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How i Do it?

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Laparoscopic sleeve gastrectomy: Pitfalls and techniques to prevent complications

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ABSTRACT

Laparoscopic sleeve gastrectomy is a relatively new procedure. It is gaining in popularity due to its simplicity, feasibility, and excellent weight loss outcomes. However, the success of the operation is directly related to the experience of the surgeon and his/her awareness of possible complications. Aim of this study was to explain proper technique to avoid complications.

Keywords: Complications; obesity; sleeve gastrectomy; surgery; technique.

Introduction

Parietal cell gastrectomy was first described as an addition to biliopancreatic diversion for morbid obesity in 1993.[1] Laparoscopic sleeve gastrectomy (LSG) was performed as a component of biliopancreatic diversion with duodenal switch (BPD-DS) in 1999 by Gagner and colleagues[2] and subsequently used as the first stage of a two-staged approach for super-obese patients in 2000. Over time, LSG has been modified and is now often used as a stand-alone procedure due to its demonstrated effectiveness in weight loss and resolution of comorbid conditions.

Laparoscopic sleeve gastrectomy (LSG) is a longitudinal gastrectomy including removal of the entire fundus and greater curvature but leaving in place the distal antrum and pylorus, thereby shortening the transit time but without changing the emptying route into the duodenum. SG is a purely restrictive technique combined with fundus elimination and reduction in the levels of the appetite-stimulating hormone ghrelin.[3]

Though LSG is a relatively new procedure, it is gaining in popularity due to its simplicity, feasibility and excellent weight loss outcome. However, the success of the operation is directly related to the experience of the surgeon and his/her awareness of the possible complications, including leakage, hemorrhage, stenosis, abscess, gastroesophageal reflux disease (GERD), and failure in weight loss. It should also be kept in mind that there are still many points of controversy regarding the procedure, including size of the calibration bougie (32-50F), distance from the pylorus (2–4–6 cm), distance from the gastroesophageal junction, reinforcement of the staple line (suture, fibrin, Seamguard, Peri-Strips, etc.), and hiatal hernias.[4] The surgeon's choice among these options can determine the outcome and success of the surgery. If we look at the inter-

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Table 1. Steps of the operation

Pneumoperitoneum
Insertion of trocars
Liver retraction
Dissection and mobilization of greater curvature
Preparation of the stomach for division
Hiatal hernia closure
Creation of the gastric tube
Hemostasis
Leak test
Drain insertion (optional)
Extraction of the gastric specimen
Closure of trocar sites

national panel including expert surgeons from 24 surgical centers located in 11 countries and involving over 12.000 cases, it is clear that no consensus has been reached on every issue pertaining to LSG.[5]

Surgical Technique

The operation is usually performed using 3, 4, 5, or 6 trocars placed in the upper abdomen based on the patient's position and technical variants. After the insertion of the first trocar for the camera, the liver is lifted in order to obtain the optimal view of the stomach (Figure 1). The greater curvature of the stomach is freed starting 4–6 cm directly above the pylorus - starting from the middle of the stomach is also suggested as the entry into the lesser sac is thought to be easier[6] - and the vascular supply to the greater curvature is divided close to the stomach using the tissue fusion device LigaSure (Covidien, Mansfield, MA, USA) or any other energy-based, seal and cut device, up to 1 cm lateral to the angle of His (Figure 2).[7–9]

Figure 1. Liver retraction: elevating the left liver lobe allows identification of landmarks.

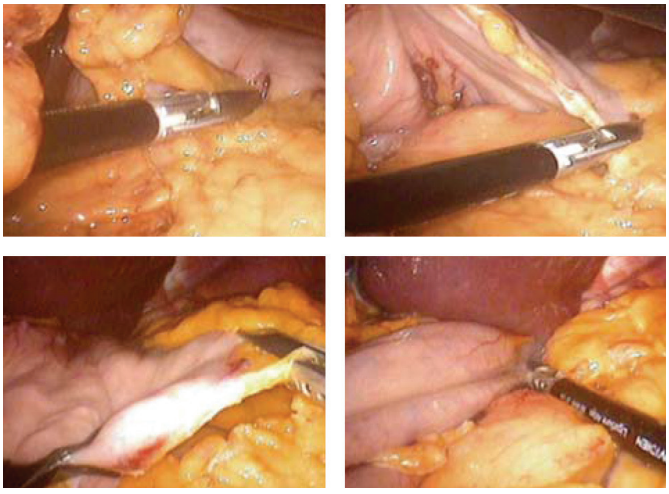

Figure 2. Dissection and mobilization of the greater curvature.

It is essential to verify that the vessels located around the greater curvature are properly sealed. All posterior attach-

Table 2. Concerns for complications

Concerns	Structure	Maneuver
Bleeding angle	Gastrosplenic ligament	- Stay close to the stomach during dissection
Stricture angle	Incisura angularis	- Keep bougie in place during resection - Use bigger size bougie (>40 Fr) - Stay 1.5–2 cm away from incisura during stapling - Closed height of the staples should be >2 mm - If using reinforcement material, green/black cartridges should always be preferred
Leak angle	Angle of his	- Stay lateral to the fat pad during resection to avoid ischemia of the esophagus that might result in staple line disruption

ments of the gastric fundus to the diaphragm should also be divided; the fat pad at the angle of His may be dissected from the attachments, but should not be removed.

After finishing the dissection of the greater curvature, the left crus should be exposed entirely, and in the presence of hiatal hernia, both the left and right crus dissected for closure using nonabsorbable sutures. Either a bougie (not less than 32F) or an endoscope, which is preferable, is inserted into the stomach and passed through the pylorus (Figure 3). The transection of the stomach is then started using an Endo GI-60 mm articulating stapler with extra-thick (intended tissue thickness around 2.5 mm) cartridge (black) inserted into the abdomen via the right-sided trocar or umbilicus (usually 15 mm) and placed tangentially across the antrum paying careful attention to the articulation of the jaws. Then, the left-sided trocar is used for the remaining stapling. Totally, 5–7 cartridges are usually sufficient to complete the transection (Figure 4). As the antrum is the thicker part of the stomach, the first two cartridges should be green or preferably black (as the closed height should be ≥2 mm), while the remaining might be blue, purple or green. We suggest using black cartridges for the first two firings and medium/thick cartridges (purple) for the other four firings (with closed height of approximately 1.5–2.25 mm). Good lateral traction of the stomach is necessary at this stage to create a straight staple line. We use either buttressing material, namely Seamguard (W.L.

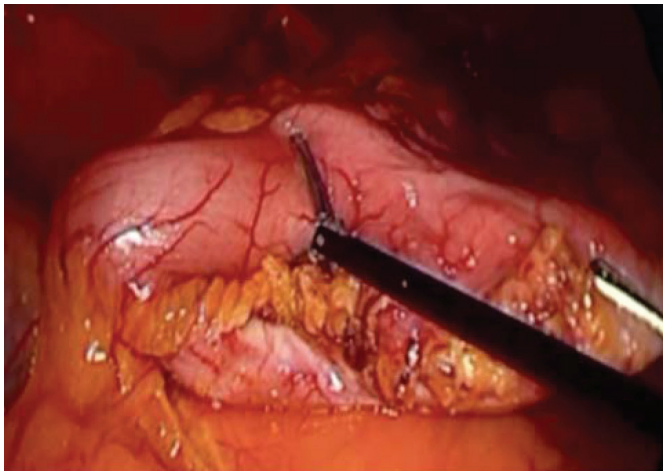

Figure 3. Preparation of the stomach for division.

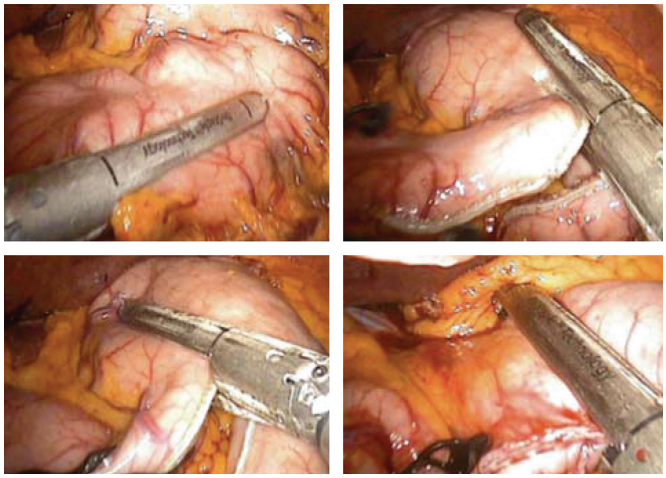

Figure 4. Creation of gastric tube.

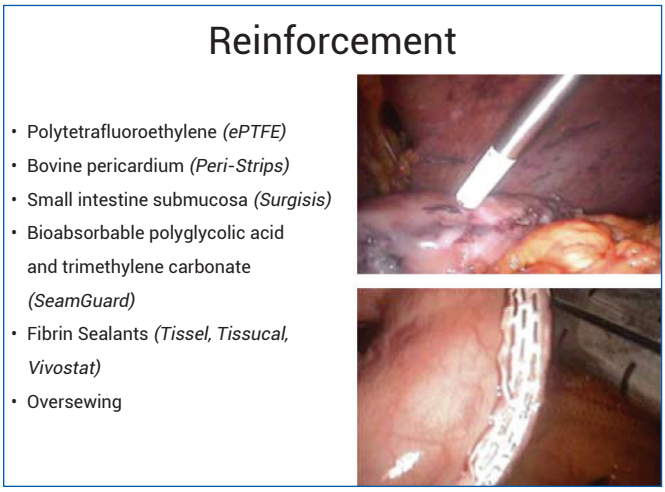

Figure 5. Buttressing materials.

Gore and Associates, Flagstaff, AZ, USA) or Peri-Strips DRY (Baxter, Deerfield, IL, USA) during the transection, or we cover the resection surface with Tisseel.[10,11] A thicker cartridge size is used if buttressing materials are essential (Figure 5).

During transection, the most important points are to avoid the incisura angularis and to remove the whole fundus at a 1 cm distance from the esophagus. After stapling, endoscopy is performed to evaluate the lumen for leaks, hemostasis and patency. The surgeon should always remember that staples are not hemostatic, and the staple line should be checked. Bleeding should be stopped using clips and/or suture, but not diathermy.

The resected stomach is then removed via one of the 15 mm trocar sites. An optional closed-suction drain is placed under the liver or behind the stomach with its tip above the spleen. The fascia of the 15 mm trocar sites should always be closed in order to prevent hernia occurrence.

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