

Routine Abdominal Drains after Laparoscopic Sleeve Gastrectomy: A Retrospective Review of 353 Patients

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Abstract Complications after laparoscopic sleeve gastrectomy (LSG) are usually silent and difficult to interpret. Our purpose was to evaluate the utility of routine placement of intraperitoneal drains at the end of LSG in detection and management of postoperative complications. This is a retrospective study of all patients that underwent LSG by a standard operative team in a 3-year period. Patients were enrolled in Group A when an intraperitoneal drain was placed and Group B when not. Three hundred and fifty-three patients underwent LSG with a median preoperative BMI of 46.4 k/m². Two hundred and one patients were enrolled in group A and 152 in group B; the two groups were comparable in their characteristics. Staple line leak, bleeding, and abscess were observed in 4%, 2.9%, and 2.5% of group A and 2.6%, 1.9%, and 1.9% of group B and the differences did not reach statistical significance. In 50% of patients with drain and leak, per os blue de methylene test was negative and in another 50% leak took place after the fourth postoperative day when drain was already taken off. Abscesses were observed significantly more often in patients that had suffered postoperative bleeding ($p < 0.001$)

or had undergone laparoscopic adjustable gastric banding (LAGB) in the past ($p = 0.02$). Placement of drains does not facilitate detection of leak, abscess, or bleeding. Furthermore, they don't seem to eliminate the reoperation rates for these complications. Maybe patients with previous LAGB and intraperitoneal bleeding could benefit from placement of a drain that will remain for more than 5 days.

Keywords LSG · Drains · Complications · Leak · Abscess · Bleeding

Introduction

Obesity has nowadays become a major medical and social problem of west countries. By 2025, 40% of US population will be obese according to current alimentary trends [1]. In recent years, a new surgical subspecialty, the bariatric surgery, proved effective in providing excess weight loss with great short-term and long-term outcomes [2, 3]. There are many different surgical procedures in this surgical field, such as laparoscopic Roux-en-Y Gastric bypass (LRYGBP), laparoscopic adjustable gastric banding (LAGB), laparoscopic sleeve gastrectomy (LSG), or laparoscopic biliopancreatic diversion with duodenal switch (LBDP-DS).

LSG is performed more frequently during the last 5 years and it presents acceptable short-term results in achieving considerable weight loss [4]. Among the advantages of this surgical method is the lack of digestive anastomosis, of mesenteric defects that may cause internal hernias and of foreign material such as gastric band [4, 5].

Bleeding, abscess formation, and staple line leak, although rare, are the most common postoperative complications of LSG. Perioperative minor complications have an overall incidence of 11% and major surgical complications

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of almost 5% in large series [6, 7]. One remarkable question is if intraperitoneal drains may facilitate the identification and treatment of these complications. A retrospective study has been undertaken in our department to estimate the utility of routine placement of drains in peritoneal cavity at the end of a LSG operation in detection and management of these postoperative complications.

Materials and Methods

The medical records of 353 consecutive patients who underwent LSG in at the First Department of Propaedeutic Surgery of the Hippokraton Hospital from July 2006 to September 2009 were retrospectively reviewed. All operations were performed from the same operative team and were completed laparoscopically. Inclusion criteria were a body mass index (BMI) greater than 40 kg/m² or greater than 35 kg/m² accompanied with relevant co-morbidities. Exclusion criteria were the inability to undergo general anesthesia and age greater than 60 years. Patients were divided in group A when an intraperitoneal drain was placed at the end of the operation and group B when not.

Operative Technique

In our department, a five-trocar technique is used and the surgeon stands between the patient's legs. After induction of general anesthesia the patient is set in supine anti Trendelenburg position and an optiview trocar (Ethicon Endo-surgery, Cincinnati Ohio) is used for entering in the peritoneal cavity. LSG starts with the division of the vascular supply of the great curvature of the stomach, sectioning the gastrocolic, and gastrosplenic ligaments very close to it. It is important to continue the dissection up to the left crus of diaphragm, dividing the gastrophrenic ligament and making totally free the gastric fundus, in order to excise it. After this first step, a 38-Fr boogie is inserted in the stomach and the gastrectomy starts about 5 cm proximal to the pylorus providing a tight tube [8]. The procedure continues with a longitudinal gastrectomy of the great curvature of the stomach which "sleeves" the stomach resulting in a new narrow tube. An Echelon stapling device is used with the Echelon Compact Linear Cutter, 60 mm loaded with the ECR60D cartridges (Ethicon Endo-Surgery, Inc). The gastric tube left has an

average volume of 80–200 ml. The staple line can be reinforced in different ways. We prefer either continuing sutures or surgical clips or GORE SEAMGUARD® bio-absorbable staple line reinforcement to reduce the rate of staple line leak or bleeding. In group A, a low suction silicon drain (Jackson-Pratt drain) which has been showed to be best in accumulating intraperitoneal liquids [9, 10] was left along the stapling line.

Postoperative Evaluation

All patients of group A received blue de methylene solution per os and all patients of group B underwent upper gastrointestinal series (UGIS) with water-soluble contrast medium on the second postoperative day. Stapling line leak was defined as existence of blue de methylene in the drain in patients with a drain or leak of contrast material on upper UGIS or the CT scan. Intra-abdominal abscess was defined as imaging of collection on CT scan in patients with septic signs. Bleeding was recorded as presence of melena or hematemesis or blood in the nasogastric tube or in the drain and drop of hemoglobin more than 2 g/dl.

Statistical Analysis

Quantitative data were expressed as mean, median, or range. Statistical analysis was performed using the chi-square test (Pearson, Mantel-Haenzel test for linear association) with the Yate's correction or the Fisher's exact test whenever needed. The cut-off for statistical significance was defined as $P < 0.05$. The statistical package used was SPSS 16.0 (SPSS Inc, Chicago, Ill).

Results

In total, 353 patients underwent LSG (203 women, 150 men) of a mean age of 38 years (range, 22–60 years). Mean preoperative BMI was 46.4 k/m² (range, 35.1–70 k/m²). Mean operative time was 58 min (range, 42–185 min) and mean hospital stay 3 days (range, 2–45 days). There was no conversion to open surgery. All operations were performed by the same team of attending surgeons. Group A consisted of 201 patients while group B of 152 patients.

Age, BMI, and male/female ratio were similar between the two groups (Table 1). Total complication rate was 13%,

Table 1 Individual characteristics of the two groups.

	Group A (n=201)	Group B (n=152)	p Value
Age	Mean, 38.6; median, 37.5	Mean, 37.2; median, 35.5	0.88
Male/female ratio	0.43	0.42	1
BMI	Mean, 46.58; median, 45.85	Mean, 46.2; median, 44.15	0.39

occurring in 46 patients and surgical complications were found in 23 patients (6.5%). As surgical complication we included leak, abscess formation, and bleeding. In all 353 patients there was an incidence of 3.3% leak, 2.5% bleeding, 2.2% abscess formation, and 0.8% deaths. Staple line leak, bleeding, abscess formation, and reoperation rates were 4%, 2.9%, 2.5%, and 4% in group A and 2.6%, 1.9%, 1.9%, and 2% in group B respectively and the differences between the two groups did not reach statistical significance (Table 2).

Eight patients presented an abscess with negative upper GI contrast series and CT for staple line leak. Five were from group A and 3 from group B. It is important that 25% of them (2/8) had undergone laparoscopic adjustable gastric banding (LAGB) in the past ($p < 0.02$). All of them had a readmission to the hospital and there was no death between them. Two of them needed a reoperation; one belonged to group A and the other one to group B.

Most patients with bleeding had tachycardia and the mean drop of hemoglobin was 3.2 g/dl. Six patients in group A had intraperitoneal bleeding. In all patients, we stopped the anticoagulation therapy and administered i.v. crystalloid fluids. One patient required transfusion of 1 unit of RBCs, two patients were transfused with 2 units of RBCs and one patient required a reoperation. In group B, three patients presented bleeding and one of them required RBCs transfusion and reoperation. Interestingly, abscesses were observed significantly more often in patients that had suffered postoperative bleeding (37.5% vs. 1.7%, $p < 0.001$).

Staple line leak was identified in totally 12 patients, confirming a rate of 3.2%, similar to the already published at international bibliography [1, 6, 8]. Eight of them belonged in group A and in four of them (50%) there was an early extraction of blue de methylene at the drain confirming the diagnosis of the leak.

Death occurred in two patients of group A (1%) and one of group B (0.6%). The first patient of group A was a female, 33 years old who had a history of a previous LAGB operation but the gastric band was removed because of erosion. The patient underwent LSG 1 year later but presented leak from the staple line and required a reoperation that included peritoneal lavage and drain

positioning because of early septic signs. Intraluminal stent was put 1 month after the operation, unsuccessfully, and the patient became septic again and underwent Roux-en-Y gastrectomy. The patient died 10 months after the LSG because of acute liver failure. The second patient of group A was a 55-year-old female who presented cardiac arrest 5 h after the operation. She was incubated and died on the second postoperative week. CT was negative for any major surgical complication. The patient in group B was a male, 41 years old, who underwent postoperatively a mini laparotomy for intra-abdominal abscess and died of fungal pneumonia.

Discussion

Bariatric patients' complications are usually difficult to interpret. Clinical signs are often silent and sometimes the only alarm sign of a possible complication is low fever or tachycardia. That's why many surgeons insist in the use of drains, believing that they can provide more safety in the postoperative care of these patients, even though the utility of drain placement in general surgery and in bariatric patients in particular remains controversial [11, 12]. Our data show similar percentages of leak, bleeding, formation of abscesses, reoperations, and deaths between patients with or without drain.

Bleeding can be identified even intraoperatively by direct vision. Postoperatively, drains can sometimes be helpful in detecting bleeding. This happens only in cases of intraperitoneal bleeding, but not in all of them. We insist in taking care for a good monitoring of patients and especially for their heart rate, confirming a suspicion of bleeding with hemoglobin measurements. This strategy provided us a safe management in all patients, even in these without drains, leaving away any reason of positioning them in order to detect a bleeding. When bleeding was identified, conservative management of stopping anticoagulation and appropriate fluid or blood resuscitation was sufficient in most of cases.

Drain placement didn't seem to protect from the formation of an abscess since percentages were similar between the two groups. In all patients, the abscess was

Table 2 Complications of the two groups

	Group A (n=201)	Group B (n=152)	p Value
Surgical complication	16 (7.9%)	9 (5.9%)	0.53
Abscess	5 (2.5%)	3(1.9%)	0.92
Bleeding	6 (2.9%)	3 (1.9%)	0.73
Leak	8 (4%)	4 (2.6%)	0.56
Reoperation	8 (4%)	3 (2%)	0.36
Death	2(1%)	1(0.6%)	0.89

confirmed with a CT after the fourth postoperative day, when drains in group A were taken off. The management of an intraperitoneal abscess requires usually drainage under CT guidance, laparoscopically, or through a mini laparotomy [13–15]. Four out of eight patients with intra-abdominal abscess, equally distributed between the two groups were subjected to CT-guided drainage that proved effective in controlling sepsis. One patient of group A required a laparotomy and one of Group B was drained laparoscopically. In our group of patients, abscess formation was associated with previous LAGB operation and intraperitoneal bleeding. Maybe these two high risk subcategories of patients could be benefit from the intra-operative placement of a drain that will remain for more than 4 days in place.

Leaks occur in 2–5% of LSG cases and in about 2 to 4.4% of LRYGBP being the major complication of bariatric operations, resulting in significant morbidity, sepsis, organ failure, and maybe death [8, 16–18]. Early detection of leaks is proven to reduce morbidity and mortality. However, detecting postoperative leaks can become a great challenge, because obese patients are not clinically reliable. Obesity poses many clinical limitations, concerning that assessment of peritonitis in these patients can be extremely difficult, as far as they have subtle findings on physical examination. Some of them have also the technical inability of massive weight that cannot slide through a CT scan bed. For cases of late detection of leak, early introduction of feeding increase the severity [13].

The physical examination of our patients with a leak revealed tachycardia and low fever in most them. Blood exams usually showed elevated WBCs and CRP levels. In 50% of patients who had drain and presented leak, blue de methylene test was negative, suggesting that diagnosis of leak cannot be based on the evaluation of the drain liquid since it confirms the leakage only if the test is positive. Furthermore, another 50% of these patients presented a later leak, after the fourth postoperative day when drain was already taken off. In these patients, upper GI series or CT scan with p.o. gastrografin and i.v. omniscan were necessary to confirm the leak.

The aim of our study was not only to estimate the utility of drains in diagnosis of surgical complication, but also to find if they offer something in conservative management of them. Up today, there is no any clinical trial on LSG answering this issue. The majority of our patients with a leak (9/12, 75%) needed a reoperation which was actually peritoneal lavage and drain positioning because they had entered an early phase of ongoing sepsis. Between patients with drain, only three of eight (37.5%) had a conservative management without a reoperation. In these patients, all gastric liquid came out the peritoneal cavity through the drain, formatting a fistula after a period of 10–15 days. The

placement of an intaluminal stent helped the healing process in these three patients. Stents were also placed in four of the five patients with drain that needed a reoperation. The placement took place after the peritoneal drainage but two of them finally underwent a total gastrectomy.

For leaks occurring in the early postoperative period and for stable patients, if suction drain offers a proper total extraction of GI fluid, keeping the patient nil per os and administrating broad spectrum antibiotics can provide a good conservative management. A proper postoperative management of these patients must also include physical examination, arterial blood gas measurements, monitoring for the first postoperative days, respiratory enhancing and WBC and CRP measurements Assuming that in majority of cases of group A there was a need of reoperation, we cannot be sure that position of drain provides us any safety on the management of surgical complications of sleeve gastrectomy. In cases of clinical suspicion, we prefer performing a CT scanning, in order to rule out any residual collection, abscess, or leakage. In cases of decision for a conservative treatment, a CT-guided position of drains could also offer a help for the avoidance of a new operations to these patients [11].

Conclusion

Placement of drains does not facilitate detection of staple line leak, abscess, or bleeding. Furthermore, they don't seem to eliminate the reoperation rates for these complications. In some cases conservative management of leaks can happen, but no one can predict during the operation which patient could benefit from the placement of a drain. Most of surgeons tend to place a drain in cases of technical difficulties, but we don't believe that there is any value on this. Maybe patients with previous LAGB and intraperitoneal bleeding could benefit from placement of a drain that will remain for more than 4 days in place.

Conflict of Interest The authors declare that they have no conflict of interest

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