Bariatric surgery: types and applications

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The rise of bariatric surgery is partly due to the epidemic of obesity in the United States. Because of this epidemic, the number of bariatric surgeries in 2003 was near 103, 000. This number was up from 16, 000 in 1992. Americans have increased in extreme obesity. Lack of exercise, failure of diets, the desire to want everything right now, has fueled the explosion of the medical procedure. There are so many obese people who are faced with weight induced disease and health complications such as diabetes, coronary heart disease, high LDL cholesterol, stroke, hypertension, nonalcoholic fatty liver disease, gallbladder disease, osteoarthritis (degeneration of cartilage and bone of joints), sleep apnea and other breathing problems. Those with these weight induced diseases have found that bariatric surgery can make many of these issues dissipate. Medical professionals are now even considering reducing the weight guidelines for bariatric surgery for people with these medical issues. Although the surgery has given a new lease on life to many, it is imperative that we remember that the procedure is a surgery.

Basically, bariatrics is a field of medicine take specializes in treating obesity. When a patient undergoes bariatric surgery, they undergo a type of operation that should help promote weight loss. At this time, only those who suffer from severe obesity qualify for bariatric surgery. The results that are desired from bariatric surgery is to produce weight loss in the patient by restricting food intake by through a surgical process. There are currently four kinds of operations that are offered in the United States at this time. The Roux-en-Y gastric bypass (RYGB), biliopancreatic diversion with a duodenal switch (BPD-DS), vertical sleeve gastrectomy (VSG) and adjustable gastric band (AGB) are all types of bariatric surgeries. Each type of surgery has risks

and benefits. Each patient must decide with their doctor which option will work better for them. Generally food will move along the digestive tract as enzymes and juices absorb nutrients along with calories. The stomach can hold around three pints of food at a time. After leaving the stomach, digestion speeds up. Food moves from the duodenum, to the rest of the 20 foot long small intestine. The food that has not been digested once the food reaches the large intestine is stored there until elimination. Bariatric surgery makes some type of change to this process, in order to promote weight loss.

Jejunoileal Bypass was the first operation created just to cause a patient to lose weight. This surgery was first performed at the University of Minnesota in the 1950’s. Physicians no longer recommend a Jejunoileal Bypass as a bariatric surgical procedure. The risk that come with global, permanent and severe malabsorption was thought to be too be to dangerous to the patient. This procedure must also be followed by vital, long term follow ups to be successful. Many patients had to have this procedure reversed in order to live.

In this surgery, called JIB for short, the stomach is left intact. The bypass induces a state of malabsorption because it bypasses most of the intestines. This procedure may have given excellent weight loss to patients but many suffered from complications like vitamin A & D deficiencies, protein calorie malnutrition, kidney stones and diarrhea. One major complication was the toxic overgrowth of intestinal bacteria. This caused problems like skin trouble, arthritis, flu-like symptoms and even liver failure. Thankfully, the jejunoileal bypass is no longer performed due to its life threatening metabolic consequences.

Gastric Bypass was also developed in the late 1960’s by Drs. Ito and Mason. It was developed from the observation of weight loss from patients that had undergone surgery for ulcers. In these surgeries, part of the patient’s stomach had to be removed. At first, surgeons performed the surgery with a loop bypass. It was soon recognized that this caused bile reflux. Physician’s started performing the operation in 1977, with a piece of intestine that is now joined to a very small stomach. This is to keep bile from getting to the upper stomach and esophagus. This procedure is now called “ Roux-en-Y” Gastric Bypass Procedure or RYGBP. It is a mixed restrictive and malabsorptive procedure. The amount of intestine that is bypassed in this particular procedure is not enough to cause malabsorption of nutrients and proteins but the portion of intestine that is bypassed is the site where most of the absorption of iron and calcium should take place. Because of this, the most common long term complication of Roux-en-Y Gastric Bypass Procedure is anemia and osteoporosis. Patients who undergo this procedure should prepare for using a mineral supplement long term.

The way in which the Roux-en-Y Gastric Bypass Procedure works is multifaceted. It is thought that many of the behavioral changes patients feel after surgery has to do with hormone alterations and neural signals that are produced in the GI tract. Many patients feel a reduction in hunger and after they eat, feel full sooner. Many no longer suffer from bad food cravings and take a liking to healthy foods. Then there is a syndrome called “ dumping” which is a sensitivity to sugar, that most patients experience. This may include palpitations, diarrhea, and other symptoms. These results happen

within ten to thirty minutes of eating foods that consist of high amounts of sugar.

In 1994, the Roux-Y gastric bypass was performed as a laparoscopic procedure and has quickly enhanced the surgery. Most patients lose less blood, have shortened hospital stays and less down time when they undergo the laparoscopic procedure, although the operation in more challenging and takes longer than the open procedure.

The most common weight loss surgery is now the Roux-en-Y Gastric Bypass Procedure. Most patients say that they have an increase in their quality of life. It has been proven to result in a durable weight loss and improvement in obesity related comorbidities. Illnesses such as diabetes, high cholesterol, liver disease, high blood pressure and many more have been proven to be control, improved or even cured.

There is a procedure that uses gastric rings to control the size of the stoma in vertical banded gastroplasty. It is called the Ring Gastric Bypass. Surgeons use these rings to maintain the size of stoma and reduce stretching. This procedure has become a rational operation that is used to control obesity. With the ring functioning as the stoma, postprandial emesis is limited. The patient has the opportunity to eat various foods like meats and vegetables without problems. This surgery results in much more weight loss than in standard gastroplasty. Some complications of ring gastric bypass are marginal ulcers, stenosis, incisional hernia and staple line breakdown.

In the surgery, biliopancreatic diversion, there is a change in normal digestion by making the stomach smaller and bypassing part of the small

intestine, so that you take in less calories. There is a biliopancreatic diversion with or without a duodenal switch. In the biliopancreatic diversion surgery without the duodenal switch, some of the stomach is cut away. The remaining part of the stomach is then connected to the bottom part of the intestine. When surgeons do the duodenal switch, only a little part of the stomach is taken away. The rest of the stomach stays attached to the duodenum and then the duodenum is attached to the lower part of the small intestine. It is thought that this process would help to prevent ulcers. Because the duodenum is more tolerant of the acids from the stomach it is much more resistant to ulceration. Cutting away part of the stomach should help reduce the presence of acid. This surgery increases the amount of gastric restriction, helps the patient get the right amount of protein, and decreases the dumping syndrome. Dumping is associated with this surgery as well, although it occurs less often with biliopancreatic diversion with duodenal switch.

Introduced in 1978, Gastric Banding is a purely restrictive bariatric procedure. Dr. Wilkinson developed a nonadjustable gastric banding to go around the upper part of the stomach. Ultimately, the dilatation of the pouch resulted in unsatisfactory weight loss. Dr. Molina, retried the gastric segmentation procedure in 1980. The stomach pouch was made smaller than in Dr. Wilkinson’s procedure and a Dacron vascular graft was used to go around the upper stomach. This was eventually replaced because the graft adhered to the liver. Dr. Kusmak in 1983, used a band of silicone to go around the stomach to create a smaller stoma and smaller gastric pouch. In order to make the band adjustable this band was modified later. In 1986,

Kuzmak created a silicone and with an inflatable balloon. The device was attached to a reservoir that is beaneath the skin, so that medical practitioners could adjust the band. When the balloon gets blown up, the band gets tighter and reduces weight. When the opposite happens to the balloon, the band gets loose and weight loss is reduced. This device can also be inserted laparascopically. At this time there are many types of adjustable bands available in the United States, none have been seen to be better than the other. In an adjustable band procedure, an intestinal bypass is not a part. Weight loss from restriction of food intake is how this procedure works. The impact on co-morbidities and rapid weight loss is less favorable when compared to the gastric bypass. There are groups who have had to undergo re-operation for long term complications. Some of the complications from this procedure are perforation, band erosion, hernia, band slippage, and a need for a revision.

In the early 1970’s gastroplasty was designed as a safer alternative to the RYGBP and the JIB. The first purely restrictive operation to treat obesity was made possible by mechanical staples. Riginally gastroplasty was done hotizontal and involved stapling the stomach into a small part by only leaving a small opening for food to pass between the upper to the lower stomach pouchs. This had very poor results for long term weight loss and was stopped. The vertical banded gastroplasty was then introduced. In this procedure there is a low mortality and deficiencies of micronutrients is virtually an abscent. Because of long term studies, VBG is being performed less often. Research shows that cases of weight regain and severe heartburn are high when compared to other procedures.

There are many new, up and coming bariatric surgeries and trends in development stages. In 1996, Gastric pacing was first introduced in humans but is still considered experimental. It is an attempt to provide durable and significant weight loss that is non-malabsorptive and nonrestrictive. The mechanisim disrupts normal gastric myoelectrical activity, called an IGS, implantable gastric stimulator. Pulses are used to disrupt eating, causing you to feel full earlier. There have been setbacks with gastric pacing because of mechanical problems with the electrical leads. Clinical trials for this procedure are ongoing.

The EndoBarrier Gastrointestinal Liner, also known as the endoluminal sleeve, is now in the late-stage clinical trials. It is thought that patients may get the benefits of surgery with a simple sleeve, incredible. Data shows that obese individuals achieved almost normal blood sugar levels in a week with uncontrolled diabetes using the endoluminal sleeve liner.

As more benefits of bariatric surgery come to light, there has been a push to offer it to more people with lower body mass indexes. As diabetes continues to increase, more people will turn to bariatric surgery for its curative powers. Also we will see an increase in programs for obese teens as studies are showing that surgery quickly improves heart health for them. Less invasive bariatric procedures are currently being developed. There is a procedure being developed called Transoral gastroplasty. In this procedure, surgeons hope to change the stomach anatomy without any cuts, so that after a small meal, patients will have a feeling of fullness.

As the waistline of Americans continues to get larger, bariatric surgery will continue to increase and flourish. With increased knowledge and research, obesity has started to be seen as a molecular disease that has potential molecular explanations. As study continues, bariatric surgery will continue to advance. There may be a time when people will finally be able to avoid this intriguing and dangerous disease called obesity.