

# Conservative Management of Anastomotic Leaks after 557 Open Gastric Bypasses

Attila Csendes, MD, FACS (Hon); Patricio Burdiles, MD, FACS; Ana Maria Burgos, MD; Fernando Maluenda, MD, FACS; Juan Carlos Diaz, MD

Department of Surgery, University Hospital, Santiago, Chile

**Background:** One of the most serious complications after gastric bypass is an anastomotic leak. In a prospective surgical protocol for the management of this complication, the authors determined the incidence of anastomotic leaks

**Methods:** From August 1999 to January 2005, 557 patients with morbid obesity were submitted to laparotomic resectional gastric bypass. In all patients a left drain was placed during surgery. All patients had a radiological study with liquid barium sulphate on the 5th postoperative day. After the occurrence of an anastomotic leak, the daily output of the leak was carefully measured.

**Results:** 12 patients developed an anastomotic leak at the gastrojejunostomy. All were managed medically, with antibiotics if necessary, enteral or parenteral feeding and frequent control by imaging procedures. In 8 patients, the left drain was maintained *in situ* up to 43 days after surgery. In 4 patients, the drain had been removed between the 5th and 8th days after surgery after a normal radiologic study, but had to be inserted under radiological control 2-3 weeks after the gastric bypass. Daily output increased significantly the second week after surgery, and the leak closed at a mean of 30 days after surgery. One patient of the 12 (8%) died 32 days after surgery from septic shock, without any abdominal collection secondary to the leak.

**Conclusion:** The occurrence of an anastomotic leak is nearly 2% after gastric bypass. The majority of them can be managed medically, without the need for a reoperation, due to the fact that there is no acid production in the small gastric pouch and there is no intestinal reflux due to the long Roux loop.

**Key words:** Morbid obesity, bariatric surgery, gastric bypass, complication, gastrojejunostomy leak

---

Reprint requests to: Attila Csendes, MD, FACS (Hon), Department of Surgery, Clinical Hospital University of Chile, Santos Dumont # 999, Santiago, Chile. Fax: 56-2-7775043; e-mail: acsendes@med.uchile.cl

## Introduction

Gastric bypass, either open or laparoscopic, is widely performed for morbid obesity.<sup>1</sup> One of the major post-operative complications is anastomotic leak at the gastrojejunostomy, resulting occasionally in death of the patient.<sup>2</sup> The diagnosis of this complication may be difficult, and the management can be either by reoperation or by medical treatment. The purpose of this prospective study was to establish the incidence of this complication and the results of a conservative protocol for the management of this complication.

## Materials and Methods

### Patient Material

The study consists of 557 patients with morbid obesity who were included in a prospective protocol from August 1999 until January 2005. All patients had a BMI  $\geq 40$  kg/m<sup>2</sup> or  $>35$  kg/m<sup>2</sup> plus a co-morbidity such as diabetes, hypertension or dyslipidemia. There were 427 women (76.7%) and 130 men (23.3%), with mean age 39.7 years (range 14 to 70). There were 132 patients (23.7%) with BMI  $<40$  kg/m<sup>2</sup>, 341 (61.2%) patients with BMI 40-49.9 kg/m<sup>2</sup>, and 84 patients (15.1%) with BMI  $\geq 50$  kg/m<sup>2</sup>.

### Surgical Procedure

In all patients the same operation was performed, as previously described.<sup>3,4</sup> Briefly, after a upper midline laparotomy or a bilateral subcostal laparotomy in the super-obese patients (BMI  $\geq 50$ ), a small gastric pouch of  $<20$  ml volume is constructed by sectioning the

stomach with linear GIA-80 and -60 staplers (Tyco Healthcare, US Surgical Corp). The distal gastric segment is removed, dividing the duodenum with a GIA-60 stapler. The gastrojejunostomy is performed with a circular stapler No. 25 (Tyco Healthcare), leaving an internal diameter of 15 mm. The staple-line is reinforced with interrupted absorbable sutures of Byosin 4-0 (Tyco Healthcare). In all patients, at the end of the procedure, 60 ml of methylene blue is injected through a nasogastric tube by the anesthesiologist, to confirm the impermeability of the staple-lines. In two patients, a small leak was thus detected and sutured immediately. The length of the Roux limb is 125-150 cm. Two silastic drains are always left at each side of the gastrojejunal anastomosis.

### Radiological Surveillance

In all patients (except one), a radiological study of the gastrojejunal anastomosis was performed between the 4th and 5th day after surgery with liquid barium sulphate and not Gastrografin® or hypaque. With the patient standing, 20 ml of barium is swallowed and the characteristics of the small gastric pouch are evaluated: size, emptying and presence or not of stricture or leak. Six different pictures are taken, moving the patient in several positions. In previous studies, we have proved that even a type I leak (small, localized and asymptomatic) can be easily diagnosed with barium sulphate, but not with liquid contrast media.<sup>5</sup>

### Conservative Management

If an anastomotic leak was demonstrated by the routine radiological study, a nasojejunal catheter was placed under radiological control as distally as possible. Enteral feeding was started in a similar fashion as our treatment of patients after total gastrectomy for gastric cancer. The drains were left *in situ* until no drainage was observed through them. If no drain was present, under radiological control by computed tomography, a 10- to 12-Fr drain was placed inside the liquid collection.

If fever was present and bacteria were isolated, antibiotics were employed according to their sensitivity. If no fever was present, antibiotics were not given. If the placement of an enteral feeding tube was not possible or the patient rejected it, parenteral

nutrition was administered. Closure of the leak was evaluated radiologically every 14 days after the beginning of the conservative treatment.

### Results

Among the 557 patients operated by the same surgical team performing the same surgical procedure, a total of 12 patients developed an anastomotic leak (2.1%). They consisted of 8 women (67%) and 4 men (33%), with mean age 45 years (range 23 to 63). Their mean BMI before surgery was 43.9 kg/m<sup>2</sup>, similar to the whole group of patients. Five patients out of 132 with a BMI <40 presented an anastomotic leak (3.8%), while 5 out of 341 patients with BMI 40-49.9 kg/m<sup>2</sup> presented a leak (1.4%). Among 84 patients with BMI ≥50 kg/m<sup>2</sup>, 2 patients suffered this complication (2.4%). These values were not significantly different.

All patients with a leak had a negative methylene blue test during surgery. In 7 patients (58%), the anastomotic leak was diagnosed between the 5th and 8th day (mean 6th day) after surgery. In five patients, the leak was diagnosed later, at a mean of 15 days after surgery, all of them having had a previous normal radiological study. In all patients, the left drain remained in place until the daily output was <20 ml. A right drain in addition was placed in 5 of the patients during surgery and was removed 5 to 7 days after surgery.

Table 1 shows the conservative management that was used in patients with anastomotic leak. In all patients in whom the diagnosis of the leak was made between 5 to 8 days, the left drain was left *in situ* for 12 to 56 days, while in 4 patients it had been removed between the 5th to 8th day, because the first radiological study was normal, i.e. without evidence of leak. However, a left drain had to be reinserted in 3 patients under radiological guidance by CT scan 13 to 18 days after surgery (late anastomotic leak). In one patient, there was no need to reinsert a drain, because there was a small output of secretion spontaneously through an enterocutaneous fistula, without fever or other clinical compromise. In this patient, the fistulous track was sealed by the introduction of an endoscope and location of the small fistulous tract, sealing it with cyanoacrylate which produced instant sealing.

**Table 1. Conservative management of anastomotic leak in this series (n=12)**

	n	%
<b>1) Management of drains</b>		
- Left <i>in situ</i> for 12 to 43 days	8	66.7
- Removed between 5th and 8th day	4	33.3
- Reinserted under radiological control	3	25.0
- Sealed with cyanoacrilate	1	8.3
<b>2) Medical management</b>		
- Enteral feeding	8	66.7
- Parenteral feeding	9	75.0
<b>3) Reoperation</b>	1	8.3

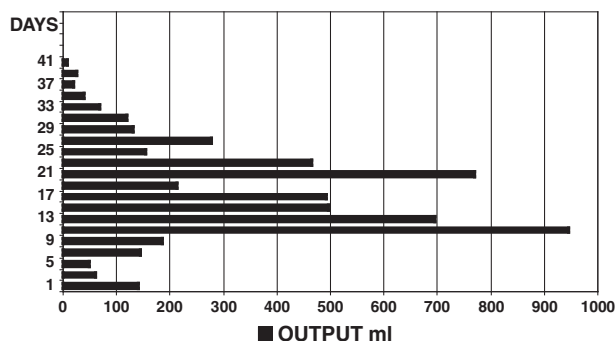
All patients with anastomotic leak were treated either with enteral or parenteral feeding or both simultaneously. Only 1 patient was reoperated, not because of the leak, but because of an acute evisceration on the 9th postoperative day, and abdominal closure was then reinforced with Ventrofil wire (Braun).

Table 2 shows the postoperative course in all 12 patients with an anastomotic leak. All patients had a prolonged postoperative hospital stay, with a mean of 23 days. However, 5 patients who had been discharged from the hospital, returned in order to replace the left drain which had been removed or to manage them conservatively. This second hospital stay for these 5 patients lasted 16 days.

Figure 1 shows the daily output of the left abdominal drain every 2 days. It can be seen that after the clear diagnosis of the leak (7 to 9 days after surgery), the daily output increases. At the 27th day after surgery, the daily output tends to progressively decrease. The drain was still *in situ* in 5 patients at 20

**Table 2. Postoperative course in the 12 patients with anastomotic leak**

1st Hospital stay	n = 12 mean 22.9 days (8-49)
2nd Hospital stay	n = 5 mean 15.8 days (8-30)
Total of 2 hospital stays	n = 5 mean 28.6 days (20-43)
Mortality	1 (8.3%)



**Figure 1.** Daily output (ml/24 hr) through left abdominal drain.

days postoperatively, while it was removed in all except 1 patient by the 30th day after surgery. This patient closed the leak on the 40th postoperative day.

The mean hospital stay, including both periods, was 29 days after the operation (range 20 to 43). One patient of this group (8.3%) died 32 days after surgery, from bilateral pneumonia and septic shock. At that time, the anastomotic leak was controlled, with a daily output of 50 ml/24 hr and no evidence of abdominal collection.

The 11 patients who survived were followed up to 25 months after surgery (range 12 to 52). The BMI was now 29 kg/m<sup>2</sup> and all of them were very satisfied with the operation.

## Discussion

The results of the present study suggest that in the first place, anastomotic leak of the gastrojejunostomy is a major postoperative complication seen after gastric bypass in patients with morbid obesity. In the second place, these leaks can be managed by conservative methods, without the need for reoperation, provided that adequate feeding is established and adequate drainage of the abdominal collection is monitored sequentially by imaging, especially by CT scans. In the third place, the leak will close spontaneously at a mean of 30 days postoperatively.

Anastomotic leak is one of the most serious complications after gastric bypass. Patients with gastric bypass behave similar to patients with total gastrectomy, because the tiny gastric pouch created in the gastric bypass (equivalent to 2 to 5% of total gastric

capacity) corresponds almost to a “near-total gastrectomy”. The technique of leaving or resecting the distal bypassed stomach has no relationship to the occurrence of this complication.

In 1990,<sup>5</sup> we classified anastomotic leaks after total gastrectomy into type I and II. Type I was a small localized subclinical leak, without spillage or dissemination into the pleural or abdominal cavity, while type II corresponded to the clinical variant with diffusion to the pleural or abdominal cavity via an irregular pathway. The only way to diagnose a type I fistula was through a contrast study with barium sulphate. In patients with a type I leak, the leak closed at a mean of 20 days after surgery. On the contrary, patients with a type II leak had systemic repercussions and required aggressive treatment. The usual day of appearance of a type II leak was around the 4th to 5th postoperative day.

Patients with gastric bypass behave somewhat differently. In them, there is no acid secretion due to the very small mass of parietal cells that are left in the pouch. There are two studies from the Mayo Clinic evaluating this aspect.<sup>6,7</sup> They demonstrated that basal acid output decreases from 4.9 to 0.001 mEq/hr or from 9.6 to 0.005 mEq/hr and peak acid output from 12.1 to 0.08 mEq/hr or from 12.8 to 0.008 mEq/hr respectively. Besides, there is no reflux of duodenal (biliary and pancreatic) or intestinal secretions due to the long Roux limb. Therefore, the only secretion that is produced and is responsible for the daily output of the leak is swallowed saliva. This probably explains the main difference in patients with total gastrectomy, who usually have a shorter Roux limb of 60 to 70 cm and in whom reflux of duodenal or intestinal content to the leak can occur. In fact, in an endoscopic study of the proximal pouch in patients with gastric bypass and a Roux limb of 75 cm, in only 11% of the patients was bile present in the pouch (indicating duodenal reflux).<sup>8</sup>

The incidence of anastomotic leak in selected series of open gastric bypass is shown in Table 3.<sup>9-15</sup> The reported values vary from 0 to 5.6% with a mean of 2.4%, which is very close to our 2.1%. For us, after having performed several thousand gastric operations, it is hard to believe a 0% report of anastomotic leak. With any surgical team, there will always be some leaks. The main point is to diagnose them early and to manage them properly.

The second aspect is that these patients can be managed conservatively without reoperation. We have learned especially after performing laparoscopic gastric bypass, that these patients may develop three types of anastomotic leaks: “early leaks”, “intermediate leaks” and “late leaks”. The “early leaks” correspond to those which appear 1 to 3 days after surgery and usually are secondary to technical surgical problems. We have not seen these leaks in the present study, but those patients usually need an early reoperation. The “intermediate leaks” are those which appear 5 to 7 days after surgery; usually there are some adhesions in the abdomen and if a drain is left in a proper position, the small amount of secretion can be well drained through this tube. We have also learned that the great majority of leaks are located or are drained to the left of the pouch and not to the right, because the creation of the tiny gastric pouch means division of the stomach to the left of the lesser curvature. Also, the “sorrow angle” in these patients is at the left and not at the right as usually occurred after a standard Hoffmeister-Finsterer subtotal gastrectomy. This is why we insist that a left drain is placed in all patients at gastric bypass, and in some a right drain can also be placed. The usual removal of the right drain is on the 5th day after surgery, while the left drain is removed between the 6th to 7th day after surgery.

The medical or conservative management includes enteral or parenteral feeding, sequential abdominal imaging in order to determine whether there is an undrained collection, and antibiotics if necessary but not routinely. Brodin<sup>1</sup> states that the incidence of this leak is between 1 to 2%.<sup>1,16</sup> A reoperation has never been needed in our patients, con-

**Table 3. Incidence of anastomotic leak after open gastric bypass in reported series**

Author	Year	No. of patients	Leakage rate %
Sugerman <sup>9</sup>	1989	182	1.6
Hall <sup>10</sup>	1990	99	0
MacLean <sup>11</sup>	1993	106	5.6
Fobi <sup>12</sup>	1998	944	3.1
Capella <sup>13</sup>	2002	652	0
Fernandez <sup>14</sup>	2004	1431	2.5
See <sup>15</sup>	2002	52	4.0
Csendes (present series)	2005	557	2.1



trary to Brolin's suggestion to perform empirically an exploratory laparotomy. When a patient who has had a normal postoperative course suddenly presents fever or tachycardia without abdominal signs, we always think first of an anastomotic leak and not of pulmonary embolism. We perform immediately a CT scan and afterwards the contrast study with barium sulphate and not liquid contrast medium. In a recent study, anastomotic leaks were diagnosed in only 17% or 22% of patients by employing liquid contrast medium.<sup>16,17</sup> If the diagnosis of a leak is confirmed, a nasojejunal tube is inserted distally to provide enteral feeding. If this is not possible or is rejected by the patient, parenteral feeding is started. In this way, the patient is constantly monitored. Psychiatric help is also advisable, because of depression that occurs in this complicated patient.

In the third place, one important point in our study was to establish the closure time for the leak. We have reviewed many articles and this specific topic is not mentioned. The leaks can close between 20 to 40 days after surgery, with a mean of 30 days. This figure is important to know both for the surgeon and the patient, in order to explain to him or her the need to have *patience* to wait for the closure of the leak, which will always happen.

## References

1. Brolin RE. Gastric bypass. *Surg Clin North Am* 2001; 81: 1077-95.
2. Baker RS, Foote J, Kemmeter P et al. The science of stapling and leaks. *Obes Surg* 2004; 14: 1290-8.
3. Csendes A, Burdiles P, Diaz JC et al. Results of surgical treatment of patients with morbid obesity: analysis of 180 patients. *Rev Chil Cir* 2002; 54: 3-9.
4. Csendes A, Burdiles P, Papapietro K et al. Results of gastric bypass plus resection of the distal excluded gastric segment in patients with morbid obesity. *J Gastrointest Surg* 2005; 9: 121-1.
5. Csendes A, Diaz JC, Burdiles P et al. Classification and treatment of anastomotic leakage after excluded total gastrectomy in gastric carcinoma. *Hepato-gastroenterology* 1990; 37: 174-7.
6. Smith CD, Herkes SHB, Behrns KE et al. Gastric acid secretion and vitamin B<sub>12</sub> absorption after vertical Roux-en-Y gastric bypass for morbid obesity. *Ann Surg* 1993; 218: 91-6.
7. Behrns KE, Smith CD, Sarr MG. Prospective evaluation of gastric acid secretion and cobalamin absorption following gastric bypass for clinically severe obesity. *Dig Dis Sci* 1994; 39: 315-20.
8. Flickinger EG, Sinai DR, Pories WJ et al. The bypassed stomach. *Am J Surg* 1985; 149: 151-6.
9. Sugeran HJ, Kellum JM, Engle KM et al. Gastric bypass for treating severe obesity. *Am J Clin Nutr* 1992; 55: 560S-566S.
10. Hall JC, Watts JM, O'Brien PE et al. Gastric surgery for morbid obesity: the Adelaide study. *Ann Surg* 1990; 211: 419-27.
11. MacLean LD, Rhode BM, Sampalis J et al. Results of surgical treatment of obesity. *Am J Surg* 1993; 165: 155-62.
12. Fobi MAL, Lee H, Holmess R et al. Operation for obesity. *World J Surg* 1998; 22: 925-35.
13. Capella JF, Capella RF. An assessment of vertical banded gastroplasty Roux-en-Y gastric bypass for the treatment of morbid obesity. *Am J Surg* 2002; 183: 117-23.
14. Fernandez AZ Jr, DeMaria EJ, Tichansky DS et al. Multivariate analysis of risk factors for death following gastric bypass for treatment of morbid obesity. *Ann Surg* 2004; 239: 698-702.
15. See C, Carter PL, Elliott D et al. An institutional experience with laparoscopic gastric bypass complication seen in the first year compared with open gastric bypass complications during the same period. *Am J Surg* 2002; 183: 533-8.
16. Gonzalez R, Nelson LG, Gallagher SF et al. Anastomotic leaks after laparoscopic gastric bypass. *Obes Surg* 2004; 14: 1299-307.
17. Hamilton EC, Siurs TL, Hamilton TT. Clinical predictors of leak after laparoscopic Roux-en-Y gastric bypass for morbid obesity. *Surg Endosc* 2003; 17: 679-84.

(Received June 1, 2005; accepted August 22, 2005)