Unit No. 7

INTENSIFYING TREATMENT: BARIATRIC SURGERY

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ABSTRACT:

Obesity is a chronic disease increasing at epidemic rates worldwide. Diet and lifestyle intervention form the basis of healthy weight management but are not effective in promoting substantial weight loss in morbidly obese individuals. Bariatric surgery appears to be the only intervention that produces profound and sustainable weight loss and excellent control of attendant comorbidities, particularly type 2 diabetes mellitus, in this group. However, fears and concerns regarding the safety and aggressiveness of surgery are limiting the acceptance of bariatric surgery as a viable treatment option. Newer, less invasive procedures hold promise to fill the gap between conservative and surgical therapies for weight loss.

Keywords:

Obesity, weight loss, bariatric surgery, metabolic surgery, endoscopic sleeve gastroplasty

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INTRODUCTION

Bariatric surgery refers to surgical procedures carried out on the gastrointestinal tract to reduce the amount of food consumed and/or nutrients absorbed by the body. The principal indication for bariatric surgery is to enable significant and sustained weight loss in morbidly obese individuals. The resulting benefit to obesity-related medical and physical comorbidities is not insignificant.[1] As published in a recent Cochrane review, "surgery results in greater improvement in weight loss outcomes and weight associated comorbidities compared with non-surgical interventions, regardless of the type of procedures used.".[2]

Despite its effectiveness, the uptake of bariatric surgery remains poor. The reasons for this may lie with the stigma related to obesity, incomplete understanding of the underlying physiology of obesity and limited awareness of surgical treatment options, including risks and outcomes.

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This article looks at how bariatric surgery procedures have evolved over the past 50 years to minimise risk by reducing invasiveness and morbidity, thereby promoting acceptance.

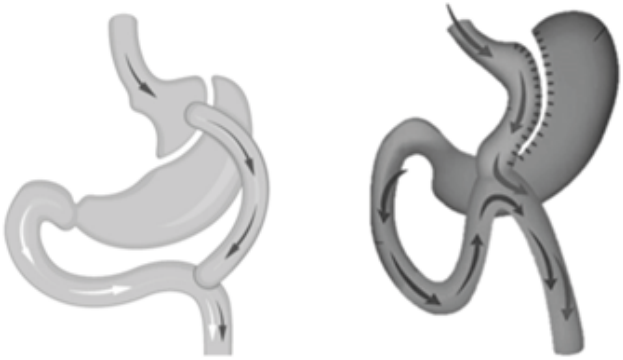
TYPES OF PROCEDURES

Gastric bypass

The first safe and effective weight loss surgery to be performed on a large scale was the gastric bypass introduced in the 1960s, which involved stapling the stomach to create a small gastric "pouch" and creating a gastro-jejunostomy to divert nutrient passage further down the alimentary tract into the mid-jejunum, bypassing the duodenum and proximal jejunum. The advent of laparoscopy led to a dramatic rise in gastric bypass surgery in the USA and worldwide. Today, two types of gastric bypass are typically performed, the Roux-en-Y and the loop or mini-bypass.[3,4] (Figure 1) Notwithstanding the different types of gastrointestinal anastomosis, weight loss results and improvement in comorbidities (especially diabetes) following the two procedures are largely similar.

The early morbidity of gastric bypass is approximately four percent and usually related to bleeding, perforation and leakage.[5] Late complications include intestinal obstruction, marginal ulceration and anastomotic stenosis. More aggressive bypass procedures include the "distal gastric bypass", "bilio-pancreatic diversion" and "duodenal switch". These procedures make up less than five percent of bariatric procedures because they are associated with higher surgical and nutritional morbidity in the long term.

Figure 1. Roux-en-Y gastric bypass (left) and mini or loop gastric bypass (right)



Gastric banding

Adjustable gastric banding was introduced in 1993 and saw a dramatic uptake all over the world.[6] The gastric band is deemed adjustable because of an expandable bladder on the

inside. The bladder is connected by a tubing to a port which is implanted subcutaneously. Fluid is added or removed from the band by cannulation of this port in the doctor's office every 4-6 weeks.

The "reversibility" and "no-cutting or stapling" appeal of the procedure was soon supplanted by complications relating to the placement of a silicone ring constricting the upper part of the stomach. (Figure 2) Despite sutures placed to fix the band at the level of the gastric cardia, slippage remained a troublesome complication. Rapid swallowing of food or even drink invariably led to choking, retching and vomiting. Inadequately masticated meat or mushroom pieces might get stuck entering the stomach and require a late-night visit to the emergency room. Most patients had their bands removed within ten years of placement as they could not tolerate the mantra of "small bites" and "chew slowly".

In the past decade, gastric band insertions have plummeted. There remains a sizable minority of patients who have successfully lost weight with gastric banding and return to the clinic for band adjustments regularly. The vast majority of gastric bands have been removed. Some patients elect to convert to a different bariatric procedure such as sleeve or bypass to maintain or improve their weight loss.[7]

Figure 2. Gastric band

Gastric sleeve

The procedure that emerged to take the place of the band was the laparoscopic vertical sleeve gastrectomy, or simply, the "gastric sleeve".[8] During this procedure, a bougie or calibration tube is placed along the lesser curvature and about 70-80 percent of the stomach is removed. (Figure 3) This changes the stomach into a tubular shape. The portion of stomach removed includes most of the body and fundus along with the greater curvature. The resection is carried out using a stapler which produces an efficient and haemostatic cut line.

Gastric sleeve numbers have overtaken all other procedures as the most popular bariatric surgery worldwide.[9] The main reason for this lies with the sleeve's simplicity and efficacy – reduction of meal portions without requiring any foreign body placement or diversion of food passage. The main problem with this procedure is the potential for twisting or narrowing of the gastric tube, obstructing food passage and causing pain, reflux and vomiting. Bleeding and leakage from the staple line has also been reported. The perioperative course following the sleeve procedure is smoother than after gastric bypass as there is no intestinal component to the surgery.

Figure 3. Gastric sleeve

Gastric balloon

First approved by the FDA in 1985, several types of gastric balloons are available in Singapore today. The gastric balloon aims to fill up the stomach and reduce hunger and cravings. (Figure 4) Gastric balloons are typically placed and removed by endoscopy, and can be kept in the stomach for up to one year. The Spatz balloon is also adjustable, so that an initial smaller volume can be placed to avoid nausea and cramps. Once the stomach is adapted to the balloon, it can be inflated further to occupy more space with the expectation of driving weight loss. Expected weight loss is in the range of 10–15 percent.[10]

Figure 4. Gastric balloon

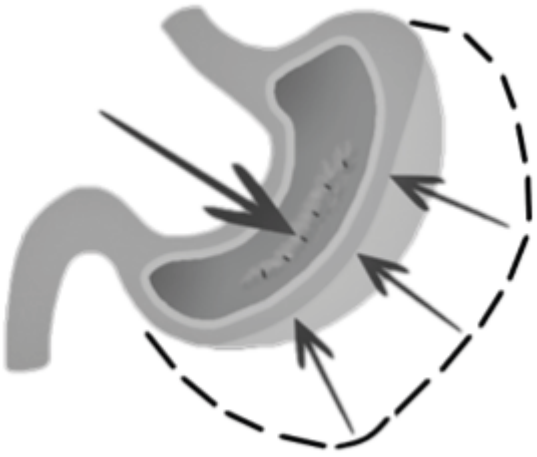
Newer Procedures

In the past decade, there is a clear trend to develop less invasive weight loss interventions which provide better weight loss than diet, lifestyle and pharmacotherapy but lower risk for adverse events when compared to bariatric surgery.

Two new products are disrupting the bariatric landscape in Singapore. The first is the Elipse pill balloon. The balloon is tightly packed into a capsule which can be swallowed in the clinic. No anaesthesia or endoscopy is required. An x-ray is done to check that the capsule has entered the stomach prior to inflation. The entire placement can be completed in 20 minutes with the patient actively participating. Balloon removal is even smoother. The Elipse has a biodegradable control valve that opens and empties after 16 weeks, and the fully deflated balloon passes out naturally with stool. Weight loss after Elipse is comparable to that of the other balloons despite remaining in the body for only four months.[11]

The other product that only received full HSA licensing in 2021 is the Overstitch device, a remarkable convergence of concept and technology. It does exactly what its name suggests. The Overstitch is a suturing tool that is mounted on an endoscope. It can be used to place sutures during endoscopy, e.g., close defects after removing polyps, suture bleeding ulcers, etc. For obese patients, the Overstitch can be used to perform a gastric plication procedure, restricting gastric distension and capacity. The stomach is sutured from within during a gastroscopy, reducing its volume by 75 percent, similar to that achieved by a gastric sleeve surgery. (Figure 5) This new procedure is called an endoscopic sleeve gastroplasty (ESG) or "endo-sleeve".[12,13]

Figure 5. Endoscopic sleeve gastroplasty



WEIGHT LOSS AND METABOLIC IMPROVEMENT

Bariatric surgical interventions produce 10–30 percent weight loss, maintained for at least 20 years.[1] Glycaemic control is dramatically improved in up to 90 percent of patients, so much so that bariatric surgery has been renamed "metabolic" surgery and added to the treatment algorithm for diabetes management in most countries.[14] The name is indeed apt because of its powerful impact on hypertension, dyslipidaemia, fatty liver and polycystic ovarian syndrome. The physical effects of weight loss leading to improvement in obstructive sleep apnoea, musculoskeletal pains, chronic leg swelling and overall quality of life cannot be overstated.[15-17]

HOW BARIATRIC SURGERY WORKS

The goal of bariatric surgery is to enable individuals to feel satisfied with smaller meal portions. Limiting gastric capacity directly impacts the size of a meal one can consume. This effect alone is responsible for most of the weight loss one experiences after bariatric surgery. Furthermore, diversion of nutrient flow distally into the gut will reduce the total amount of food that can be digested and absorbed. In the early days of bariatric surgery, extensive intestinal bypasses were commonly performed. They were effective in reducing nutrient absorption, to the point of inducing diarrhoea, malnutrition and potentially liver failure. That is why many of those procedures are obsolete and gastric bypass procedures carried out today generally retain an adequate length of small intestine (referred to as the common channel) for nutrient absorption.[18]

The sense of satiety and regulation of appetite is complex, with recent evidence pointing to fundamental roles for genetic, homeostatic and hedonic mechanisms.[19] The ultimate control of what and how much we consume appears to rest not in the stomach or adipose tissue but in the brain. To simply "eat less and move more" as is often advocated by many self-styled diet gurus and obesity experts fail to recognise the ongoing struggle between nutrient sensors, endocrine factors, neural and emotional signals.[20] Perhaps bariatric surgery is a potent weight-loss tool because alteration of the stomach and intestine influences appetite control centres in the brain via various neuro-biological feedback pathways.[21] Several candidates identified to contribute to weight loss after gastrointestinal manipulation include altered secretion of the incretin hormones ghrelin, PYY, oxyntomodulin and GLP-1, gut microbes and bile acids.[22]

PROCEDURE CHOICE AND INFORMED CONSENT

Ultimately, the patient must live with the procedure so it is imperative that an informed choice is made. Most of the fears and concerns that patients express are related to the surgery itself. In modern bariatric surgery all procedures are done by laparoscopy or keyhole technique with a typical hospital stay of 1-2 days. Adverse event rates in experienced centres are below five percent.[23] Pain and general side effects of surgery are similar to other GI procedures such as appendectomy and cholecystectomy. Newer alternatives

such as the Elipse balloon and endoscopic sleeve gastroplasty are appealing because they are even less invasive and can be done on an outpatient basis.

Pure gastric restrictive procedures rarely bear any long term nutritional risk, although women may be at risk for iron deficiency. It is different for gastric bypass procedures where vitamin and mineral supplementation must continue lifelong.[24] This is usually acceptable to a patient who has been on treatment for diabetes, hypertension, etc. because they will feel that they are swapping out their medications for supplements.

In Singapore, bariatric surgery is regarded as a medical treatment for obesity if the body mass index is >32.5 kg/m^2, if related medical or physical comorbidities are present.[25] Medisave may be used for reimbursement and many of the integrated shield plans have permitted the inclusion of these conditions, particularly type 2 diabetes mellitus, fatty liver, polycystic ovarian syndrome, metabolic syndrome and obstructive sleep apnoea, among their approved indications for bariatric surgery.

FOLLOW-UP

Adapting to new dietary and lifestyle habits can often be a challenge. Many patients do not realise at the outset that despite having bariatric surgery, those daily habits are the key to shed weight and keep it off. That is why close clinical follow up is important and positively correlated with greater weight loss, regardless of procedure type.[26] Visits should be scheduled with not just doctors but also the dietitian and exercise therapist. Some patients may benefit from psychological supervision during the early adjustment period.

During follow-up, it is important for clinicians to identify any problems or complications early. For example, vomiting may sometimes occur if a patient eats too quickly or drinks fluids at mealtimes. However, if vomiting persists, it may be a symptom of underlying stenosis or ulcer, which may need investigation and treatment. On the other hand, it is rare for a patient to regret their decision to undergo bariatric surgery.[27] When questioned, most patients say that they wished they had surgery earlier.

CONCLUSION

With proper planning, consideration and procedure selection, bariatric surgery can be a powerful tool to tackle obesity and its related comorbidities. Successful weight loss after bariatric surgery requires close monitoring and follow-up by a multidisciplinary team. In 2021 we have a wide variety of bariatric procedures to choose from: office-based treatments to outpatient endoscopic therapy and finally, laparoscopic surgery.

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LEARNING POINTS

- **Obesity is a chronic, neurobiological disorder that is an important risk factor for both cardio-metabolic diseases and cancer.**
- **Bariatric surgery is an effective treatment for obesity and its comorbidities. Gastrointestinal alterations after bariatric surgery lead to changes in gut hormones and feedback signalling to appetite control centres in the brain.**
- **Close multidisciplinary follow-up is essential to promote successful weight loss and avoid nutritional complications in the long term.**