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ORIGINAL ARTICLE

# Earliest signs and management of leakage after bariatric surgeries: Single institute experience

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## KEYWORDS

Morbid obesity;  
Bariatric surgery;  
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**Abstract** *Background:* The aim of this study was to describe the clinical presentation and outcomes of treatment in patients who develop gastrointestinal leaks after different bariatric surgeries. *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 earliest signs of presentation were tachycardia and unilateral decrease in air entry in all patients. The average time to diagnosis was  $3.9 \pm 2.6$  days. In four patients contrast study was negative (40%). Six leaks occurred after laparoscopic sleeve gastrectomy (6.3%), 2 after laparoscopic gastric bypass (3.6%), one after open gastric bypass (2.3%), and 1 after laparoscopic vertical banded gastroplasty (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  $13.9 \pm 7.8$  days.

*Conclusions:* Tachycardia and unequal breath sound in the early postoperative course are worrisome signs that warrant laparoscopic exploration even if contrast studies were negative. 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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## 1. 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,<sup>1</sup> the number of bariatric procedures 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.

## 2. Materials 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 ( $5 \times 1.5$  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 not reinforced by either over-sewing or 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 except after laparoscopic gastric band (LGB). Drains were removed 24 h after start of oral intake provided the output was 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 are presented as mean  $\pm$  SD. The Fisher's exact test was used to determine the statistical significance between groups.

## 3. Results

A total of 632 patients underwent different bariatric surgical procedures. All patients had a BMI  $\geq 40$  kg/m<sup>2</sup> or  $\geq 35$  kg/m<sup>2</sup> plus one or more of the obesity related co-morbidities. Five hundred forty-nine patients (87%) had one or more co-morbidity, including degenerative arthropathy (62%), hypertension (53%), dyslipidemia (48%), lower limb 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 16–58). 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 and 3 men, with a mean age of  $31.2 \pm 9.7$  years (range 20–51). Their mean BMI before surgery was  $47.2 \pm 8.1$  kg/m<sup>2</sup> (range 40–66). Table 1 shows details of the surgical procedures and the related incidence of leak. The highest rate (6.3%) was seen after LSG and the lowest (0.0%) after LGB and OVBG. Two were after 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 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.

The average time to the diagnosis of the leak was  $3.9 \pm 2.6$  days (range, 1–10 days). All leaks were clinical as no routine postoperative radiological study was done to detect sub-clinical leaks. Patients showed signs and/or symptoms of leak at a mean of  $3.2 \pm 2.7$  days (range 0–10 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. All patients diagnosed before discharge showed tachycardia and unequal air entry. An upper GI series using water soluble contrast (Gastrographin) was used in 7 patients. It showed the leak in 4 patients but was negative in 3 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 Gastrographin 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 Gastrographin study in 4 patients. Two patients were 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 a leak at the gastro-jejunal anastomosis as documented by Gastrographin study. One patient (10%) had a leak at the staple line of the distal portion

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

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

GBP, gastric bypass; VBG, vertical banded gastroplasty.

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