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ORIGINAL ARTICLE

LEAKAGE IN BARIATRIC SURGERY: A 10-YEAR EXPERIENCE

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Abstract

Background: Leakage is a dreaded complication of bariatric surgery. The aim of this study was to describe the clinical presentation and outcomes of treatment in patients who develop gastrointestinal leaks after bariatric surgery.

Methods: Retrospective review of 632 consecutive bariatric surgical procedures performed from 1999-2009 in Alexandria University Hospital, Egypt.

Results: leakage occurred in 10 patients. Symptoms and signs included tachycardia, fever, tachypnea, left shoulder pain, abdominal pain, chest pain, and/or change in the nature of the drain effluent. The average time to diagnosis was 3.9±2.6 days. Six leaks occurred after laparoscopic vertical banded gastroplasty (6.3%), 2 after laparoscopic gastric bypass (3.6%), one after open gastric bypass (2.3%), and 1 after laparoscopic sleeve gastrectomy (2.4%). The most common leak location was at the esophagogastric junction (70%). Four patients (40%) required reoperations. A percutaneous abdominal drainage was placed in five patients (50%). In 2 patients (20%), the prophylactic drain was maintained in situ till cessation of leakage. Two patients (20%) died. Mean hospital length of stay was 13.9±7.8 days.

Conclusions: Leakage is a serious complication after bariatric surgery with a significant mortality. Patients with signs of sepsis or hemodynamic instability require emergent exploration. Leaks that are more insidious may be treated successfully with percutaneous drainage or maintenance of prophylactic drains.

Keywords: Morbid obesity, bariatric surgery, complication, leak.

INTRODUCTION

The prevalence of morbid obesity is rapidly increasing worldwide. As surgery has been recognized to be the only effective long-term treatment for morbid obesity,[1] the number of bariatric procedure realized each year has dramatically increased. However, surgical therapy can be associated with complications. Gastrointestinal (GI) leaks are one of the most dreaded complications following bariatric surgery because of the difficulty in diagnosing them and the associated increased morbidity and mortality. Difficulty in diagnosis is related to nonspecific systemic symptoms and limitations in most radiological studies. Treatment modalities are variable and ranges from observation to reoperation. The aim of this study was to describe our experience with the clinical presentation and outcomes of treatment in

patients who developed GI leaks after different bariatric surgical procedures.

PATIENTS AND METHODS

A retrospective study of 632 consecutive morbidly obese patients who were treated with different surgical procedures was undertaken. These procedures were performed between November 1999 and December 2009 in General Surgery Department, Alexandria Main University Hospital, Egypt. They included open vertical banded gastroplasty (OVBG) in 308 patients, laparoscopic vertical banded gastroplasty (LVBG) in 95 patients, open gastric bypass (OGBP) in 68 patients, laparoscopic gastric bypass (LGBP) in 55 patients, Laparoscopic sleeve gastrectomy (LSG) in 41 patients, and laparoscopic gastric band (LGB) in 65 patients. In OVBG, the stomach was stapled in continuity using the bariatric notched stapler TA 90 BN™; while in LVBG, the stomach was transected to create the pouch. In both OVBG and LVBG, the pouch outlet was encircled by a polypropylene band (5×1.5 cm). Both OGBP and LGBP involved separation of the gastric pouch using a linear cutter stapler. While the gastro-jejunostomy was hand sewn in OGBP, it was created using a linear cutter stapler in LGBP. Laparoscopic sleeve gastrectomy involved Gastric tubulization over a 36-French bougie starting 6 cm from the pylorus. The staple line was reinforced by neither over-sewing nor buttressing material. An intraoperative leak test using methylene blue was done in all patients undergoing transection of the stomach. A prophylactic tube drain was routinely placed in all patients. Drains were removed 24 hours after start of oral intake provided output is neither excessive nor abnormal. A routine postoperative upper GI radiological study was not done.

Hospital records were reviewed for patient demographics, body mass index (BMI), co-morbidities, type of surgical procedure, primary procedure vs revision, use of drains, the postoperative time for leak diagnosis, clinical signs and symptoms, the radiologic findings, location of the leak , treatment rendered, length of hospital stay, and outcomes. Data were presented as mean ± SD. The Fisher's exact test was used to determine statistical significance between groups.

RESULTS

A total of 632 patients underwent different bariatric surgical procedures. All patients had a BMI ≥40 kg/m^2 or ≥35 kg/m^2 plus co-morbidity. Five hundred forty-nine patients (87%) had one or more co-morbidity, including mechanical arthropathy (62%), hypertension (53%), dyslipidemia (48%), lower limbs venous insufficiency (34%), diabetes mellitus (12%), and obstructive sleep apnea (9%). There were 493 women (78%) and 139 men (22%), with a mean age of 35 years (range 16 to 58). six hundred twenty-one were primary procedures and 11 were revision procedures.

Ten patients (1.6 %) developed GI leaks and were the subject of this study. They consisted of 7 women (70%) and 3 men (30%), with a mean age of 31.2±9.7 years (range 20 to 51). Their mean BMI before surgery was 47.2±8.1 kg/m2 (range 40 to 66). Table1 shows details of the surgical procedures and the related incidence of leak. The highest rate (6.3%) was seen after LVBG and the lowest (0.0%) after LGB and OVBG. Two were revision surgery (20%). One failed LGB underwent conversion to LGBP and one failed OVBG underwent conversion to OGBP. The incidence of leak in the 11 patients who underwent revision procedures was 18%. This was significantly higher when compared to the leakage rate in primary GBP procedures (P=0.02).

Table 1. Details of the bariatric surgical procedures and the related incidence of leak (n=632).

Procedure	Total number	Leak number (%)
Laparoscopic VBG	95	6 (6.3)
Open VBG	308	0 (0.0)
Open GBP	68	1 (2.3)
Laparoscopic GBP	55	2 (3.6)
Laparoscopic sleeve gastrectomy	31	1 (2.4)
Laparoscopic gastric band	65	0 (0.0)
Total	632	10 (1.6)

GBP, gastric bypass; VBG, vertical banded gastroplasty.

Table 2 presents a summary of the main findings in the present study, showing the type of the bariatric procedure, the postoperative timing and the method of diagnosis of leak, its location, the treatment rendered, the hospital stay, and the mortality.

Table 2. Details of leakage in 10 patients.

No	Surgery	PO day	Location	Diagnostic tool	Treatment	LOS
1	Lap. VBG	1	EG junction	Exploration	Reoperation + PC drainage	17
2	Lap. VBG	2	EG junction	Gastrografin	PC drainage	11
3	Lap. VBG	2	EG junction	Gastrografin	Prophylactic drain	5
4	Lap. VBG	3	Distal stomach	Exploration	Reoperation	5
5	Lap. VBG	5	EG junction	Gastrografin	PC drainage	15
6	Lap. VBG	5	EG junction	Gastrografin	PC drainage	28
7	LSG	3	EG junction	Gastrografin	PC drainage	10
8	Lap. GBP	3	Jejunal perforation	Exploration	Reoperation	died
9	Lap. GBP (revision)	5	EG junction	CT	Reoperation	died
10	Open GBP (revision)	10	gastrojejunostomy	Gastrografin	Prophylactic drain	20

EG junction, esophagogastric junction; GBP, gastric bypass; LOS, length of hospital stay; No, serial number; PC drainage, percutaneous drainage; PO day, postoperative day of diagnosis; VBG, vertical banded gastroplasty.

The average time to the diagnosis of the leak was 3.9±2.6 days (range, 1-10 days). All leaks were clinical as no routine postoperative radiological study was done to detect subclinical leaks. Patients showed signs and/or symptoms of leak at a mean of 3.2±2.7 days (range 0 to 10 days) postoperatively. The clinical presentation included tachycardia (70%), fever (70%), tachypnea (50%), left shoulder pain (30%), a change in the nature of the drain effluent (30%), abdominal pain (20%), chest pain (10%), oliguria (10%), and/or hypotension (10%).

In 6 patients (60%), the leak was diagnosed before discharge after surgery, while 4 (40%) patients were readmitted because of the leak. An upper GI series using water soluble contrast (gastrografin) was used in 7 patients. It showed the leak in 5 patients while was negative in 2 patients. Six patients underwent computed tomographic scans (CT) of the abdomen and an abnormality was found in all of them. Three patients underwent an ultrasound as the initial diagnostic test before CT in 2 patients and before gastrografin in 1 patient. An abdominal collection was found in the 3 patients.

Seven leaks (70%) were noted at the staple line just below the esophagogastric (EG) junction. The site of leakage was diagnosed using upper GI Gastrografin study in 5 patients. One patient was operated upon based on the clinical findings alone and abdominal CT was used to diagnose the leak site in one patient. One patient (10%) had leak at the gastro-jejunal anastomosis as documented by gastrografin study. One patient (10%) had a leak at the staple line of the distal portion of the stomach after LVBG. The leak was missed on a gastrografin study and discovered at laparoscopic exploration. Another patient (10%) with a repeated negative gastrografin study was noted at exploration, for a leak after LGBP, to have a perforation at the afferent biliary limb. The perforation was believed to be due an injury caused by the linear cutter stapler while transecting the jejunum and had been missed during the primary procedure.

Four patients (40%) underwent reoperations to diagnose and treat the leak. The decision to operate was based on the clinical condition of the patients. Operative treatment included drainage of intra-abdominal collections, washout of the abdominal cavity, and placement of tube drains, in addition to repair of the leaking defect using simple sutures. Four patients were successfully treated non-operatively with percutaneous drainage of the leak site and any associated collection. A fifth patient required percutaneous drainage of an intra-abdominal collection that developed subsequent to

reoperation. Percutaneous drainage was CT-guided in one patient and ultrasound-guided in the rest of the patients. Two patients were treated with continued drainage via tube drains prophylactically placed at the time of the index surgery. All patients received intravenous broad-spectrum antibiotics and proton pump inhibitors, and all patients were kept nothing per mouth. Total parenteral nutrition was administered to 7 patients (70%), and one patient (LVBG) (10%) received enteral nutrition through a nasogastric tube. Four patients (40%) were transferred to the intensive care unit (ICU) for a mean of 5.3±2.1 days (range 3 to 7 days). Two patients (20%) required an endotracheal intubation and a mechanical ventilatory support. The remaining 60% of the patients were managed without being transferred to the ICU. The mean hospital stay for the patients, who developed leak, including 2 admissions for 4 patients, was 12.7±7.3 (range 5-28). Two patients (20%) died 7 and 9 days respectively after surgery secondary to sepsis and multiple organ failure in the first patient and pulmonary embolism in the second. Excluding the 2 mortalities, the mean hospital stay was 13.9±7.8 (range 5-28).

DISCUSSION

GI leak after bariatric surgery is an infrequent complication but one that can be expected to occur at some point in every bariatric surgeon's experience. The incidence in our overall series was 1.6%. The reported incidence in the literature varies according to the procedure; 0-5.6% for OGBP,[2-7] 0-4.3% for LGBP,[8-11] 0.7-5.3% for (LSG),[12-17] 1.1-7.1% for LVBG,[18-20] 0.07% for OVBG,[21] and 0-0.5% for LGB.[22-24] These figures are comparable to ours of 2.3%, 3.6%, 2.4%, 6.3%, 0.0%, and 0.0% respectively. We noted a significantly higher incidence of leak after LVBG. This may be attributed to a higher pressure in the pouch caused by the polypropylene band at its outlet. As expected, procedures which did not involve transection of stomach, namely LGB and OVBG had a very low incidence of leakage. Leaks were noted to be more frequent with revision bariatric surgery (18%). This increased rate of leakage was statistically significant when compared with the corresponding primary procedures. Revision of previous bariatric procedures has been found to carry a higher risk of leakage reported to be as high as 19%,[25] probably due to the increased dissection required by re-operative surgery, with a resulting increased risk of injury and ischemia to the tissues.

In the majority of our patients (70%), leak was located just below the EG junction. The EG junction has been reported as the usual site of leak after LSG.[15,17,26] Particular attention should be paid in this area at the time of staple firings. It is important to use staples of an adequate height and to avoid stapling the esophagus. Tucker et al.[27] suggested leaving a narrow cuff of tissue at the most superior aspect of the greater curve, just below the angle of His, which should be imbricated with a running 2/0 silk suture. There is no consensus with regard to the need for reinforcement of staple line with buttressing material or over-sewing.[28-30]

GI leakage after bariatric surgery has been identified as an independent risk factor associated with perioperative death.[31] The early recognition and prompt treatment cannot be overemphasized. As expected, the most common presentations (fever, tachycardia, and tachypnea) in the present study were not specific. This raises the importance of high index of suspicion for diagnosis of this potentially lethal complication. Gastrografin upper GI series examinations are helpful to establish leaks at the gastro-jejunostomy or upper gastric pouch staple line. However, they do not definitively rule out leaks in other locations.[32] In the present study, gastrografin was falsely negative in 2 patients. Although abdominal CT scan was positive in all cases in the present study, important limitations exist in its use and accuracy.[5,32] A positive radiology should not be awaited for before exploring patients in whom the diagnosis is still unclear. Two patients died in the present series, both after exploration for leakage after GBP. One patient was operated upon after repeated negative upper GI gastrografin study and the other only after a positive CT scan. We believe that a lower threshold for exploration for a suspected leak, particularly after GBP, might have decreased the mortality in the series. Lee et al.[33] noted that reliance on false negative imaging studies may delay operative intervention, particularly when there is a leak at sites other than the gastro-jejunostomy, e.g. the gastric remnant or the jejuno-jejunostomy. We agree with Marshall et al.[34] that any patient who is ill after Roux-en-Y gastric bypass with unexplained tachycardia warrants an exploration, even in the face of a normal swallow study.

While operative treatment in patients with GI leak is mandatory when hemodynamic instability and peritonitis are present, not all leaks require operative management. Non-operative treatment was undertaken successfully in 6 patients (60%) in the present study. Four patients required a percutaneous drainage technique. A fifth patient required percutaneous drainage of a recollection after surgical intervention. We recommend a skillful interventional radiologist to be among the team involved in the management of these patients. In many studies, percutaneous drainage was very advantageous in the control of leaks after bariatric surgery.[4,15,17,34] However, the patient must be clinically stable, without hypotension or oliguria, for this method to be chosen over exploration. In 2 patients, leaks were controlled by drains that were placed prophylactically at the time of surgery. These leaks were discovered by noting a change in the nature of the drainage; the patients were otherwise asymptomatic. Similarly, Gonzalez et al.[5] used closed suction drains routinely at the gastro-jejunostomy; finding that in the event of an early and small volume leak, those drains can evacuate effectively leaking enteric content, possibly allowing non-operative treatment in selected patients. Marshall et al.[34] recommended the use of prophylactic drains in

re-operative surgery and in cases judged by the surgeon to be at high risk for leakage. They also use drains in the extremely obese patient who, because of weight limitations, would be difficult to study radiographically.

In conclusion, leakage is a serious complication after bariatric surgery with a significant mortality. Early diagnosis is the key to adequate treatment. In patients in whom the diagnosis is unclear, a diagnostic celiotomy or laparoscopy is an integral part of the treatment algorithm. Different ways exist to manage leaks, depending on the magnitude of the collection and the clinical presentation. Patients with signs of sepsis or hemodynamic instability require emergent exploration. Leaks that are more insidious may be treated successfully with percutaneous drainage or maintenance of prophylactic drains.

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