

# Laparoscopic Biliopancreatic Diversion with Duodenal Switch: Technique and Initial Experience

A. Baltasar;<sup>1</sup> R. Bou;<sup>2</sup> J Miró;<sup>2</sup> M. Bengochea;<sup>2</sup> Carlos Serra;<sup>2</sup> Nieves Pérez<sup>3</sup>

<sup>1</sup>Chief of Surgery, <sup>2</sup>Surgical Staff, <sup>3</sup>Surgical Resident, Virgen de los Lirios Hospital, Alcoy, Alicante, Spain

**Background:** The duodenal Switch (DS) is a variant of the biliopancreatic diversion (BPD) for the surgical treatment of morbid obesity.

**Materials and Methods:** The laparoscopic DS (LapDS) operation is described, and the early surgical outcomes of 16 patients are reported.

**Results:** Postoperative stay was 5 to 8 days. Local wound infection at a trocar site was the most common local complication.

**Conclusion:** LapDS is an advanced, complex and feasible technique in bariatric surgery.

**Key words:** Morbid obesity, bariatric surgery, biliopancreatic diversion, duodenal switch, laparoscopy

## Introduction

The duodenal switch (DS) is a well-established technique for the surgical treatment of morbid obesity as a variant of the hybrid or mixed Scopinaro biliopancreatic diversion (BPD).<sup>1-6</sup> This procedure combines the early restriction of a pylorus-preserving vertical subtotal gastrectomy with the malabsorption of a BPD (exclusion of the first half of the small bowel, with a 75-cm common limb). Michel Gagner at Mount Sinai Hospital, New York, performed the first laparoscopic duodenal switch (LapDS) in September 1999.<sup>7,8</sup> We hereby present our experience.

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Reprint requests to: Dr. Aniceto Baltasar, Cid 61, 03803 Alcoy, Alicante, Spain. Fax: (34) 96-533-04-00; e-mail: abaltasar@seco.org

## Patients and Technique

Sixteen morbidly obese patients underwent LapDS from October 2000 to June 2001 (Figure 1). Body mass index (BMI) was >40 kg/m<sup>2</sup> in all patients. Complete information concerning risks and benefits of this new surgical approach was given, and patients gave informed consent as recommended

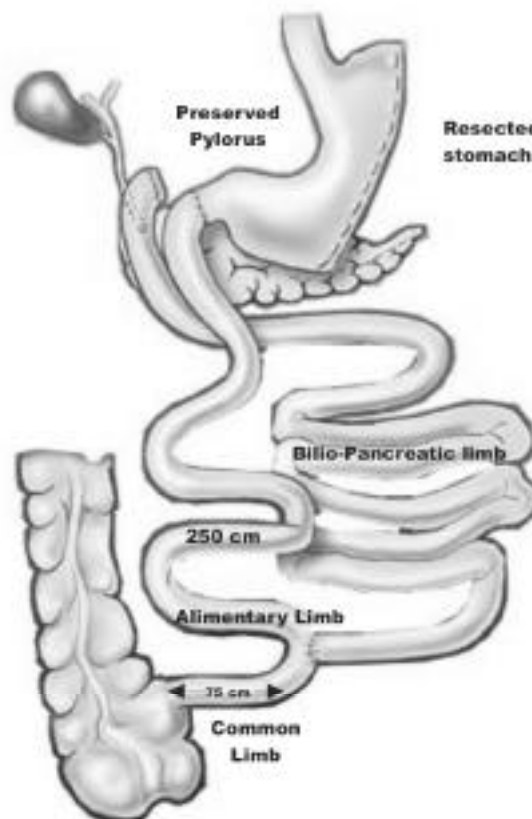


Figure 1. Laparoscopic duodenal switch.

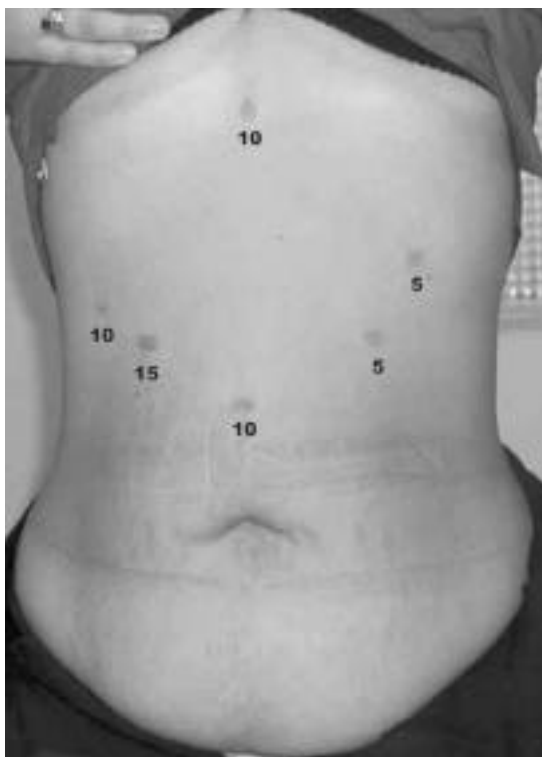
by the Spanish Surgical Society for a) bariatric surgery and b) laparoscopic method. Fourteen of the patients were female and two male, with ages 23 to 50 years, weights 104 to 145 kg, and BMI 43 to 56.

## Operative Technique

The patient is in the supine position, under general anesthesia, with the legs separated. Six trocars are used. The supraumbilical one is for the camera. Another at the sub-xiphoid midline (10 mm) allows liver separation and access to the hiatus. Two trocars are placed at the subcostal margins (right 10-mm and left 5-mm). Two trocars are placed at the lateral borders of the anterior rectus muscles above the umbilicus (right 15-mm and left 5-mm) (Figure 2).

The greater curvature of the stomach and the first part of the duodenum are completely devascularized with the harmonic scalpel. The duodenum is divided with a linear cutter.

The vertical subtotal gastrectomy starts 7 cm proximal to the pylorus at the greater curvature by the serial application of two linear cartridges paral-



**Figure 2.** Final wound, indicating sites of trocars (diameter in mm).

lel to the lesser curvature, without using a nasogastric tube stent. The rest of the stomach is divided with cartridges serially as far as the cardia. Thus, a gastric tube is constructed, based on the lesser curvature, and 70-80% of the stomach at the greater curvature is resected. The gastric remnant is filled with methylene blue to detect leaks, and no attempt is made to measure the volume of the tube, although it can be easily done by clamping the proximal and distal ends of stomach while filling the tube. The stomach is removed through the 15-mm port. Hemostasis of the suture-line is accomplished with an Argon scalpel or hemostatic clips.

The surgical team moves to the head of the patient, and the TV monitor is situated to the patients' right. The *common limb* (CL) measurement starts at the ileocecal junction without stretching the bowel. A suture marker is placed at 75 cm, indicating what is to become the CL. The bowel is divided with a linear cutter 250 cm proximal of the ileocecal valve to form the *alimentary limb* (AL). The mesentery is partially divided with the harmonic scalpel.

The *biliopancreatic limb* (BPL) and AL are joined by a side-to-end anastomosis at the 75 cm marker, hand-sutured to prevent narrowing at this small size, small bowel lumen.

The duodeno-ileal end-to-end anastomosis is hand-sutured by a continuous suture of 2-0 polypropylene. In four patients the duodeno-ileal anastomosis was done by circular stapling, with the anvils passed by mouth, two with the Ethicon 21 stapler (Wittgrove technique)<sup>9</sup> and two with the Tyco 25 stapler (Gagner technique).<sup>8</sup>

The mesenteric defects are left open. Suture-lines are checked for bleeding, and intraluminal irrigation is done with methylene blue to detect any leaks.

Only the fascia of the 15-mm trocar is closed, using Endoclose.

## Results

Operative times ranged from 195 to 270 minutes. Three patients were admitted to the Intensive Care Unit for less than 20 hours.

One patient had significant intraoperative bleed-

ing at the gastric division suture-line that required a continuous sero-serosal suture with Endo-Stitch. She also had rectal bleeding, and 5 units of packed red cells were transfused. The excessive bleeding was presumed to be heparin-related.

All patients had a Gastrografin® swallow on the first day, and liquids were allowed. One patient developed partial stenosis of the gastric tube, and was treated by nasogastric intubation for 2 days.

Two patients required reoperations by laparotomy. One was operated 2 days after surgery for small bowel kinking at the BPL-CL entero-enterostomy site, because of impingement of the staples on the other side of the small bowel wall.

In the second patient, the end of the BPL was anastomosed to the duodenum and the proximal DL to the CL by error, so that the patient had two non-connected bowel loops, one proximal (stomach, duodenum and BPL) and one distal (DL and CL). The proper construction was done by laparotomy 4 days after the laparoscopic procedure.

Patients were discharged 5 to 8 days postoperatively, except for the three patients with complications. Three patients developed local wound infections at the sites where the circular stapler had been used, and these wounds had a secondary closure.

Patients had no more postoperative pain than following regular laparoscopic procedures. The patients got out of bed and walked on the day of

surgery, but the patient with intrabdominal bleeding stayed in bed for 5 days after prophylactic heparin had been discontinued.

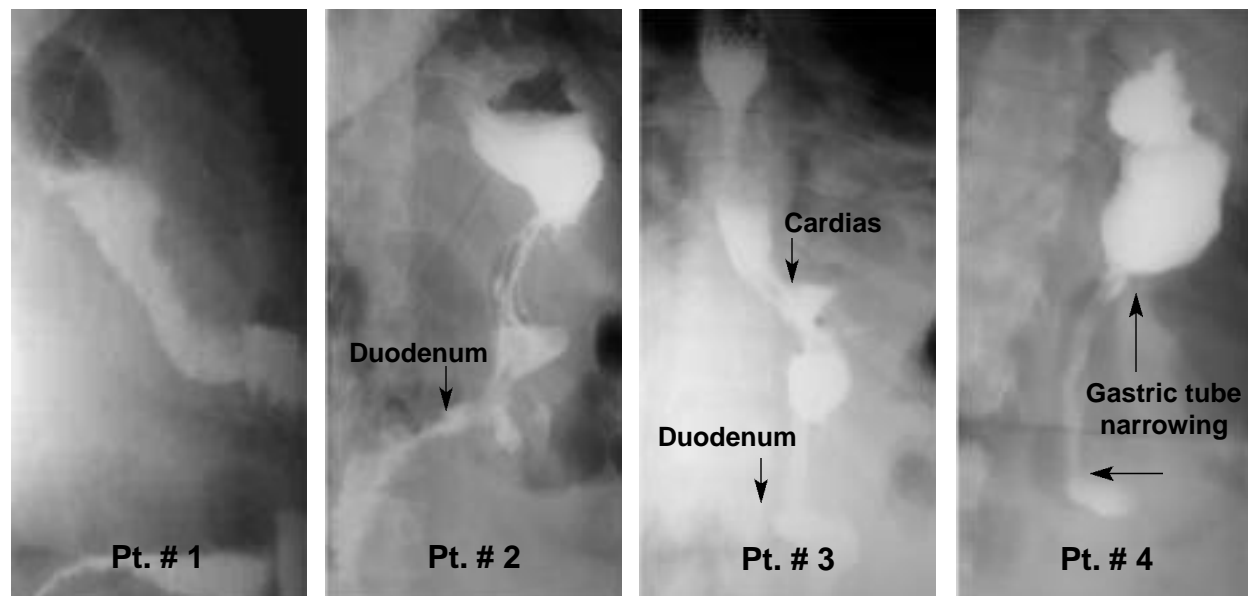
The final abdominal wounds and trocar sites are shown in Figure 2. Some radiological studies performed during the immediate postoperative period are shown in Figure 3.

## Discussion

Bariatric surgery is in continuous evolution. The *simple* techniques such as the adjustable bands are very popular in Europe, Australia and Mexico (more than 50,000 have been done). We abandoned the vertical banded gastroplasty because of poor long-term results.<sup>10,11</sup>

*Complex* procedures such as open or laparoscopic gastric bypasses<sup>12</sup> are most frequently performed in U.S.A. The hybrid, mixed techniques are common in Italy, and the DS is a variation. About 30 U.S. surgeons perform the DS; the technique is becoming increasingly popular because its excellent weight loss and quality of life.

The LapDS is an important technological step, because it allows a complex and very invasive operation (with several suture-lines) to be performed with significantly less abdominal wall



**Figure 3.** Gastrografin® GI studies in the immediate postoperative period.

trauma.

Devascularization of the greater curvature of the stomach can only be done safely with the harmonic scalpel. Bleeding of the divided stomach can be controlled by the Argon scalpel used sequentially after each stapler firing. This bleeding can be major and bothersome, as reported by Ren et al<sup>8</sup> who required blood transfusion in 10% of their patients, and this places in doubt the use of prophylactic heparin with this technique.

The duodeno-ileal anastomosis can be done with circular staplers. Passing the anvil through the mouth with the Ethicon-21 stapler is cumbersome, because the size of the anvil diameter makes the manoeuvre difficult. By using the flipping Tyco-25 anvil (as Gagner does)<sup>7,8</sup> the anvil passes much more easily. The problem remains in passing the nasogastric tube through pyloric valve, which may take a long time to manoeuvre. By using the hand-suturing technique, these problems are resolved. Also, introduction of the stapler through the abdominal wall would increase the possibility of local wound infection at the trocar site.

When the surgical steps become standardized and the advances in laparoscopy are applied, more surgical teams, properly-trained in laparoscopy and bariatric surgery, will be able to perform the LapDS. The difficult learning curve is overcome by proper training and repetition of the surgical act. Gagner is able to perform this operation in <2 hours. The standard laparoscopic gastric bypass takes <1 hour for expert laparoscopic bariatric surgeons. Long-term weight loss >5 years should be the same as in open surgery, because the procedure is a replication of the open one.

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