

Principles of Bariatric Surgery

¹Gülçin Türkmen Sarıyıldız  ²Canan Çiçek Demir 

1. Atılım University, School of Medicine, Medicana International Ankara Hospital, Department of General Surgery, Ankara, Turkey

2. Atılım University, School of Medicine, Medicana International Ankara Hospital, Department of Endocrinology, Ankara, Turkey

Corresponding author: Canan Çiçek Demir, Atılım University, School of Medicine, Medicana International Ankara Hospital, Department of Endocrinology, Ankara, Turkey

E-mail: canancecek@hotmail.com

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ABSTRACT

This mini-review appoints on the mechanisms linking bariatric surgery and the logic of weight loss by addressing various types of procedures in individuals with obesity. The essential approach for bariatric surgery for the purpose of achieving satisfactory weight loss involves the determination that, obesity is a disease associated with multiple adverse events on human health which can be reversed or improved by successful weight loss following bariatric surgery in individuals who have failed to achieve weight loss by non-surgical treatment options. Here we summarize different types of bariatric surgery and their clear differences.

Keywords: Bariatric surgery, sleeve gastrectomy, gastric mini bypass, obesity

INTRODUCTION

In ancient times, obesity was not a health problem, but a sign of wealth, health, beauty, and fertility. Obesity, which is defined as abnormal and excessive fat accumulation in the human body, is a chronic disease of our age that is increasing in prevalence all over the world and adversely affects many systems in the organism. Early diagnosis of endocrine disorders that may cause obesity is important to prevent the overtreatment of obese individuals. In the treatment of exogenous obesity, there are corrections of environmental factors, diet, regular physical activity, lifestyle changes, and medical treatment options. Surgical treatment is considered in patients who cannot achieve successful weight loss and weight control as a result of all these. Although surgical treatment is the final treatment method to be preferred, paradoxically, it appears as the treatment option that provides the most permanent weight control and has more promising long-term results (1). It should be kept in mind that it will be useful to be known as an adjunct tool in the treatment of complicated obesity. The aim of surgery should be to provide effective weight control with the most physiological method possible.

DEFINITIONS and CLASSIFICATION

Body mass index (BMI) is calculated using weight in kilograms divided by the square of height in meters (kg/m^2). Today, the standard screening and monitoring tool for obesity is the measurement of body mass index (BMI). A universal classification for BMI has been offered by the World Health Organization and many studies have been conducted on this definition and classification system (2).

Underweight: less than $18.5 \text{ kg}/\text{m}^2$

- Normal range: $18.5 \text{ kg}/\text{m}^2$ to $24.9 \text{ kg}/\text{m}^2$
- Overweight: $25 \text{ kg}/\text{m}^2$ to $29.9 \text{ kg}/\text{m}^2$
- Obese, Class I: $30 \text{ kg}/\text{m}^2$ to $34.9 \text{ kg}/\text{m}^2$
- Obese, Class II: $35 \text{ kg}/\text{m}^2$ to $39.9 \text{ kg}/\text{m}^2$
- Obese, Class III: more than $40 \text{ kg}/\text{m}^2$

BARIATRIC SURGERY INDICATIONS

In the treatment of obesity, bariatric surgery, which is also called metabolic surgery, has been applied with increasing frequency in recent years. A multidisciplinary approach, appropriate patient selection, adequate preoperative evaluation, and appropriate postoperative follow-up are very important for the success of the surgery and to achieve minimized acceptable morbidity and mortality rates. Indications for bariatric surgery can

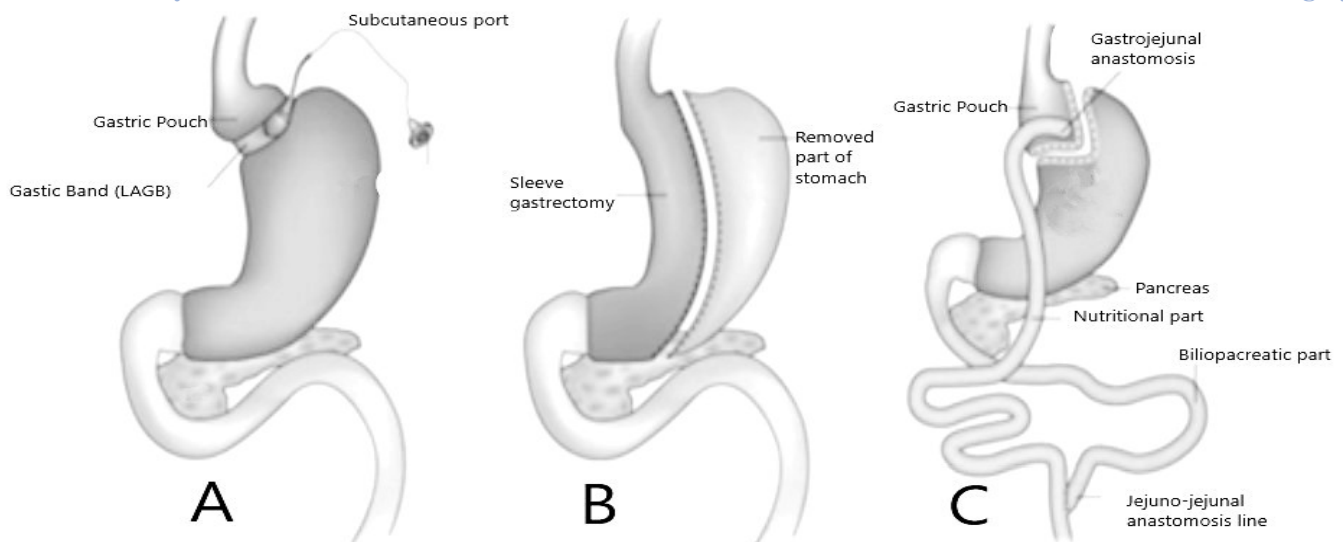


Figure 1A. Adjustable gastric band. (Adapted from references 4,5)

be listed as follows;

- To have the ability to understand the surgical procedures to be applied and to evaluate the benefits and possible complications of the surgeries

- Body mass index (BMI) >40 kg/m²
- Body mass index (BMI) >35 kg/m² and accompanying type 2 diabetes, hypertension, dyslipidemia, sleep apnea, arthritis

- Patients with body mass index (BMI) >30 kg/m² and uncontrolled type 2 diabetes, which has been shown by increasing studies in recent years

- Adherence to lifestyle changes to be applied in the postoperative period

- Being between the ages of 18-68: Although there is an age limit, there may be differences in the age range according to the performance status of the patients.

BARIATRIC SURGERY TECHNIQUES

Bariatric surgery techniques are surgical techniques that can be performed by open, laparoscopic, robotic, or endoscopic methods, which restrict food intake by reducing the stomach volume, shortening and/or bypassing the intestinal segment where the ingested food will be absorbed, or provide weight loss by combining both methods. Briefly, it can be grouped under two main headings restrictive and malabsorptive.

Restrictive Techniques

An adjustable gastric band (LAGB, lap band): It was first used in morbid obesity surgery in 1993 and is still being used in the USA with FDA approval since 2001 (3). In this method, a gastric pouch of approximately 30 ml is created by placing a silicone band 2-3 cm below the gastroesophageal junction (**Figure 1A**) (3,4). In this way, the patient's early feeling of satiety is ensured and less caloric intake is realized. It is the most physiological surgical procedure because there is no need for any resection, diversion, or bypass procedure in the stomach

or intestinal system. Weight control is attempted by inflating and deflating the silicone band around the stomach with the help of a fully reversible port placed under the skin when desired. With this method, the rate of extreme weight loss (Excess Weight Loss: EWL), which is accepted as an indicator of surgical success, is not as high (usually as much as 50%) as the achieved weight loss following sleeve gastrectomy and gastric bypass surgery (50-70%). However, this method is still used in the USA because it does not require resection. However, it is a method that has begun to be abandoned in Europe and many parts of the world.

Sleeve gastrectomy: It was previously used as a first-line surgery in patients with a very high body mass index to reduce excess weight and reduce complications associated with prolonged surgery before surgeries such as Roux en-Y gastric bypass (RYGB), biliopancreatic diversion - duodenal switch (BPD-DS) (6). Due to the effective weight loss and good metabolic results observed in the postoperative period in following periods, sleeve gastrectomy was started to be performed as the primary surgery by Canadian surgeon Michel Gagner (4) (**Figure 1B**). Today, laparoscopic sleeve gastrectomy (LSG) has become a safe and effective primary bariatric surgical method with high popularity and increasing frequency for surgeons and patients. The success of the surgery is based on creating a tubular stomach with the appropriate technique and leaving no gastric fundus part behind. Although EWL rates are 60-70% at the end of 2 years, weight regain is seen at 55-60% rates after 5 years (7).

Malabsorptive Techniques

Roux En Y gastric bypass: It is the most frequently performed bariatric surgery technique in the world, especially in the United States (8). It provides effective weight loss with its restrictive effect with the gastric pouch of 10-30 ml volume formed in the stomach

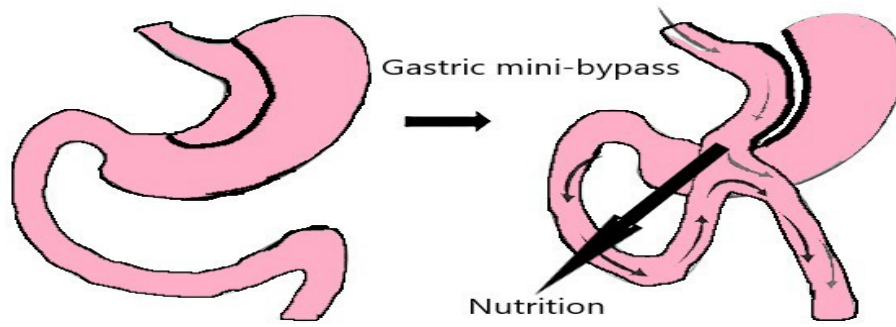


Figure 2. Mini gastric bypass. Retrieved from Mahawar et al. (11)

section below the gastroesophageal junction and by reducing food absorption by bypassing a part of the duodenum (**Figure 1C**). Since a certain part of the small intestine is bypassed, the total length of the intestine where food is digested and absorbed is shortened; thus, the amount of calories and fat taken with the surgically created malabsorption is reduced. Due to a number of intestinal hormones secreted due to the newly formed digestive tract, hunger is suppressed, the patient feels satiated, and it is observed that type 2 diabetes is treated by regulating sugar metabolism (9). With this bariatric procedure, patients can lose 60-80% of their excess weight (EWL). The disadvantages are that weight regain is low compared to sleeve gastrectomy but relatively high compared to other procedures, and the risk of internal herniation because more than one anastomosis is required.

Mini gastric bypass -single anastomosis gastric bypass: This technique was developed by Dr. Robert Rutledge in 1997. In fact, this technique is based on the Billroth 2 gastrojejunostomy logic, which is performed following stomach ulcers and stomach cancer in the past years (10). A 20 cm gastric pouch is prepared along the long axis of the gastric minor curvature under the guidance of the intraluminal gastric tube, and the procedure is completed by performing a

gastrojejunostomy anastomosis 150-200 cm distal to the ligament of Treitz (**Figure 2**). It is an effective surgical method that is in restrictive and absorption-reducing features. While performing it with a single anastomosis technique is superior to RNY, intestinal gastric bile reflux that may develop afterward is seen as a disadvantage of the procedure. In recent years, this surgical procedure, the frequency of which has been increasing all over the world, is increasing in popularity in terms of the short operation time, easy application, weight loss equivalent to other methods, and resolution of comorbidities.

Biliopancreatic diversion ± duodenal switch: The biliopancreatic diversion was first described by Scopinaro et al. in 1979 (12) (**Figure 3**). This surgery consists of a horizontal gastric resection with the closure of a duodenal stump, gastroileal anastomosis, and an ileoileal anastomosis, to form a 50 cm common channel and a 250 cm alimentary channel. It is the least frequently performed bariatric surgical procedure today. It has a limited application area in patients who are super obese (BMI >60 kg/m²) or in cases where revision is required after the first surgery. It is one of the surgeries that most disrupt physiology (13). Complications can include serious nutritional losses, diarrhea, and conditions that impair quality of life such as steatorrhea. It is recommended that this technically

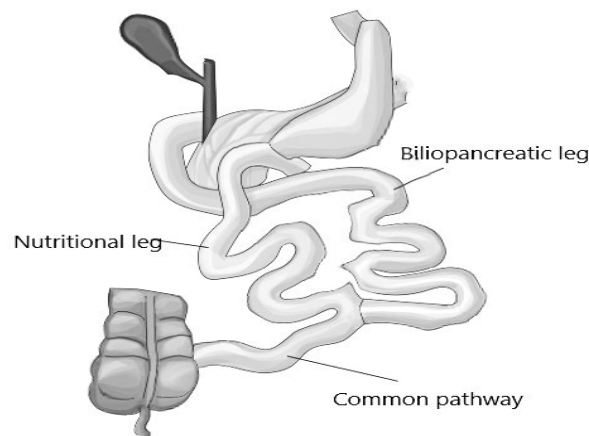


Figure 3. Biliopancreatic diversion and duodenal switch (Adapted from reference 12)

difficult procedure be performed in centers with suitable technical infrastructure, high patient volume, and by experienced surgeons (14).

Conclusion and Look to the Future

The rates of obesity and diabetes mellitus are growing among all ages of the population, especially among young adults. As the population becomes more obese and access to weight loss procedures becomes more accessible, it is clear that the number of bariatric surgical operations will increase in the future. It is a debate whether bariatric surgery is the solution to the problem and whether bariatric surgery should not be considered a treatment for obesity-related morbidities. However, lifestyle intervention has modest improvements in long-term outcomes in obesity, so bariatric surgery is becoming increasingly attractive. However, justifying this procedure for obesity treatment requires stronger evidence given the potential complications and recurrence of obesity.

DISCLOSURES

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