Surgical Management of Obesity

In this episode of Surgery 101 final year McMaster medical student, Julie La, will discuss surgical management of obesity.

By the end of this episode, you should be able to:

- Describe various types of bariatric surgery including adjustable gastric band, sleeve gastrectomy, roux-en-y gastric bypass and duodenal switch.

Let’s start by reviewing the NIH guidelines for bariatric surgery.

1. Age 18-64
2. BMI greater than 40 or BMI greater than 35 with comorbidities such as type 2 diabetes, cardiovascular heart disease, severe OSA or GERD
3. Some contraindications include: current substance dependency, recent major cancer, untreated psychiatric illness, diseases that would make you ineligible for any surgery, pregnant, cirrhosis, chronic pancreatitis

Most bariatric surgery is performed by general surgeons with subspecialty training in Minimally invasive surgery and Bariatrics.

Bariatric surgery has been evolving since the 1950s. Many groups around the world recognized obesity as a medical issue, and began to try various ways to reduce the size of the stomach the concept of restrictive surgery, rearrange the intestines to facilitate malabsorption and then eventually some combination of both. As we learn more about how and why bariatric surgery works, we are learning that there are a number of gut hormones that are involved in augmenting weight loss in these procedures. These procedures while initially done open, are almost exclusively performed laparoscopically.

In Canada, bariatric surgery is covered by our public health plans which is decided upon provincially. With that there is variation in procedures that are covered.

In Ontario, the Ministry of Health funds 3 types of bariatric surgery, all of which are done laparoscopically.

1. Roux-en-Y gastric bypass
2. Vertical sleeve gastrectomy
3. Duodenal switch

In Alberta, the duodenal switch is not performed but adjustable gastric banding is.
Now to review the steps and anatomy of bariatric surgery. These can be tricky to follow! Honestly, reading them in textbooks repeatedly was even difficult to follow. I hope that I’ve simplified things and that the slides provided will be a helpful tool. This might be a section that needs a few listens!

The first procedure I’ll discuss is the **adjustable gastric band**.

The gastric band was initially approved the FDA in 2000. Since then hundreds of thousands of these bands were placed around the world. The principle behind this procedure is the placement of a foreign body, the adjustable gastric band around the proximal stomach. This is then connected via tubing to a port that sits on the fascia below the skin. The port can then be accessed to inflate the band with saline or deflate the band removing saline. The adjustment is to allow for more or less restriction. The band was initially a very attractive weight loss procedure as it is minimally invasive, adjustable and completely reversible. Unfortunately, it has been wrought with complications which has led a large number of these bands being removed.

Next, the components of the **Roux-en-Y gastric bypass**. This procedure includes: the pouch: which is a small segment of the stomach that is stapled off. It acts as the new gastric reservoir with a much smaller volume. This will help decrease overall intake and increase the sense of satiety or fullness. Next is the bypass part, where a distal portion of the small intestine, the jejunum, is divided and then attached to the gastric pouch. This is called a gastro, stomach to jejunum, jejunostomy. Gastrojejunostomy. The new pathway that this creates is called the Roux limb.

Recall the physiology of Obesity? One simple way to look at it energy in versus energy out. Using a distal portion of the small intestine, will result in bypassing a large absorptive surface, decreasing the amount of energy in.

Okay, now about 100-150cm downstream from this new connection between the pouch and jejunum, the gastrojejunostomy, the proximal aspect of the jejunum from your division, is connected to a distal or downstream part of the small intestine. Remember, this connection goes from the distal, bottom part of your stomach from where the pouch was stapled off all the way down to the proximal jejunum. But, as you might notice, there’s an important area that is stuck between this area, the duodenum! This area contains the outlet for digestive enzymes and bile to drain. This anastomosis is called an entero-enterostomy and it is to allow for pancreatic and biliary secretions to mix with ingested food much later in the gastrointestinal tract, enhancing the restriction of energy absorbed.

A **vertical sleeve gastrectomy** is much simpler than the roux-en-Y gastric bypass. This will be a break in the podcast! Woohoo! It involves removing a large portion of the stomach, leaving the lower esophageal sphincter and pylorus intact. You’re left with a stomach roughly shaped like a banana. With a sleeve, there is lower morbidity and mortality given that the small intestine is not involved, which carries with it risks of obstruction, internal hernias and malnutrition which we will discuss later.

Finally, we have the newest surgical procedure, the **duodenal switch**, also known as the biliopancreatic diversion with duodenal switch.
This one can be the trickiest to follow, so I would recommend following along with a drawing.

This starts with a vertical sleeve gastrectomy. The procedure that results in a banana shaped stomach. This is followed by a duodenal cut or transection proximally, before, the ampulla, where bile and digestive juices will drain.

Next, the “duodenal switch” part of the surgery, to make a new path for ingested food, there is Roux limb formation with an ileal transection, that is about 250 cm from the ileoceleal valve and the ileum is connected to the proximal duodenum, a duodeunoileostomy. Let's think about this for a second, food goes in your mouth, down the esophagus, into the sleeve, banana shaped stomach, exits and enters the proximal duodenum before any pancreatic or biliary digestive juices have made contact, then it passes the new connection, the duodeunoileostomy, and whoa, it's now in the ileum, completely bypassing most of the duodenum, the jejunum and some ileum! That’s a lot of absorptive surface missed. This helps a lot with restricting energy uptake.

The other half of the “duodenal switch” involves the other part of the duodenum, the distal aspect, which contains the ampulla for drainage of bile and pancreatic digestive enzymes, is connected to the ileum, quite far downstream. And let’s think, why would we do this? Well, this length of bowel contains all the drainage from the biliary tract and pancreas! Of course, as you know, digestive enzymes and bile are essential in breaking down and absorbing nutrients.

Basically, in the bariatric population, it is a fine balance between restriction for weight loss and sufficient absorption to prevent malnutrition.

Comparing Surgical Options

Now that we’ve discussed 4 different types of bariatric procedures, let’s compare the options and why one surgery may be chosen over another.

Simply, as you can see moving from left to right on the chart, the more involved and complex the greater success with weight loss, however the higher the complication rate.

Choosing which surgery is right for which person involves a careful discussion with the patient and the surgeon taking into consideration factors such as patient, age, co-morbidities, desired weight loss and patient preference.

Now that we’ve reviewed the various weight loss procedures, impact on comorbidities and weight loss expectations, it is important to once again recognize that bariatric surgery is a tool for patients with obesity. The post-operative care which involves maintaining a detailed food diary, regular follow up with a dietician, ongoing cognitive behavioural therapy to manage previous maladaptive eating patterns and engaging in regular physical activity are key to weight loss maintenance and success after bariatric surgery.

Thank you so much for listening to the 3rd podcast in our series of 5 on Obesity Medicine and Bariatric Surgery. Hopefully you now are familiar with what bariatric procedures exist and the fundamental concepts behind them. I am looking forward to our final two podcasts on flow of a bariatric patient from community to surgery and to review the complications of bariatric surgeries.
This podcast was written and produced with guidance and support from Jenni Marshall, Program Assistant in Digital Education, and Dr. Johnathan White, general surgeon at the University of Alberta, creator of Surgery 101. The expert content reviewers were Dr. Aliyah Kanji, bariatric surgeon at the University of Alberta and Dr. Renuca Modi, Assistant Clinical Professor in the Department of Family Medicine at the University of Alberta and Medical Lead for the Edmonton Adult Bariatric Clinic.