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Laparoscopic sleeve gastrectomy for morbid obesity: role of intraluminal and intraperitoneal postoperative drainage

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SUMMARY: **Laparoscopic sleeve gastrectomy for morbid obesity: role of intraluminal and intraperitoneal postoperative drainage.**

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Background and aims. *Bleeding and staple line leak are the most common postoperative complications of LSG. To prevent and/or to promptly identify such complications, conventional peri-operative protocols imply post-operative gastric decompression (NGT) and staple line drain (IAD). Our aim was to evaluate the role of naso-gastric tube (NGT) and intra-abdominal drain (IAD) in preventing and/or facilitating identification and treatment of post-operative complications after sleeve gastrectomy.*

Patients and methods. *A retrospective observational study on two consecutive series has been undertaken to evaluate the real utility of routine placement of NGT and IAD at the end of a LSG to prevent (primary end-point), promptly identify (secondary end-point) and manage (tertiary end-point) bleeding and staple line leakage. Collected outcome data of all consecutive cases, which underwent primary LSG at our Department, were analyzed. The first 100 consecutive patients (group A) received the standard perioperative protocol and the other consecutive 100 (group B) received a fast track protocol (no NGT neither IAD).*

Results. *The two groups were not different in their outcome. Two bleeding occurred in Group A and were conservatively treated. One abscess developed in group B soon after surgery. It was diagnosed by an abdominal CT performed because patients presented fever, leucocitosis and tachycardia. It was successfully treated by percutaneous ultrasound-guided drainage. One fistula occurred in group B after discharge on 30th post-operative day. Fistula was suspected based on fever and tachycardia in absence of any abdominal discomfort and was confirmed by an abdominal CT. The patient was successfully treated in 40 days by endoscopic positioning of a gastric tube-prosthesis and percutaneous ultrasound-guided drainage of abdominal collection. A third patient in group B experienced bleeding suspected due to hemoglobin drop and confirmed by abdominal CT. He also was conservatively treated.*

Conclusions. *In conclusion, placement of drains does not facilitate detection of leak, abscess, or bleeding after primary LSG.*

KEY WORDS: Sleeve gastrectomy - Morbid obesity - Intraluminal drainage - Intraperitoneal drainage.

Introduction

Laparoscopic sleeve gastrectomy (LSG) is the most commonly performed bariatric procedure worldwide according to a 2011 survey (1). Its success among bariatric surgeons during last 5 years is related to acceptable short-term results in achieving considerable weight loss associated with some advantages of the surgical procedure as *in primis* lack of digestive anastomosis (2). Bleeding and staple line leak are the most common postoperative complications of LSG (3). The leak rate can vary between 1% and 3% for primary procedure and more than 10% in revision surgery, and the risk of postoperative bleeding has been reported to be between 1% and 6% in different series (1, 4). To prevent and/or to promptly identify such complications, conventional perioperative protocols imply post-operative gastric decompression by the mean of a nasogastric tube (NGT) and staple line drain by the mean of an intra-abdominal drainage (IAD). Literature is lacking of prospective studies and surgeons are still not fully confident of avoiding gastric decompression and peritoneal cavity drainage (5). In the only two reports written respectively by Albanopoulos K et al. in 2011 (6) and Rossetti G et al. in 2014 (7) it has been preliminarily shown how NGT and IAD do not really influence the post-operative outcome in terms of lower surgical morbidity rate. Moreover, NGT and IAD represents post-operatively a serious di-

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scomfort for patients who often refer nausea and throat pain related to NGT and abdominal pain due to IAD. Hence, a remarkable question is if NGT decompression and IAD are really necessary due to their hypothetical role in preventing and/or facilitating identification and treatment of such complications after LSG. A retrospective observational study on two consecutive series has been undertaken to evaluate the real utility of routine placement of NGT and IAD at the end of a LSG to prevent (primary end-point), promptly identify (secondary end-point) and manage (tertiary end-point) bleeding and staple line leakage.

Patients and methods

Collected outcome data of all consecutive cases, which underwent primary LSG at our Department were analyzed. Since the no-NGT/no IAD protocol was introduced in September 2015, all patients treated between February 2013 and August 2015 routinely received NGT and IAD after LSG, conversely all patients operated since September 2015 until November 2016 did not have positioned NGT or IAD. In this way, two consecutive series of 200 patients who underwent LSG have been identified and analyzed. One-hundred patients (group A) consecutively received LSG with positioning of NGT and IAD and other 100 patients (group B) received LSG without any intraluminal or intrabdominal drainage. Eight patients were excluded from evaluation because received LSG as re-do surgery after gastric banding removal and all have been drained by NGT and IAD. On third post-operative day both groups of patients underwent upper gastrointestinal series with water-soluble contrast medium (Gastrograpin) to exclude leaks and/or stenosis. If not complicated, all patients of both groups were discharged at fourth post-operative day. In Group A, NGT and IAD were removed at third post-operative day after oral Gastrografin. All bariatric procedures were performed by the same team and were completed as scheduled. Eligibility for bariatric surgery has been assessed using the European IFSO criteria (8). All patients received a daily dose of low molecular weight heparin (LMWH) subcutaneously starting on the evening before surgery and continued to 4 weeks postoperatively. Intake of solid food is allowed up to 10 h prior to surgery and intake of clear fluids up to 6 h prior to surgery. All patients are admitted to the hospital the day before surgery. Anti-embolism stockings are provided and patients are required to urinate before transportation to operative room to abandon need for urine catheters.

Operative technique

At our department, we use a four trocars technique and the surgeon is positioned between the patient's legs. The patient, once completed general anesthesia is placed in anti Trendeleburg position. We induce the pneumoperitoneum using a Veress needle to the Palmer's point and we enter into peritoneal cavity with optical trocar. The LSG starts with the interruption of the great gastric curvature vessels, dissecting the gastrocolic and gastrosplenic ligaments near the stomach. A 36-Fr boogie is inserted in the stomach and using a linear cutting stapler a longitudinal gastrectomy is performed starting 5 cm proximal to the pylorus and excising completely the gastric fundus. We routinely reinforce staple line with clips just to reduce the rate of staple line bleeding. In group A, a low suction silicon drain (Jackson-Pratt drain) was left along the staple line and a naso-gastric tube (NGT) was positioned under vision in the remnant stomach. In group B no drain neither NGT were left. Intraoperatively all patients received blue de methylene solution at the end of sleeve procedure to test the stapling line. Stapling line leak was defined as presence of blue in the drain or leak of contrast medium on radiography or CT scan. Bleeding was recorded as presence of melena or hematemesis or blood in the NGT or in the drain and drop of hemoglobin more than 2 gr%.

Statistical differences between the groups were analyzed using the Student'st and χ^2 tests.

Results

The two groups were not different in their demographic features (Table 1). Two bleeding occurred in Group A and were conservatively treated. One presented as ematemesis despite the presence of a NGT which was conversely empty. The other one presented with tachycardia and drop of the haemoglobin value and the

TABLE 1 - PATIENTS' DEMOGRAPHICS.

	Group A (NGT and IAD)	Group B (no NGT neither IAD)	*p*
n	100	100	NS
Age (mean;range)	39 (22-60)	40 (24-61)	
Male/female (ratio)	20/70	24/66	NS
BMI (mean; range)	43 (38-48)	45 (39-52)	NS
Comorbidities			
• Diabetes mellitus	20	18	NS
• Hypertension	30	26	NS
• Dyslipidemia	9	11	NS

NGT: naso-gastric tube; IAD: intra-abdominal drain.

abdominal drainage was silent. One unit transfusion was necessary in one case, and two units in the other. One abscess developed in group B soon after surgery (fourth-days post-operatively). It was diagnosed by an abdominal CT performed because patients presented fever, leukocytosis and tachycardia. It was successfully treated by percutaneous ultrasound-guided drainage. One fistula occurred in group B after discharge on 30th post-operative day. Fistula was suspected on the basis of fever and tachycardia referred during outpatient visit in absence of any abdominal discomfort and was confirmed by an abdominal CT. The patient was successfully treated in 40 days by endoscopic positioning of a gastric tube-prosthesis and ultrasound-guided percutaneous drainage of abdominal collection. A third patient in group B experienced staple line bleeding suspected on the basis of hemoglobin drop and confirmed by abdominal CT, in absence of any clinical discomfort. He also was conservatively treated. Reoperation was not necessary in any complicated case in both groups. Statistical analysis did not show any significant difference in morbidity rates between the two groups (Table 2).

TABLE 2 - POST-OPERATIVE COMPLICATIONS.

	Group A (NGT and IAD)	**Group B (no NGT neither IAD)**	***p***
n	100	100	
Complications	2 (2%)	3 (3%)	NS
• *Bleeding*	2 (2%)	1 (1%)	NS
• *Abscess*	0	1 (1%)	NS
• *Fistula + abscess*	0	1 (1%)	NS
• *Reoperation*	0	0	NS

NGT: naso-gastric tube; IAD: intra-abdominal drain.

Discussion and conclusions

LSG, due to its simplicity and efficacy, has led a large number of surgeons to adopt it. However, compared to gastric bypass procedures, its complications can be even more severe. Staple line leaks are the most commonly reported complications, ranging in different series between 1% and 3% after primary procedure and more than 10% in revision surgery (3). Based on upper gastrointestinal contrast study, gastric leak can be classified into two types. Type I (subclinical leak) is controlled either through a surgical drain or through a fistulous tract into the abdominal or chest cavity. Ultrasound or CT-guided percutaneous drainage of collection and positioning of an endoscopic self-expandable metallic prostheses in the stomach are successful in most of cases. Type II (clinical leak) is a disseminated leak with diffusion of the contrast into the abdominal or chest cavities (9). In these cases, exploratory laparoscopy to perform an abdominal washout with surgical repair of the leak (if technically feasible) and establishment of an enteral feeding route should be carried out. Moreover, positioning of an endoscopic self-expandable metallic prostheses is strongly recommended. Based on the time of diagnosis, gastric leaks are classified as early or late. An early leak is generally diagnosed within the first three days after surgery, whereas a delayed leak is usually diagnosed more than eight days after surgery. It is clear that leaks after LSG could be noted within the first days following the surgery or discovered after patient discharge. Almost all are detected within the first month following surgery but some cases can occur up to 6 months after surgery. Such complications in the bariatric population are usually difficult to interpret and potentially life threatening. Clinical signs are often missing and the only alarm sign is fever and tachycardia. For this reason, many surgeons still adopt a standard post-operative protocol consisting in intra-luminal decompression (NGT) and intra-abdominal drainage (IAD). However, the utility of drain placement in general surgery is still controversial. It is widely accepted that gastric leaks can be due to mechanical or ischemic causes. Mechanical causes include suture defects due to stapler misfiring or direct tissue injury. Usually they appear within few days (day 1-2) after surgery compared to ischemic causes that usually appear on day 5-6 post-operatively [3]. Aggressive dissection of the posterior attachments of the upper sleeve and thermal injuries to the gastric tube by ultrasonic devices can lead to insufficient vascularization of the gastric tube remnant. Moreover, a too narrow gastric tube or a discrepancy between the proximal and distal gastric tube can cause an even only functional stenosis leading to a gastric emptying impairment. Consequently, an increased intraluminal pressure can occur with reduced gastric compliance potentially leading to a high incidence of proximal fistulas. The latter mechanisms, also associated with faulty eating habits, seem to be related to late fistulas that are observed up to 6 months after sleeve gastrectomy. It is already clear that NGT and abdominal drainage, usually removed within five days following surgery, could play a role only in the immediate perioperative period. Based on what we mentioned above concerning the impact of increased intraluminal pressure on the gastric leak formation, most surgeons still position and leave in place for 24-72 hours a NGT in order to reduce the intraluminal pressure and potentially reduce the incidence of fistula (10, 11). Based on our findings, comparable with those achieved by Rossetti et al. (7), the NGT does not show to have any role in the prevention of gastric fistula neither in the diagnosis of intraluminal hemorrhage af-

ter LSG. As already suggested by some authors (10), it would seem to play a decisive role in fistulas occurrence other factors as the size of the boogie used to calibrate the sleeve gastrectomy or the distance between the first staple firing and the pylorus. It is opinion among surgeons, still widely adopting IAD after LSG, that observation of the intra-abdominal drain output may help to identify staple line bleeding and/or leakage. The source of bleeding after LSG 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. 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. A number of buttressing materials are commercially available to attempt to reduce the rate of bleeding from the staple line but their use remains controversial. Albanopoulos et al. (6) did not observe a significant difference in their rate of postoperative bleeding and fistulas in patients with staple line suturing. Therefore at our institution we do not routinely use any reinforcement materials (sutures or buttresses) for LSG (11). Moreover, as already described by Albanopoulos K. et al. (6) and as reported in two cases of bleeding of our series (group A), in the majority of cases of staple line bleeding or leakage, drainage is silent and does not allow surgeon to suspect such complications which are often revealed by other clinical signs as fever/tachycardia/vomit or by laboratory test as drop in hemoglobin value or by diagnostic imaging as peri-gastric fluid collection on abdominal ultrasound/tomography. In gastric surgery, drain placement is designed for the removal of fluid collections or for the early detection of post-operative bleeding, gastric fistulas, and intra-abdominal infections. Drain placement on the basis of our results seems not to protect from the formation of an abscess neither facilitate fistula or bleeding diagnosis of a fistula. Moreover, recent advances in interventional radiology as ultrasound- or computed tomography (CT)-guided percutaneous drainage and aspiration allowed surgeons to manage mininvasivelly the above mentioned complications with very low risk of intestinal injury (12, 13).

In conclusion, based on our results placement of intraluminal (NGT) or intraabdominal (IAD) drains does not prevent neither facilitate detection of leak, abscess, or bleeding after primary LSG.

Conflict of Interest

All Authors have no conflict of interest with any institution or product that is mentioned in the manuscript and/or is important to the outcome of the work presented here.

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