

## Role of Laparoscopic Surgery in Bariatric Surgery

Saif Majed A Alzabni<sup>1</sup>, Raed Walif Maseud Alrashdi<sup>2</sup>, Saidan Walif Maseud Alrashdi<sup>2</sup>,  
Khalid Atqa D Alreshidi<sup>1</sup>, AbdulRahman Fadhi Alrashidi<sup>3</sup>, Ahmed Abdulkarim M  
Alshammari<sup>4</sup>, Mohammed Musnad Alrashdi<sup>5</sup>, Mohammed Sulaiman Mohammed Alajlan<sup>6</sup>,  
Abdulrhman Olyan Alsobhi<sup>6</sup>

<sup>1</sup>*Operating room technician, Hail General Hospital-Hail*

<sup>2</sup>*Operating room technician, Al-Sulaimi General Hospital-Hail*

<sup>3</sup>*Operating room technician, King Fahd Specialist Hospital in Buraydah-Buraydah*

<sup>4</sup>*Operating room technician, King Salman Specialist Hospital -Hail*

<sup>5</sup>*Operating room technician, Maternity and Children's Hospital - Hail*

<sup>6</sup>*Operating room technician, King Khalid Hospital-Hail*

### Abstract

Obesity has become more common in recent years, and it is currently one of the biggest global public health issues. Since there is increasing agreement that bariatric surgery is now the most successful and long-lasting treatment for clinically severe obesity, the number of bariatric surgery procedures performed has grown significantly in recent years. Since bariatric surgery improves quality of life, reduces obesity-related comorbidities and mortality, and achieves sustained weight loss, it is widely acknowledged as a very successful treatment for obesity. All things considered, bariatric surgery is linked to a 42% decrease in cardiovascular risk and a 30% decrease in all-cause mortality. The purpose of this study was to evaluate the utility of laparoscopic surgery for treating obesity and for bariatric procedures.

**Keywords:** *laparoscopic, surgery, bariatric, obesity.*

### Introduction

Obesity has become more common in recent years, and it is currently one of the biggest global public health issues. Since there is increasing agreement that bariatric surgery is now the most successful and long-lasting treatment for clinically severe obesity, the number of bariatric surgery procedures performed has grown significantly in recent years [1].

Over the last few decades, the obesity pandemic has become worse and is now a global public health concern. There is increasing agreement that the majority of patients with clinically severe obesity who are

most at risk for the death and comorbidities associated with obesity should be treated primarily with bariatric surgery. Over the past few decades, The amount of bariatric surgery operations performed has increased dramatically. Researchers found that there was an 800% rise in bariatric surgery operations performed in the US between 1998 and 2004 (13,386 vs. 121,055). Data gathered globally between 1998 and 2003 shows an increase in procedures from 40,000 to 146,301. This growth in procedures is also evident [1].

Over 2.5 million deaths globally occur as a result of these comorbidities. Obesity has a significant negative impact on life expectancy;

for example, a 25-year-old male who is morbidly obese has a 22% lower predicted remaining lifetime than a person of normal weight, which translates to a loss of almost 12 years of life [2].

Regretfully, diet treatment is not very successful in treating obesity over the long run, both with and without support groups. As of right now, there are no pharmacological treatments that can effectively cure obesity, particularly morbid obesity. Guidelines for surgical treatment of morbid obesity (BMI  $\geq 40$  or  $\geq 35$  in the context of major comorbidities) were set by the National Institutes of Health in 1991. This procedure is now known as bariatric surgery [3].

Since bariatric surgery lowers mortality and morbidity associated with obesity while also improving quality of life, and achieves sustained weight loss, it is widely acknowledged as a very successful treatment for obesity. All things considered, bariatric surgery is linked to a 42% decrease in cardiovascular risk and a 30% decrease in all-cause mortality. Surgical procedures can be broadly categorized as malabsorptive procedures (where the primary cause of weight loss is malabsorption), restrictive procedures (where the stomach's capacity is considerably reduced), or a mix of features that are malabsorptive and restricting [4].

During laparoscopic surgery, small keyhole incisions are made, and a laparoscope—a thin rod with a camera attached is used to see the abdominal and pelvic cavities. With this minimally invasive surgical method, patients recover more quickly and have better results [5].

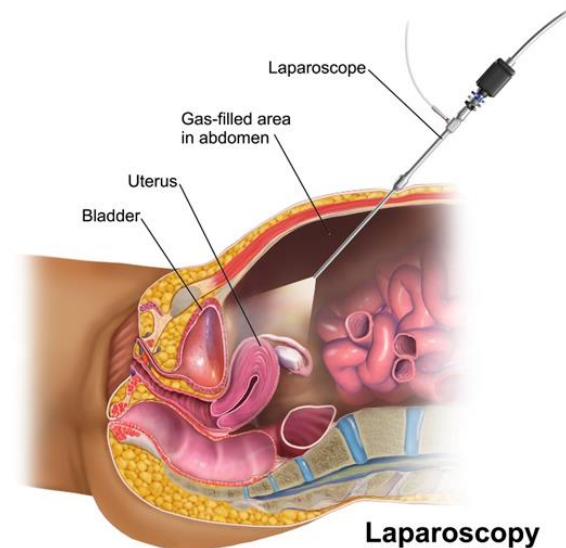


Figure (1) picture of a laparoscopy[5].

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## Literature review

### Laparoscopic surgery

A minimally invasive surgical procedure utilized in the abdomen and pelvis is called laparoscopic surgery. It employs a laparoscope to see inside your body without fully opening it up. A laparoscope is a thin, telescopic rod with a camera at the end. In contrast to open abdominal surgery, which requires a 6- to 12-inch incision, laparoscopic surgery only requires two to four tiny incisions, each no larger than half an inch. The others are for the surgical tools, and one is for the camera. Keyhole surgery is another name for minimally invasive surgery that refers to very tiny incisions [5].

Although it is acknowledged to be a significant milestone, laparoscopic surgery has been termed the greatest innovation in surgery. However, because of its unrestrained proliferation, it has been called the “biggest unaudited free-for-all in surgical history.” The majority of the time, laparoscopic surgery is rather invasive, requires a general anesthetic, and has only marginally improved on existing therapies. In fact, “minimally invasive” surgery

was subsequently replaced by “minimal access” surgery [6].

Laparoscopic surgery is a cutting-edge method to gain access to the abdominal cavity. It uses optics and electrical imaging tools to replace a single large incision with numerous smaller ones. This apparatus should enable future surgeries to be more exact and accurate because to the remarkable, greatly magnified views of the surgical anatomy and pathology it provides [7].

Since the debut of laparoscopic cholecystectomy in the late 1980s, the use of minimally invasive (laparoscopic) surgery has increased significantly in general surgery. The development of numerous medical tools and techniques led to this, including the invention of pneumoperitoneum by Kelling, the use of carbon dioxide by Zollkofer, the dual-trochar technique by Kalk, the use of the Veress needle to create pneumoperitoneum by Veress, the Hasson trochar, the first laparoscopic appendectomy by Semm, and the laparoscopic cholecystectomy by Muhe and Perrisat. Minimally invasive surgery is currently the most important subspecialty of general surgery [8].

#### Bariatric surgery

Regardless of the type of surgery performed, bariatric surgery is now thought to be the most effective treatment option for morbid obesity. It improves weight loss outcomes and obesity-related comorbidities more than non-surgical therapies do. There are several surgical choices that are always changing according to findings in the literature, unique local situations, and the surgical staff's expertise in each nation [9].

In the last 15 years, there has been a significant rise in the obesity rate: for boys, it has risen from 2% to 10% and for girls, from 2% to 9%. Furthermore, obesity is thought to be a direct cause of one in ten early deaths among Canadian people between the ages of 20 and 64. Resurgent interest in bariatric (obesity) surgery has resulted from the poor long-term efficacy of behavioral and pharmaceutical therapy in individuals suffering from extreme obesity in Canada. Several governments are

now working to increase program accessibility for bariatric surgery. More than 4000 to 5000 patients in Canada are expected to have bariatric surgery in the near future; as a result, family physicians will be crucial in advising patients about the necessity of bariatric surgery and will require training in long-term patient management [10].

Bariatric surgical procedures:

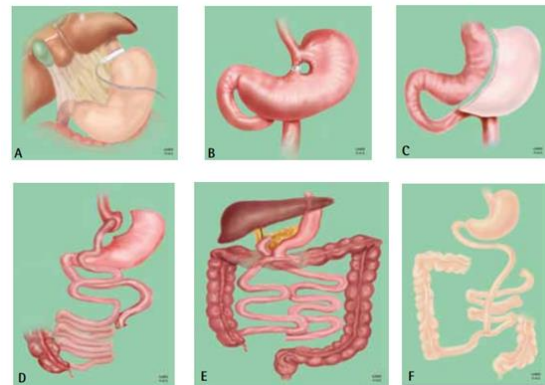


Figure (2) Bariatric surgical procedures [11].

Why does this study search about bariatric?

More weight loss has been seen with bariatric surgery than with non-surgical care, and more significantly, weight loss has been shown to be sustained over the long run. For individuals who have co-morbidities and a body mass index of 40 or less, bariatric surgery is currently thought to be the only effective treatment for obesity. Numerous comorbidities, such as type 2 diabetes, hypertension, obstructive sleep apnea, and steatohepatitis, can be alleviated or even totally reversed with surgery, according to a plethora of research [4].

The Swedish Obese Subjects, one of the oldest weight-loss studies, assessed the long-term effects of several bariatric surgeries and showed a considerable improvement in quality of life along with a significant reduction in death from cancer and cardiovascular disease. Bariatric surgery is superior to pharmacological therapy in establishing remission of type 2 diabetes and improving the overall cardiovascular risk profile, according to observational and randomized controlled trials with up to a 5-year follow-up period [4].

Who was advised to undergo bariatric surgery?

Bariatric surgery (BS) is recommended for those with a Body Mass Index (BMI) of 40 kg/m<sup>2</sup> or above, or with a BMI between 35 and 40 kg/m<sup>2</sup> with obesity-related comorbidities [12].

Advantages of laparoscopic in bariatric:

#### 1-Reduced wound size

Keyhole surgery, sometimes referred to as laparoscopic surgery, involves making very small incisions, around ½ of an inch or less, as opposed to the huge incisions, 6 to 12 inches, needed for open surgeries. This translates to less blood loss, decreased pain and discomfort, a decreased chance of postoperative complications, and a quicker recuperation for the patient.

#### 2-Less scarring

Reduced scarring is a big advantage of laparoscopic surgery. Utilizing cutting-edge technology, the method pinpoints exact incision sites to guarantee minimal invasion, allowing patients to recuperate more quickly and with fewer scars following surgery [13].

#### 3- Lower loss of blood

Excessive bleeding during surgery is less likely when laparoscopic treatments are performed with tiny incisions and cutting-edge technologies. This lowers the likelihood that the patient will need blood transfusions and increases patient safety.

#### 4- Improved illustration

High-resolution cameras and sophisticated imaging equipment are used in laparoscopic surgery to give the surgeon a clear, magnified picture of the operating site. This increased visual acuity contributes to safer and more successful surgical outcomes [13].

#### 5- lower risk of infection

Comparing laparoscopic surgery to regular surgical techniques, the risk of infection is much lower. Smaller incisions lessen the possibility that internal organs would be exposed to outside pollutants, which is

particularly advantageous for patients who are obese. Laparoscopic surgery leaves smaller scars, which improves patient safety by lowering the risk of post-operative infections.

6-faster recuperation and resume of regular activity

Laparoscopic surgery allows the patient to recuperate in just two to three weeks, as opposed to standard surgical treatments that require a recovery period of four to eight weeks. This enables them to swiftly return to their regular routines [13].

7- The use of CO<sub>2</sub> pneumoperitoneum is the factor responsible for the unfavorable physiologic changes during laparoscopic surgery, and reduced tissue injury is likely the main cause causing the positive outcomes of laparoscopic bariatric surgery. While the favorable effects of reduced tissue injury affect the period from injury to recovery, the adverse effects of CO<sub>2</sub> pneumoperitoneum are temporary during the intraoperative phase [13].

Types of laparoscopy bariatric surgery

#### 1. Laparoscopic sleeve gastrectomy

The stomach is divided vertically throughout the procedure, resulting in a 75% reduction in size. The maintenance of the pyloric valve at the bottom of the stomach guarantees that stomach function and digestion remain unaffected. This is an irreversible procedure that might be the first stage of a Roux-en-Y gastric bypass or duodenal switch (RYGB) [4].

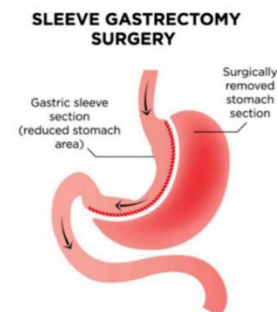


Figure (3) laparoscopic sleeve gastrectomy [4].

2. By encircling the top portion of the stomach with an inflatable band to create a little pouch, laparoscopic adjustable gastric banding.

To create a 15–30 mL gastric pouch, an adjustable silicone band is wrapped around the upper abdomen, right behind the cardia. By injecting or removing saline through a portal inserted into the subcutaneous tissue and attached to the band, the width of the exit can be altered [4].

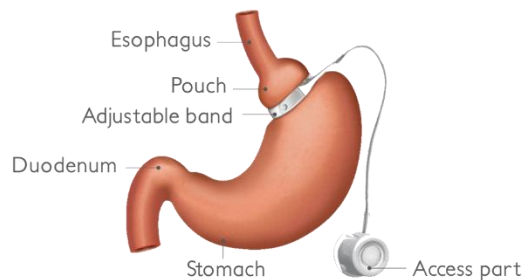


Figure (4) laparoscopic adjustable gastric banding [4].

### 3. Laparoscopic gastric bypass

#### Laparoscopic R-Y gastric bypass

The advancement of metabolic and bariatric surgery has been expedited by the laparoscopic R-Y gastric bypass procedure (LRYGB). Following RYGB, long-term weight reduction (>10 years) was estimated to be between 25 and 30 percent overall weight loss and 55 to 70 percent excess weight loss (EWL). Revision surgery may be necessary for up to 20% of RYGB patients due to various problems or weight gain. Weight gain following laparoscopic resection of the stomach was linked to anastomosis and pouch dilatation. Recently, endoscopic therapy was established, and it is advised as the initial course of treatment for patients who have weight gain following RYGB. Compared to LSG, weight reduction following LRYGB was shown to be comparable or somewhat better; however, LRYGB was associated with higher nutritional deficits. Thus, rather than LRYGB, LSG is currently the most popular bariatric and metabolic operation [14].

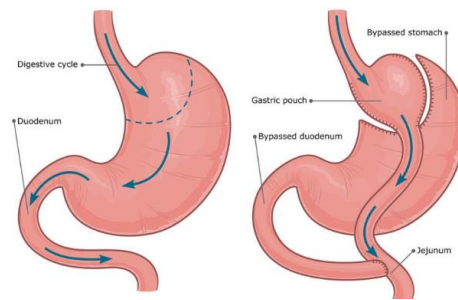


Figure (5) Gastric Bypass [14].

#### Laparoscopic single anastomosis (Mini-) gastric bypass

Rutledge originally described the Mini-Gastric Bypass, also known as the streamlined single anastomosis gastric bypass, in 2001. A randomized trial established that the treatment is safer and easier to do than LRYGB, despite considerable debate surrounding it in the USA [14].

#### Role of laparoscope in sleeve gastrectomy

##### Steps in laparoscopic surgery:

###### 1- Position

The patient is positioned with their legs apart, right arm abducted, and left arm adducted and tucked in a steep reverse Trendelenburg posture. The scrub nurse is to the left and the camera surgeon is to the right of the operating surgeon, who is positioned between the patient's legs. The patient's left shoulder is adjacent to the instrument trolley. At the head end is the monitor unit. Adjacent to the right shoulder is the anesthetist trolley [15].

###### 2- Incision and Port Placement

The umbilicus is everted using an Allis clamp. A 3.4-cm reverse omega-shaped incision is created at the base of the everted umbilicus such that, should it invert back, it would be hidden within the umbilicus' summit. The subcutaneous fibrous attachments would be dissected until the anterior rectus sheath was reached, without cutting the umbilicus. This dissection is done with scissors at the umbilical cicatrix in order to reach its nadir, which links to the sheath [15].

### 3- Liver Retraction

Following peritonectomy, the liver's left lobe is retracted. While it is not necessary to retract the liver in order to execute the surgery, we think it is a crucial step in order to see the gastroesophageal (GE) junction [15].

### 4- Dissection

Using a Ryle's tube or gastric calibration tube, the stomach must be thoroughly emptied before starting the dissection process. Since the incisura angularis is the location directly opposite the greater omentum's thinnest component, the dissection starts with dividing the greater omentum's attachment to the stomach's greater curvature [15].

### 5- Application of Staplers

The sleeve is made to fit over an Ethicon 37.6 French gastric calibration tube. The staplers are applied with the working trocar (12 mm) in the left hand. The stomach sleeve is resected by firing 60-mm linear cutting staplers one after the other in succession [15].

### 6- Closure of Incision

Under vision, each of the two fascial deficiencies (12 and 10 mm) is closed separately with a non-absorbable monofilament suture. Using 3-0 Vicryl, interrupted subcuticular stitches are used to seal the skin [15].

Effect of sleeve gastrectomy on disease as diabetes

Recent research revealed that sleeve gastrectomy combined with intense medical therapy was a more practicable and effective way to reduce hyperglycemia in obese patients with type 2 diabetes (BMI between 27 and 43) than intensive medical therapy alone. Following a sleeve gastrectomy, there was a notable decrease in FBS and HbA1c levels and an impressive increase in insulin sensitivity. This is mostly due to the rise in CCK (a neuropeptide that increases insulin secretion), GIP, GLP1, and GLP2, which are important for metabolic regulation and diabetes resolution, along with the decrease in ghrelin serum levels.

Serum uric acid reduction was also linked to insulin resistance remission in patients following bariatric surgery who were extremely obese [16].

In terms of glycemic control and type 2 diabetes remission, surgical treatment outperformed medication therapy; however, there were differences in the rates of remission from one to five years after treatment (Table). Overall, medicinal treatments and surgery reduced HbA1c by 0.4% to 1.5% and 1.8% to 3.5%, respectively, in terms of glycemic control. A growing body of research indicates that bariatric surgery lowers the likelihood of type 2 diabetes's macrovascular and microvascular complications [17].

## Conclusion

Laparoscopy is currently the "gold standard" for the surgical therapy of morbid obesity. A wide range of procedures, including sleeve gastrectomy, adjustable gastric banding, vertical banded gastroplasty, Roux-en-Y gastric bypass, and biliopancreatic diversion, can be carried out.

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