The Clinical Effect of Laparoscopic Sleeve Gastrectomy And Complications

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Abstract

Background: Laparoscopic sleeve gastrectomy (LSG) is an emerging surgical approach and has been a surge in popularity because of its perceived technical simplicity, feasibility, and good outcomes all over the world. LSG shown to be effective in producing weight loss and improving type 2 diabetes mellitus, but it is also has some potential complications. We believe that patients should be informed in detail on the advantages and disadvantages and complication of each available procedure. The purpose of this study was to determine the outcome of obese patients after LSG as our initial experience.

Method: All relevant articles found by Medline, Ovid and Pub Med search were used, Literature search was informed by the use of key words, sleeve gastrectomy; laparoscopy LSG; clinical effects; complications.

Conclusion: LSG has been popular as a stand-alone treatment of choice for morbid obesity. It has been shown to be extremely successful in decreasing excess weight in patients within a short time. In addition, a short list of complications contributes to its attractiveness as a treatment. After LSG procedures can be a very serious, life-threatening complication that needs immediate attention Reasonable choice and operative indications and postoperative management could help to achieve satisfactory clinical outcome.

Keywords: Laparoscopy LSG, Sleeve gastrectomy, Clinical effects, Complications.

I. Introduction

Obesity is a complex and chronic disease that is attributed to a combination of genetics and environmental factors. Obesity is a common disease affecting more than 300 million adults worldwide[1]. The incidence of obesity is steadily rising, and it has been estimated that 40% of the US population will be obese by the year 2025 if the current trend continues[2] In the United States in 2011-2012, 69% of adults aged over 20 were considered overweight, 35.1% were obese, and 6.8% were morbidly obese. Similar trend are also seen in children (2-19 years) with obesity rate of 16.9% during the same period [3]. In 2008 the World Health Organization estimated that more than 500 million adults are clinically obese (BMI > 30 kg/m²) worldwide. Obese patients develop obesity-related comorbidities including type 2 diabetes mellitus (T2DM), hypertension, dyslipidemia, coronary artery disease, certain types of cancer, and gastroesophageal reflux disease (GERD)[4, 5]. Diet control, exercise and medications are able to improve in the short term, such as blood glucose and other metabolic parameters, but Laparoscopic sleeve gastrectomy (LSG) is a bariatric procedure with very good long-term weight-reducing and metabolic effects. Bariatric Surgery is the treatment of morbid obesity Efficient methods of surgery in patients with reduced weight at the same time, significantly easing fertilizer Obese T2DM, hypertension, high cholesterol and other Metabolic complications.

Healthcare providers must consider a treatment’s effect on weight loss, as well as its impact on obesity-related comorbidities. Bariatric surgery, in conjunction with intensive lifestyle interventions and medical treatments, has been shown to produce marked weight loss and improvement in much obesity-related comorbidity[6]. However, evidence show surgeons should have an understanding of the complications associated with LSG and an approach for dealing with them. Complications of LSG that need to be identified urgently include, staple line leak, Gastroesophageal reflux disease (GERD), hemorrhage, hiatus hernia, Nutritional deficiencies, and development of an abscess. The aim of this study is to discussclinical effect and complication of LSG as a literature review.

II. Method

This study considers a number of documents and studies that need to be considered for the study. This review was conducted under PRISMA-P guidance. A search of literature was performed using Pub med, EMBASE, Cochrane Library, Ovid, and Web of Science databases were searched systematically for all articles. The following search terms were used: Laparoscopy LSG, Sleeve gastrectomy, Clinical effects, Complications which were formulated to ensure that only relevant sources are obtained. Studies were limited to

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humans and those published in English language between 2010 and 2015. Headlines and abstracts were carefully read to exclude non-pertinent articles. If any doubt of suitability remained after the abstract was examined, the full manuscript was obtained. Reference lists of all retrieved articles were manually searched for additional studies. Internet search engines were also used to perform a manual search for abstracts from international meetings which were then downloaded and studied.

The first search of literature was conducted as a component of clinical effect of laparoscopic sleeve gastrectomy and complications based on review. A supplementary study was further conducted as a way of ensuring that the material touching the subject was not misplaced. The analysis included analyzing the significance of the differences in observation and findings, and making an inference. For instance, in each case, the analysis would seek to understand what the number of sources that support certain positions is. Subsequently, the analysis would examine the significance in differences.

**History of LSG**

Bariatric surgery refers to surgical procedures designed to help people lose weight. LSG is a relatively new type of Bariatric Surgery, by restricting stomach reduction the food, while removal of rich Ghrelin Secretary cells of stomach to reduce appetite and effects weight reduction. The Sleeve gastrectomy or Gastric Sleeve procedure, involves removing about 4/5 of the stomach. It is performed by laparoscopy and consists of the restrictive portion of the biliopancreatic diversion +/- duodenal switch bariatric surgical procedure (BPD/DS). As with SG, hemorrhage, anastomotic leak and stenosis can all occur in BPD or BPD-DS. Historically, BPD has been considered a high-risk procedure, with higher rates of complications than the other major modalities. Early complications can occur more frequently, but this is in the context of higher BMI and a greater number of co-morbidities when compared with RYGB. Long-term data records an excess weight loss of more than 65% with an incisional hernia rate of 38% in BPD/BPD-DS. There is a higher rate of discontinuation of glycaemic therapy in those with diabetes, with up to 90% of individuals discontinuing oral therapy.

Initially sleeve gastrectomy was performed as an open procedure in 1988, known as the Hess and Marceau operation which is actually the first stage of the biliopancreatic diversion-duodenal switch (BPD-DS)[7]. In 1993 it was proposed as a single weight loss procedure described by Johnston, which later became known as the Magenstrasse and Mill operation. In 1999, Gagner[8] performed the first laparoscopic BPD/DS (lap BPD/DS). Since then, Regan[9], proposed sleeve Stage of gastrectomy for gastric bypass surgery, to reduce operation and Complications and mortality. Baltasar et al[10] in 2002 as a body mass index of 66 patients underwent LSG. Since then LSG gradually has been widely recognized and accepted surgeon.
Clinical Application of LSG
On the clinical application of LSG, there are two groups of thought:
1. LSG For high-risk patients with severe obesity, age, stage of operation in order to reduce the overall risk or as a previous bariatric surgery Patients gain weight back after surgery.
2. LSG as a surgery and adjustable gastric banding, gastric bypass, biliopancreatic bypass parallel independent surgical procedures.

Surgical Effects
According to Zachariah et al [11] after 5 years of follow-up from 2007 to 2012 was retrospectively analyzed that, LSG has a clear effect of weight loss and LSG were compared with other types of Bariatric Surgery weight loss effect. A randomized controlled study compared LSG with adjustable drawstring volume reduction surgery (laparoscopic adjustable gastric banding, AGB) of weight loss effect[12], the results show that LSG in postoperative patients with 1-year and 3-year average of EWL% 57.7% and 66%, respectively, while AGB after EWL% over the same period were 41.4% and 48%. In another study LSG were compared with Roux-en-Y Laparoscopic gastric bypass surgery (laparoscopic Roux-en-Y gastric bypass LRYGB) weight loss results, LRYGB average EWL to 88% (mean follow-up of 15.7 months), LSG to 70% (mean follow-up 38.3 months)[13]. Buchwald et al[14] A meta-analysis from 1990 to 2003 2738 relevant articles in English literature 22,094 patients underwent bariatric surgery results in EWL% as the evaluation standard, the results show AGB 47.5%, LSG 68.2%, LRYGB 61.6%, BPDS 70.1%; And distinct difference in weight loss between the surgical results of the gradual emergence after 2 years. The results show that, LSG after short-term weight loss effect is very significant, significantly higher than the purely restrictive procedures - AGB; studies have shown that even after two years after weight loss can be achieved classic gastric bypass surgery.

LSG and Coexisting Disease
LSG with Type 2 Diabetes Mellitus T2DM, weight loss surgery patients to reduce weight while significant and lasting remission of T2DM[14]. In recent years, more and more studies show, LSG as a new member of bariatric surgery, have significantly improved the efficacy of T2DM, including reducing or disable hypoglycemic drugs, insulin sensitivity and repair damaged restore normal levels of glycated hemoglobin HbA1c. Different studies on T2DM "mitigation" and "cure" the standards are not exactly the same, but the average coverage of the "cure rate" of 80% to 91% [15, 16]. Abbatini et al[17] Retrospective analysis of 3 years follow-up of LSG, LRYGB, AGB, postoperative T2DM the cure rates were 80.9%, 81.2% 60.8%, and by hyperinsulinemic-euglycemic clamp assay to have been cured of insulin sensitivity in patients were normal. Buchwaldetal[14] meta-analysis showed that, Weight loss surgery T2DM, the total cure rate was 76.8%.Where LSG cure rate of T2DM is 71.6%, lower than the biliopancreatic bypass (biliopancreatic diversion, BPD) (98.9%) and LRYGB (83.7%) higher than the AGB (47.9%). It indicate that LSG treatment of T2DM showed better than AGB but not up to the classic effect of gastric bypass surgery but Buchwald 3 years follow-up results show, LSG and LRYGB no significant difference between the role of the treatment of diabetes. This may indicate that LSG is similar to gastric bypass surgery, independent of the weight loss effect in the treatment of diabetes.

LSG and Hypertension
Some scholars is defined as the antihypertensive drug treatment is no longer required after the operation, Hypertension relief is defined as the types of antihypertensive drugs used to reduce postoperative and (or) dose reduced[18]. Sarkhoshet al[18] systematic analysis of the 2000 to 2011 of the relevant literature, showed LSG hypertension cure rate of 58%, healing and (or) remission rate of 75%. Buchwald[14] meta-analysis also confirmed the different types of weight loss surgery in varying degrees of improvement in hypertension, or even cure, AGB, LSG, LRYGB, BPD for hypertension cure rate was 38.4%, 72.5%, 75.4%, 81.3%. The cure of hypertension and (or) to improve the rates were 71.5%, 80 6%, 87.1%, 91.8%.

LSG and Hyperlipidemia
Hyperlipidemia is a common complication of obesity, studies show that only 20% of obese patients is without Hyperlipidemia[10]. High Hyperlipidemia and cardiovascular disease have a close relationship in obesity patients. According to Al khalifaset al[19] systematic review the mean levels of pre- and postoperative cholesterol were 194.4 ± 12.3 mg/dL (range 178–213), and 181 ± 16.3 mg/dL (range 158–200), respectively. The mean levels of pre- and postoperative triglyceride were 149.3 ± 21.2 mg/dL (range 120–174) and 102 ± 14.2 mg/dL (range 84–116), respectively. The mean levels of pre- and postoperative HDL were 121.3 ± 10.3 mg/dL (range 109–138) and 112 ± 3.3 mg/dL (range 109–117), respectively, and the mean levels of pre-and postoperative LDL were 46.4 ± 2.8 mg/dL (range 42–49), and 54±9.3 mg/dL (range 43–64), respectively.

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Improvement of Hyperlipidemia after LSG and 83.5% of the patients had experienced resolution or improvement of Hyperlipidemia. Another 7 studies reported only Hyperlipidemia resolution and 54% of patients had complete resolution of Hyperlipidemia [19]. Buchwald et al [14] A meta-analysis also confirmed that, AGB, SG, LRYGB, BPD remission rates was 71.1%, 80.9%, 93.6%, 99.5%.

**LSG and Obstructive Sleep Apnea Syndrome**

According to Buchwald et al [14] in the meta-analysis, all kinds of weight loss after surgery in patients with sleep apnea symptoms were significantly improved. AGB, SG, RYGB, BPD cure rates were 94.6%, 76.7%, 86.6%, 95.2%, AGB, SG, LRYGB, BPD cure and (or) the improvement rate was 55.6 percent, respectively, 89.3%, 94.9%, 86.7%.

LSG has the exact effect of heavy reduction at the same time, can significantly alleviate obesity coexist, T2DM, hypertension, Hyperlipidemia treatment appear to be parallel with the weight loss results were markedly better than AGB, due to the lack of large long-term randomized controlled study, there is no clear comparison with LRYGB effect.

**Complications of LSG**

Although studies have shown that SG-related surgical complication rate is low, a study in 2011 by the Cleveland clinic Florida revealed that gastric sleeve surgery has lower complication rates and preoperative rates compared to both lap band and Gastric Bypass. The study reviewed the outcomes of over 2,400 gastric sleeve patients. But if this is not diagnosis and treatment on timely, may result in very serious and life threatening or even death. The diagnosis and active treatment are very important. The most commonly Use auxiliary examination method for upper gastrointestinal radiography and CT scan to rule out leaks and stem Resistance, perforation, and stomach anastomotic stenosis dilation.

**Gastro-gastric Leakage**

Gastric leak is one of the most serious and dreaded complications of LSG It occurs in up to 5% of patients following LSG [20, 21]. According to Parikh et al [22], LSG postoperative gastric leakage rate is 2.2%. If not timely treatment Therapy, can quickly lead to blood poisoning or even death. Based on the time of diagnosis, gastric leaks are classified as early or late. An early leak is generally diagnosed within the first 3 days after surgery, whereas a delayed leak is usually diagnosed more than 8 days after surgery [23]. Most leaks appear in the proximal third of the stomach, close to the gastro esophageal junction, reported 85.7% of leaks in the proximal third and only 14.3% in the distal third [24]. Gastric leaks can be diagnosed either incidentally on a routine upper gastrointestinal series performed postoperatively without any clinical signs or during exploratory laparoscopy/laparotomy performed owing to unexplained tachycardia. in another study a combination of clinical signs of fever, tachycardia and tachypnea was found to be 58.33% sensitive and 99.75% specific for detection of anastomotic leaks [25].

Clinical manifestations are similar to other intra-abdominal infection of the stomach leaks, no significant clinical Symptoms, or as peritonitis and septic shock, multiple organ failure. It’s The most common symptoms for early postoperative fever, abdominal pain, tachycardia, low blood Pressure or oliguria, when these symptoms occur, should take into account the possibility of gastric leakage occurs. Which some patients showed unexplained tachycardia. Most Conditions according to the occurrence of symptoms sufficient to diagnose gastric leakage and, if necessary, feasible of upper digestive tract Radiography, oral methylene blue test, abdominal CT examination to assist diagnosis.

Treatment of a delayed gastric leak is more challenging surgically owing to the presence of an inflammatory reaction. In this setting, attempts to repair the leak are usually futile. Treatment options include conservative or surgical management [26]. This depends on the patient’s hemodynamic condition and on physical and radiological findings. In the absence of hemodynamic instability and physical findings suggestive of peritonitis, conservative management may be initiated. This entails fluid resuscitation, initiation of intravenous antibiotics, nothing by mouth, percutaneous drainage of intra-abdominal collections (if drainable) and intraluminal stenting [27]. In a septic patient with radiological evidence of a leak with diffuse intra-abdominal fluid collections, surgical drainage of the fluid collection is warranted.

**Hemorrhage Bleeding**

After LSG is a rare but serious complication. The risk of postoperative bleeding has been reported to be between 1% and 6% after LSG [28]. The source of bleeding can be intra- or extra luminal. Intraluminal bleeding from the staple line usually presents with an upper gastrointestinal bleed. Common symptoms include hematemesis or melena stools. Extra luminal bleeding usually presents with a serial drop in serum hemoglobin levels or signs of tachycardia or hypotension. Common sources for extra luminal bleeding include the gastric staple line, spleen, liver or abdominal wall at the sites of trocar entry. We suggest a second-look laparoscopy in
any patient who presents with extra luminal bleeding with a sustained heart rate greater than 120 beats per minute and a drop in hemoglobin of more than 10 g/L postoperatively. Urgent laparoscopy facilitates a diagnosis and allows evacuation of the clot as well as surgical control of the source of bleeding. Many times the actual source cannot be identified, but we believe that evacuation of the hematoma and placement of a closed suction drain often serves as a helpful adjunct to patient resuscitation [26]. In a another prospective randomized trial, Dapri and colleagues [29] compared the rate of staple line bleeding after LSG using 3 different techniques: stapling the stomach with no reinforcement, or reinforcement with either suturing or buttressing with Gore Seam guard. These investigators observed a significantly lower rate of bleeding with the use of buttressing material. There was no difference in the incidence of a leak. Activity or causing heavy bleeding in patients with hemodynamic instability, vital signs of patients should be closely monitored.

Abscess
Intra-abdominal abscess is another possible complication after LSG. It usually presents with symptoms of abdominal pain, fever/chills or nausea and vomiting [26]. If there are clinical suspicions, one should obtain a computed tomography scan of the abdomen to rule out the presence of intra-abdominal abscess. In a series of 164 patients undergoing LSG, Lalor et al [30] reported 1 patient with an abscess (0.7%). Treatment includes percutaneous drainage and antibiotics.

Nutritional deficiencies
After Bariatric Surgery trace element deficiency malnutrition is a most common complication. This is due to your stomach’s ability to digest certain nutrients, as well as your diet which may not include these nutrients, and will require the usage of gastric bypass vitamins. Nearly 30 percent of patients who have weight-loss surgery develop nutritional deficiencies such as anemia, osteoporosis, and metabolic bone disease. Deficiencies in micronutrients after bariatric procedures are a known threat if not corrected appropriately. According to the study by Aarts [31], from 2005 to 2008, 60 patients underwent LSG the study showed that Anemia was diagnosed in 14 (26%) patients, Iron 23 (43%), folie acid eight (15%), and vitamin B12 deficiency was found five (9%) patients, respectively. Vitamin D and albumin deficiency was diagnosed in 21 (39%) and eight (15%) patients. Hypervitaminosis A, B1, and B6 were diagnosed in 26 (48%), 17 (31%), and 13 (30%) patients, respectively. Thus after LSG due to decrease intake and absorption can cause micronutrient deficiencies.

Nutritional care is an important part of the long-term health of all weight loss surgery patients. All bariatric surgery procedures create some new risk for deficiency that is over and above preoperative deficiency. It is important for any practitioner caring for bariatric surgery patients to establish education, nutritional protocols and guidelines for follow-up laboratory testing. This is generally well managed by taking the vitamin and mineral supplements. Routine blood work is therefore warranted after LSG to diagnose vitamin and mineral deficiencies. Therefore we advise that after LSG postoperative serum trace element content should be monitored regularly.

LSG and Gastro esophageal Reflux Disease GERD
Gastro esophageal reflux disease (GERD) is a condition seen commonly in the bariatric surgery population. In a recent systematic review by Chiu and colleagues [32] the authors found the data to be inconclusive with respect to the effect of LSG on GERD. Of the included studies, 4 showed an increased incidence of GERD postoperatively, whereas 7 showed a decrease in the incidence of GERD. According to Carter and et al [33] performed a retrospective study on patients who underwent LSG and found 47% of their patients to have persistent (> 30 d) GERD symptoms. Two studies, Arias et al [34] and Braghetto et al [35], excluded patients with GERD preoperatively. Arias et al [34], a single institution retrospective chart review conducted over 26 months, demonstrated a 2.1% incidence of GERD after SG. Braghetto et al [35] conducted a single institution study that excluded patients with GERD preoperatively and reported an incidence of 27.5% after SG. Follow up was not clearly reported and it is not stated whether the study was conducted prospectively. It is reasonable to assume that the modest 2.1% incidence of GERD cases reported by Arias et al [34] would have been offset by a decrease in existing GERD if patients with GERD preoperatively were not excluded. The 27.5% increase reported by Braghetto et al [35] may have been sufficient to cause an overall increase in GERD regardless of exclusion criteria.

The etiology is not completely understood but may include a mixture of hereditary and functional factors with a role of abnormal relaxation of the lower esophageal sphincter (LES), increased frequency of transient sphincter relaxation, or from increased pressure from the stomach secondary to a hiatus hernia or increased intra-abdominal pressure [36-38]. This can lead to symptoms including heartburn, regurgitation, dysphagia, odynophagia, increased salivation and chest pain. But the most common reported symptoms included heartburn (46%) and regurgitation (29%). Management of patients with persistent GERD involves treatment.
with proton pump inhibitors. These patients require close clinical follow-up. If their symptoms persist despite the use of proton pump inhibitors, we usually perform a gastroscopy for diagnosis.

**Hiatal Hernia, GERD and SG,**

The relationship between hiatal hernia (HH), SG, and GERD warrants discussion. It is reported that hiatal hernia repair concurrently with LSG could result in a 47.5% decrease in GERD prevalence postoperatively at 12 months if one is detected intraoperatively[39]. Sorci et al[40] demonstrated no de novo cases of GERD in any of the 97 patients undergoing SG and hiatal hernia repair. Even in cases where no hiatal hernia repair was planned the dissection involved in SG can function to reduce any hiatal hernia via traction applied during routine dissection. This was evidenced by the fact that in Daes et al[39] of the 65 HH diagnosed preoperatively 31 had been reduced through the dissection associated with SG at the time of operation. Recognition and planned repair of hiatal hernia concurrently with SG may be one of the major technical factors in reducing post-SG GERD in the future. However; it is controversial for the treatment of patients with medication-refractory GERD after LSG, especially for these patients with hiatal hernia.

According to Kotak[41] reported that primary hiatal hernia repairing in GERD patients after LSG was a well-tolerated and effective operation. Clapp[42] also reported that the use of a prosthetic bio absorbable mesh to repair a hiatal hernia could be a more effective operation after LSG. Comparing with primary hiatal hernia repairing with or without using mesh, however, fundoplication with hiatal hernia repair would provide a better and long-term control of reflux in GERD patients after LSG.

**III. Conclusion**

In conclusion, LSG has been popular as a stand-alone treatment of choice for morbid obesity. It has been shown to be extremely successful in decreasing excess weight in patients within a short time. In addition, a short list of complications contributes to its attractiveness as a treatment. After LSG procedures can be a very serious, life-threatening complication that needs immediate attention. Currently, we defined that LSG is a safe and feasible surgical approach. Reasonable choice and operative indications and postoperative management could help to achieve satisfactory clinical outcome.

**References**


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