabetes than from complications from bariatric surgery.

The Earlier the Surgery, the Better the Results

The longer a patient has diabetes the greater the likelihood of irreversible loss of insulin production. A key finding of all studies is that the less time one suffers from diabetes, the more likely he or she will have complete remission of diabetes following surgery.

About the Authors:

Tomasz Rogula, MD, PhD, is an associate staff surgeon at the Cleveland Clinic Bariatric & Metabolic Institute.

Stacy Brethauer, MD, is the assistant Laparoscopic Fellowship director and associate staff surgeon at the Cleveland Clinic Bariatric & Metabolic Institute.

Bipan Chand, MD, is the Director of Surgical Endoscopy, Advanced Laparoscopic and Bariatric Surgery and staff surgeon at the Cleveland Clinic Bariatric & Metabolic Institute.

Philip Schauer, MD, is professor of Surgery, Cleveland Clinic Lerner College of Medicine, and director of the Cleveland Bariatric & Metabolic Institute. He is also the past president of the American Society for Metabolic and Bariatric Surgery.

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- 2. Schauer PR, Burguera B, Ikramuddin S, Cottam D, Gourash W, Hamad G, Eid GM, Mattar S, Ramanathan R, Barinas-Mitchel E, Rao RH, Kuller L, Kelley D. Effect of laparoscopic Roux-en-Y gastric bypass on type 2 diabetes mellitus. Ann Surg 2003 238:467-484; discussion 84-85.*
- 3. Dixon JB, O'Brien PE, Playfair J, Chapman L, Schachter LM, Skinner S, Proietto J, Bailey M, Anderson M. Adjustable gastric banding and conventional therapy for type 2 diabetes: a randomized controlled trial. JAMA. 2008 Jan 23;299(3):341-3.*



OAC Membership

Building a Coalition of those Affected

About OAC Membership

The OAC is a grassroots organization and was created to bring together individuals impacted by the disease of obesity. One of the first steps to getting involved and making a difference is to become a member of the OAC.

Membership allows the OAC to build a Coalition of individuals impacted, bringing a unified voice in obesity. These are the individuals that make up OAC's membership:

- Those who are currently struggling with their weight, whether obese or morbidly obese
- Those who are seeking treatment for their obesity
- Individuals who have successfully and/or unsuccessfully treated their obesity
- Friends, coworkers and family members of patients
- Professionals whose work is dedicated to those affected
- Organizations that support efforts in obesity

You probably find yourself fitting into one of the categories above. This is because obesity affects just about every person in the U.S. and directly impacts more than 93 million Americans. With this number continuing to grow, so must our voice. And that is where **YOU** become an important part in what the OAC strives to do.

Membership Categories and Benefits

The OAC wants **YOU** to be a part of what we do. No matter how you're impacted, having individuals join our efforts who believe in making a difference is essential. That's why the OAC offers various member categories, so you can get involved at your desired level.

Several valuable benefits also accompany your OAC membership, including an annual subscription to OAC News. Each membership category offers something different. To learn more about membership benefits, please visit the OAC Web site at www.obesityaction.org.

Not ready to join the OAC as a paid member?

You can become a "Friend of the OAC" and still have your voice be heard. When joining the OAC in this category, you can get involved in our efforts while receiving electronic benefits. There is no charge to become a "Friend of the OAC." To sign-up, check the box below and complete the application.

Sign me up as a "Friend of the OAC"

Membership Application

Yes! I would like to join the OAC's efforts.
I would like to join as a/an:

- Patient/Family Member: \$20
- Professional Member: \$50
- Physician Member: \$100
- Surgeon Member: \$150
- Institutional Member: \$500 (*Surgery centers, doctors' offices, weight-loss centers, etc.*)
- OAC Chairman's Council: \$1,000 and up

Name: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Email: _____

Payment Information

Enclosed is my check (payable to the OAC) for \$ _____.

Please charge my credit card for my membership fee:

Discover® MasterCard® Visa® Amex®

Credit Card Number: _____

Expiration Date: _____ Billing Zip Code: _____

Mail to: OAC
4511 North Himes Ave., Ste. 250
Tampa, FL 33614

Or Fax to: (813) 873-7838