**International Journal of Healthcare Sciences** ISSN 2348-5728 (Online)
Vol. 4, Issue 2, pp: (1773-1780), Month: October 2016 - March 2017, Available at: www.researchpublish.com

# Comprehensive Review of Bariatric Surgery Procedures

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***Abstract:*** **The Goal of this review was to introduction the Bariatric surgery procedures, also to evaluate which treatment, and problem which follow after these various surgeries. We conducted an electronic literature search of MEDLINE, EMBASE, and Cochrane Library databases, until December 2016.This paper briefly summarizes present surgical choices for weight loss with a focus on the majority of utilized procedures. Bariatric surgical treatment should be considered for patients who have actually not achieved adequate weight reduction with lifestyle and medical management who are at high risk of morbidity and death, and who are struggling with the complications of obesity. Success with bariatric surgery is most likely when multidisciplinary health care suppliers, in conjunction with primary health care suppliers, evaluate, treat, keep an eye on, and assess individuals both before and after surgery. Cosmetic surgeons ought to use the competence of their multidisciplinary care group to promote and manage the health of their bariatric surgical patients. Nevertheless, SG achieves clearly much better results than other limiting methods and is equivalent in some elements to the Roux-en-Y gastric bypass, the present gold requirement in bariatric surgical treatment.**

***Keywords:*** **Bariatric surgery procedures, various surgeries, bariatric surgery.**

## 1. INTRODUCTION

The prevalence of obese and weight problems is increasing internationally [(1)]. Amongst high-income nations, the United States has the highest mean body mass index (BMI) for ladies and guys, [(2)] and over two-thirds of U.S. adults aged 20 or older are obese or overweight [(3)]. Overweight and obesity are connected with increased risk of morbidity and mortality. Approximately 112,000 deaths each year are connected with obesity in the United States [(4,5,6, 7,8)]. Treatments of weight problems, other than surgical treatment, are typically ineffective in long-lasting weight control [(9,10)]. In addition to continual weight loss, surgical treatment offers fringe benefits to people with obesity-related comorbidities and reduces relative risk of death due to substantial weight-loss [(11)]. As a result, the demand for bariatric surgery has increased dramatically in recent years. The overall number of operations performed in the United States and Canada reached 220,000 in 2008 to 2009 [(12)].

Present surgical options performed in large volume in the US consist of laparoscopic Roux-en-Y gastric bypass (LRYGB), laparoscopic vertical sleeve gastrectomy (LVSG), and laparoscopic adjustable gastric band (LAGB) positioning. Laparoscopic duodenal switch (DS)/ biliopancreatic diversion is much less often performed. Saline-filled intragastric balloons have likewise just recently been developed to endoscopically treat obesity [(4,6,12)]. Designed to occupy space in the stomach, intragastric balloons induce satiety and minimize food consumption. Thus the Goal of this review was to introduction the Bariatric surgery procedures, also to evaluate which treatment, and problem which follow after these various surgeries.

## 2. METHODOLOGY

We conducted an electronic literature search of MEDLINE, EMBASE, and Cochrane Library databases, until December 2016. We used the search Mesh terms: *bariatric surgery*, *obesity surgery*, *gastric band*, *gastric bypass*, *sleeve gastrectomy*, and *gastroplasty* in combination with *weight gain* or *weight loss* or *nutrition*. Studies search were restricted to the English language, and human subjects. Furthermore, studies were searched using the references lists of found articles.

## 3. RESULTS

- **Laparoscopic Roux-en-Y gastric bypass (LRYGB):**

LRYGB has emerged as a durable bariatric surgical procedure since the mid-1990s (13), although its open counterpart had been performed for weight loss since the 1960s (14). The procedure of gastric bypass has been well documented and can be performed with some variability, but the current iterations of the procedure utilize a small gastric pouch with a volume of ~30 cc to restrict meal size and a Roux-en-Y jejunojejunostomy reconstruction distally for drainage of the remnant stomach and biliopancreatic limb (15). Approximately, 30–40 cm distal to the ligament of Treitz, the jejunum is divided. The distal cut end of the jejunum (the Roux limb) is anastomosed to the gastric pouch, and the proximal cut end of the jejunum (the biliopancreatic limb) is anastomosed 75–150 cm distal to the gastrojejunostomy (Figure 1). Variable alimentary (Roux) limb lengths of 75–150 cm are constructed to affect a more extensive "bypass" of proximal intestines with varying results on weight loss (16,17).

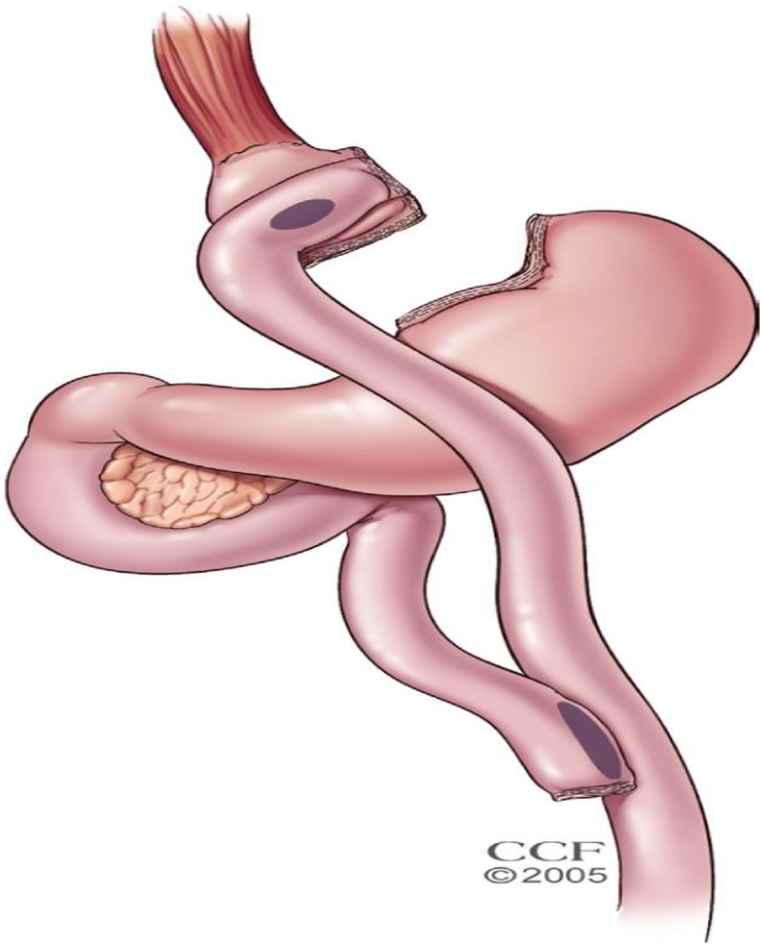


**Figure 1: Roux-en-Y gastric bypass.**

- **Laparoscopic sleeve gastrectomy:**

Sleeve gastrectomy (SG) began to be used in 1988 as a variation of biliopancreatic diversion (BPD) with duodenal switch [18,19]. In contrast to the BPD described by Scopinaro et al [20] in which a horizontal gastrectomy was carried out, the pylorus and duodenum were preserved in SG, yielding a decrease in dumping symptoms and minimal ulcers. In addition, gastrectomy was more restrictive, allowing a decrease in the malabsorptive element and dietary secondary impacts [21]. This method was performed openly, with Ren et al [22] being the first to perform it laparoscopically in the late 1990's. In the early 2000's, provided the high frequency of problems in patients with a high body mass index (BMI) [23], Regan et al [24] described a two-step approach to treat patients with high surgical risk. In an initial step, SG was executed to accomplish enough weight reduction to allow the Roux-en-Y gastric bypass (RYGB) or BPD to be performed more securely in a second action [25].

SG is a bariatric technique including subtotal vertical gastrectomy with conservation of the pylorus, consisting of longitudinal resection of corpus, fundus and antrum, to produce a tubular duct along the lesser curvature. Resection makes up approximately 80% of the stomach and the remnant gastric has a capacity > 100 mL. It is thought about a much easier strategy than other treatments such as RYGB, given that multiple anastomoses are required [25] (**Figure 2**). Variations of SG have actually been described, and although no relative research studies have actually been conducted, none seems to use benefits. SG has actually been carried out with different degrees of intestinal bypass, consisting of versions with 2 exits from the stomach such as SG transit with bipartition [26] and SG with loop bipartition [27]. In an effort to achieve a surgery with more metabolic impacts, SG has also been linked with ileal transposition [28]; finally, short-term research studies on SG with a gastric band have actually been reported [29]. SG yields much better results than other restrictive methods and resembles RYGB in regards to weight-loss and carb metabolism improvement in the brief and medium term [30]. This SG superiority over other restrictive techniques has actually been connected to various systems such as adjustment of gastrointestinal motility, hormone mechanisms, changes in bile acids and gut microbiote. Unlike other limiting techniques such as gastric banding, SG provokes a rapid gastric emptying and sped up intestinal transit [31,32]. It appears that the rapid transit may set off hormone systems that will be described listed below; it could likewise cause increased satiety, as accompanies drugs that boost gastric emptying [33].

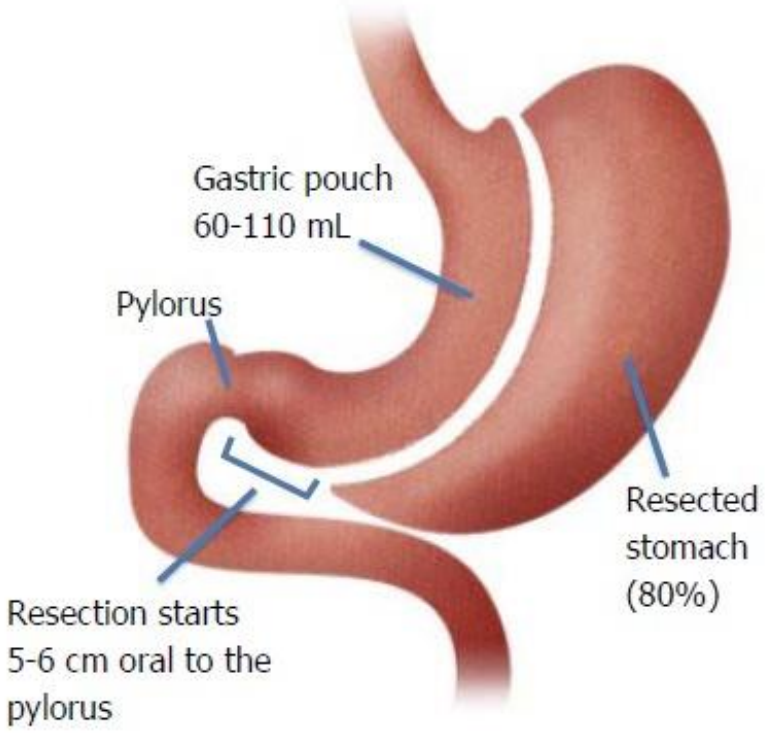


**Figure 2: Sleeve gastrectomy.**

- **Comparing the above mentioned procedures:**

When comparing LVSG and LRYGB weight loss results, the treatments are similar. There is a propensity toward greater %EWL for LRYGB [34,35,36,37]. Excess body weight reduction ranges between 46% and 81% for patients who have actually gotten LVSG compared to 59%-- 94% for patients getting LRYGB. The issue rates for both the procedures are low (**Figure 3**) [34,35,36,37]. Bleeding problems vary in between 0% and 3.6% in patients going through LVSG compared to 1.5%-- 5% in patients undergoing LRYGB [34,35,38,40]. Leak rates range between 0% and 2.3% in patients treated with LVSG compared to 0% - 1.9% in patients treated with LRYGB [34,36,37,38]. Venous thromboembolism problems consisting of both deep venous apoplexy and lung embolism rates range in between 0.2% and 3.39% for patients who got LVSG compared with 0.2% - 0.7% in patients who got LRYGB. Obstruction, including stenosis or little bowel blockage, took place in 0%-- 1.3% of LVSG patients and 0%-- 3.4% of LRYGB patients. Death is rare for both personnel treatments, ranging from 0% to 0.2% in patients who received an LVSG and 0%-- 0.4% in patients who received an LRYGB [34,35,36,37,38,39,40].

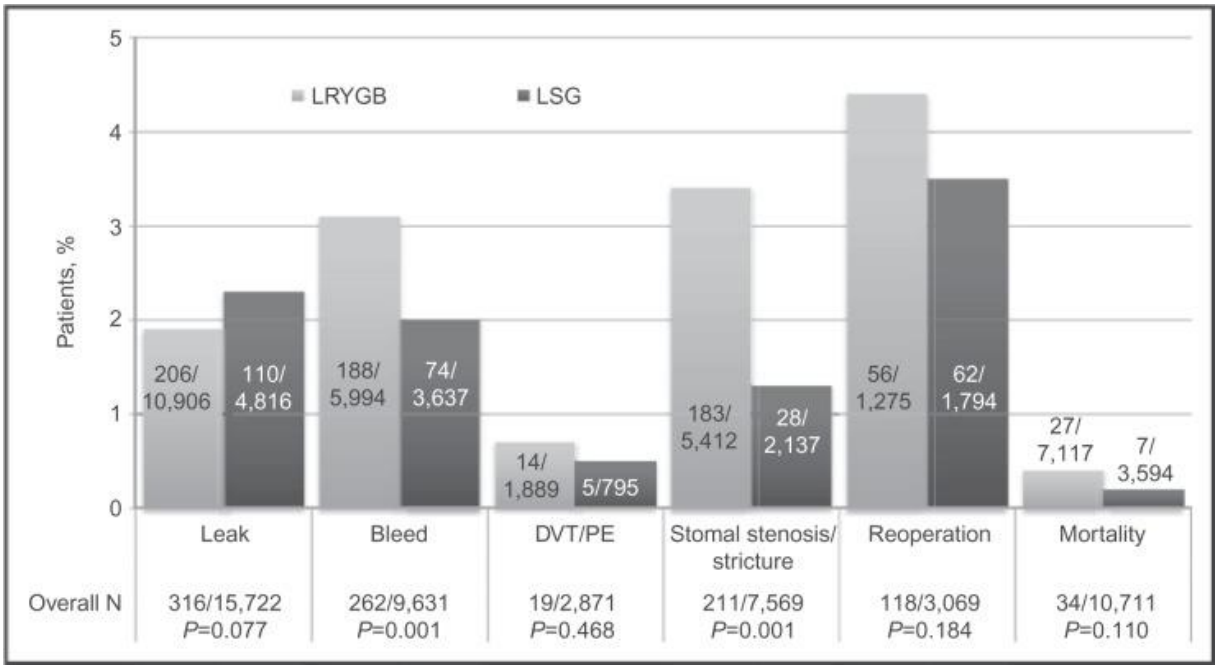


**Figure 3: Thirty-day complication rates. according to 7 studies [34-40]**

- **Intragastric balloons technique:**

Intragastric balloons are a recently developed endoscopic therapy for weight-loss. The balloons are endoscopically placed into the stomach and filled with saline, planning to inhabit area in the stomach to cause satiety and decrease food consumption (**Figure 4**) [42]. Research studies have shown the balloons to induce %EWL of 25% - 40% [42]. Negative effects and problems consist of queasiness, vomiting, abdominal pain, ulcer development, balloon deflation, and gadget migration.

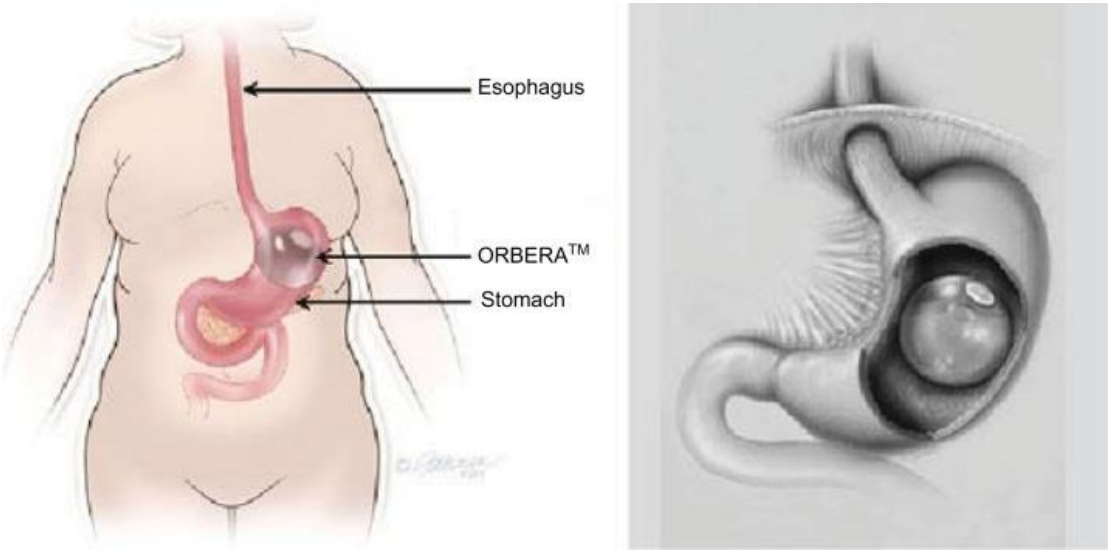


**Figure 4: Intragastric balloon.**

- **The implantable weight loss device:**

The primary focus of this paper, the VBLOC device, makes use of the vagus nerve as the target of treatment. Instead of carrying out a permanent truncal vagotomy, the goal was to intermittently interrupt transmission of the vagus nerve, theoretically causing less physiologic adjustment and for that reason a more irreversible effect [43]. This has actually led to the development of the Maestro Rechargeable System (VBLOC device) which was approved by the US Food and Drug Administration (FDA) in 2015 (**Figure 5**) [43]. VBLOC is the first weight reduction gadget authorized by the FDA considering that the laparoscopic gastric band in 2001 [43].

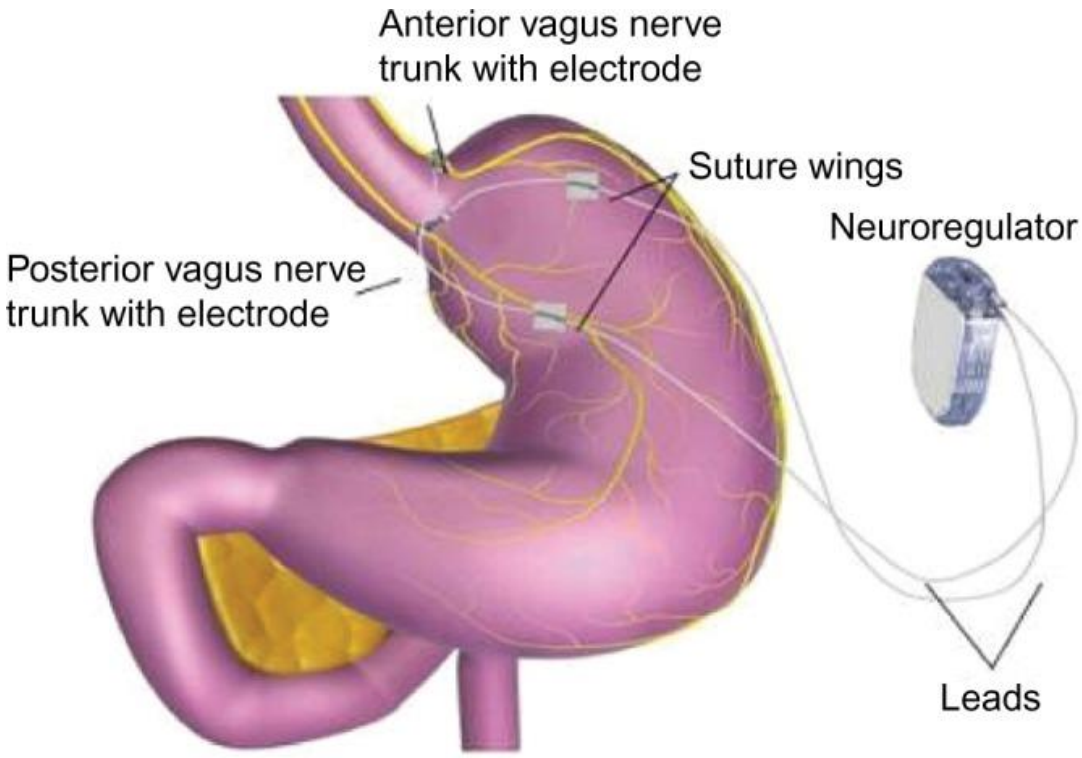


**Figure 5: (VBLOC device).**

Until just recently, the vagus nerve has actually not been widely included as part of the treatment for obesity. One of the earliest reports studying vagotomy for weight loss in animals was printed in 1964, assessing the result of vagotomy and pyloroplasty on weight reduction in dogs [(44)]. A little case series first explaining the utilization of vagotomy in humans for the treatment of weight problems was published in late 1979 [(45)]. Truncal vagotomy was carried out on 13 patients with a mean starting weight of 123 kg, as a treatment for morbid obesity. Weight decreases of 20- 30 kg (range 2- 64 kg) were observed during follow-up durations varying from 4 to 24 months [(45)]. Ever since, there have been a small number of studies showing minimized calorie intake and boosted weight-loss results after truncal vagotomy, more than likely secondary to reduced liquid calorie consumption [(46)]. Nevertheless, with the fast development of laparoscopic gastric bypass and laparoscopic gastric band in the 1990s and early 2000s and reports of less durable weight reduction results with truncal vagotomy (% EWL less than 25% and maintenance of weight-loss less than 5 years) [(47)], the interest in the vagus nerve waned.

- **General Complications associated with bariatric surgery:**

Mortality rates are less than 1% for patients with BMIs less than 50 kg/m$^2$ who are younger than 55 years of age [(48)]. For patients with BMIs greater than 60 kg/m$^2$, who likewise have comorbid conditions, the death rate is 2% to 4%. Lower risk of morbidity and death are positively correlated with surgical volume at the clinic (> 100 cases each year), cosmetic surgeon experience, surgery at a tertiary care center, sex of patient (woman), age of patient (< 55 years), and respiratory status [(49)]. Typical bariatric surgical complication rates are less than 10% [(50)]. A bariatric surgical patient varies from the average basic surgery patient because problems may present with minimal physical symptoms and signs, the patient is challenging to evaluate owing to his/her body habitus and inability to fit on many diagnostic examination tables, and the patient weakens rapidly and has very little reserve to weather a devastating illness. The best chance to improve outcomes remains in the very first 6 to 12 hours, and after 24 hours the risk of morbidity and death intensify rapidly [(51)]. There is around a 3.1% occurrence of bleeding after bariatric surgical treatment [(52)]. Twenty-two percent of bleeds stop spontaneously, 55% require blood transfusion, and 22% need operative intervention [(52)]. Active bleeding typically provides within 6 hours of the personnel intervention and manifests with bright red bleeding orally, rectally, or abdominally, with possible hypotension and tachycardia. Prompt surgical or endoscopic intervention is required. Delayed bleeding often presents numerous days postoperatively with dark blood either within surgical drains pipes or passed orally or rectally. Delayed bleeding typically does not present with signs of hemodynamic instability, and the doctor can pursue diagnostic maneuvers such as radiologic, hematologic, and endoscopic evaluation [(50,52)].

## 4. CONCLUSION

This paper briefly summarizes present surgical choices for weight loss with a focus on the majority of utilized procedures. Bariatric surgical treatment should be considered for patients who have actually not achieved adequate weight reduction with lifestyle and medical management who are at high risk of morbidity and death, and who are struggling with the complications of obesity. Success with bariatric surgery is most likely when multidisciplinary health care suppliers, in conjunction with primary health care suppliers, evaluate, treat, keep an eye on, and assess individuals both before and after surgery. Cosmetic surgeons ought to use the competence of their multidisciplinary care group to promote and manage the health of their bariatric surgical patients. Nevertheless, SG achieves clearly much better results than other limiting methods and is equivalent in some elements to the Roux-en-Y gastric bypass, the present gold requirement in bariatric surgical treatment.

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