

# The biliointestinal bypass



Ann. Ital. Chir., 2007; 78: 27-30

Giancarlo Micheletto, Enrico Mozzi\*, Ezio Lattuada\*, Marco Lanni, Massimo Perrini, Riccardo Caccialanza\*\*, Alessandra Spinola\*, Matteo Santamaria, Barbara Sala, Santo Bressani Doldi



Dipartimento di Scienze Chirurgiche (Direttore: Prof. S.B. Doldi) - Cattedra di Chirurgia Generale dell'Università degli Studi di Milano (Direttore: Prof. S.B. Doldi), Istituto Clinico S. Ambrogio, Milano.

\*Divisione di Chirurgia Generale Ospedale Maggiore Policlinico, Mangiagalli e Regina Elena, IRCCS, Milano (Direttore: Prof. G. Roviaro).

\*\*Servizio di Dietetica, IRCCS Policlinico San Matteo, Pavia.

## The biointestinal bypass

**BACKGROUND:** Since 1990 we adopted the biliointestinal bypass (BIBP) for all morbid obese patients eligible to a malabsorption procedure. Since 2001 we used laparoscopic technique.

**MATERIALS AND METHODS:** 102 patients; mean age 35.4 (18-54) years; preoperative mean weight Kg 148.3 (105-225); mean preoperative BMI 54.1 kg/m<sup>2</sup> (40-66.2); mean follow-up 10 years (1-22). 83 patients underwent open and 19 laparoscopic BIBP. The operation was performed with five lap ports. Section of the jejunum 30 cm from the Treitz and of mesentery was made by linear stapler. The cholecysto-jejunal anastomosis was completed with 45 mm linear stapler. A side-to-side anastomosis between the proximal jejunum and the last 12-18 cm of the ileum was created by firing a 60 mm linear stapler. On the excluded ileum an anti-reflux valve system was hand-sutured.

**RESULTS:** Five years post-operatively mean weight was 89 (62-130) kg, mean BMI was 31 (24-41) kg/m<sup>2</sup>. Two patients of the 19 laparoscopic patients were converted in open surgery for adhesions post-appendectomy. The main late complications were incisional hernia (19.3%) and abdominal bloating (2.9%). The reversal and conversion rate was 6.5%. There was no death.

**CONCLUSION:** Our experience showed that five years post-BIBP the weight loss was satisfactory in 90.7% of patients. Using laparoscopic technique it is possible to reduce pain, in-hospital time, respiratory and thromboembolic complications, convalescence and incisional hernia.

**KEY WORDS:** Biliointestinal bypass, Morbid obesity; Surgery.

## Introduction

According to M.A.L. Fobi<sup>1</sup> an effective operation for obesity control is characterized as follows:

- The procedure should produce a significant weight loss (> 25% excess weight loss)
- Operative and postoperative morbidity should be less than 20% and mortality less than 1%
- Weight loss should be maintained for a long period (>= 5 years)
- Effects of the procedure should be documentable by more than two authors

By our experience<sup>2</sup> we'll try to show that biliointestinal bypass (BIBP) can meet these criteria and particularly laparoscopic approach can reduce respiratory, thromboembolic and late postoperative complications.

## Materials and Methods

One hundred two morbid obese patients underwent BIBP (Fig. 1). Mean age was 35.4 (18-54) years; mean preoperative weight was 148.3 (105-225) Kg; mean BMI was 54.1 kg/m<sup>2</sup>. Mean follow-up is 10 years. All patients were submitted to surgery following screening by a team consisting of a surgeon, a physician, a psychologist and a dietician. Anastomosis of the fundus of gallbladder to the proximal end of the bypassed jejunum with a 45 mm linear stapler makes BIBP different from jejunoileal bypass (JIBP) because in this way the enterohepatic cir-

Pervenuto in Redazione Dicembre 2005. Accettato per la pubblicazione Maggio 2006.

Per la corrispondenza: Prof. G. Micheletto, Unità Operativa di Chirurgia Generale - Istituto Clinico "Sant'Ambrogio", Via Faravelli 16, 20149 Milano (Italy) (e-mail: giancarlo.micheletto@unimi.it).

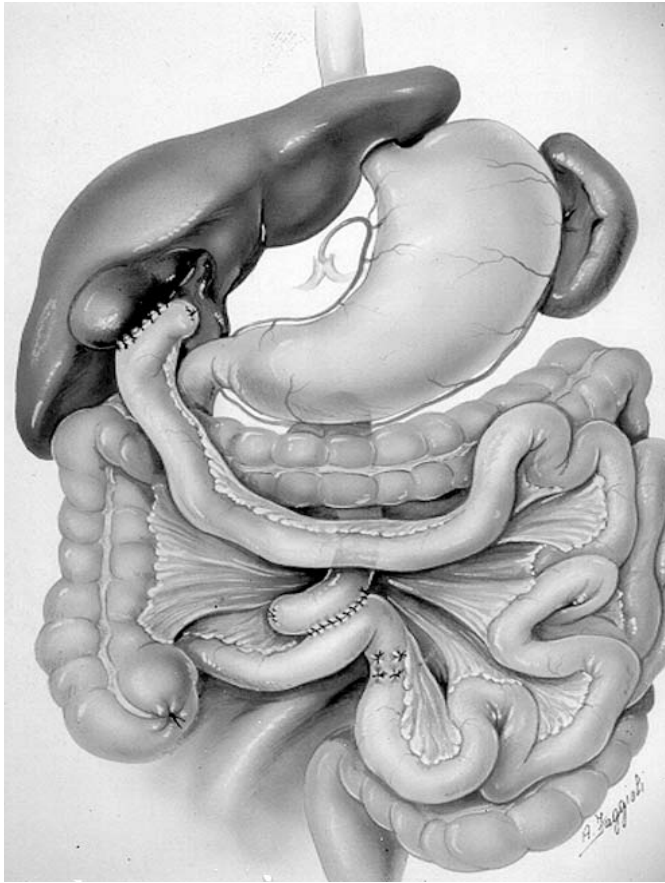


Fig. 1: Biliointestinal bypass scheme.

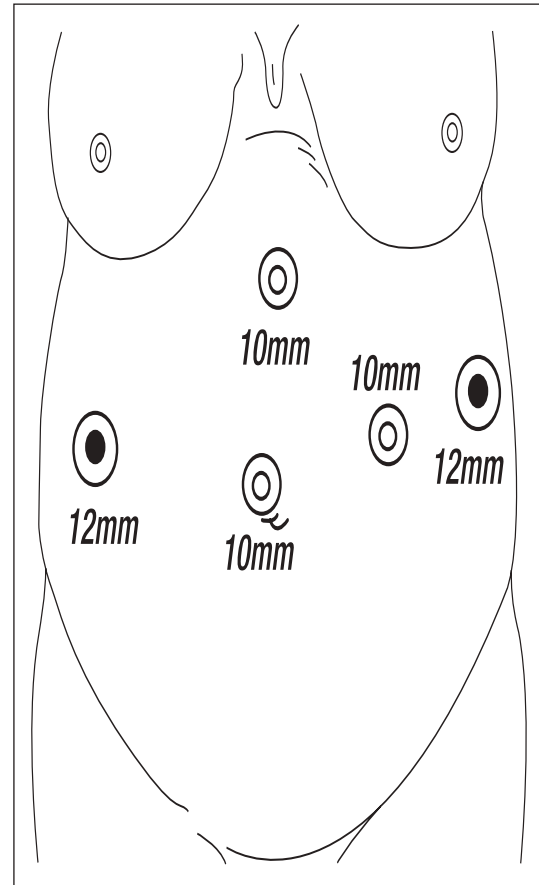


Fig. 2: Trocars in laparoscopic biliointestinal bypass.

culuation of bile acids is assumed to be preserved<sup>3,4</sup>. Since 2001 we performed the biliointestinal bypass by laparoscopic approach (Fig. 2). Section of the jejunum 30 cm from the Treitz and of mesentery was made by linear stapler. The cholecysto-jejunal anastomosis was completed with 45 mm linear stapler. A side-to-side anastomosis between the proximal jejunum and the last 12-18 cm of the ileum was created by firing a 60 mm linear stapler. On the excluded ileum an anti-reflux valve system was hand-sutured.

On discharge patients were administered the following treatment:

- Vitamin D<sub>3</sub>: 1200000 IU/month i.m.
- Vitamin B<sub>12</sub>: 5000 γ/month i.m.
- Oral electrolytes (K<sup>+</sup>, Ca<sup>++</sup>, Fe<sup>++</sup>) and trace minerals
- Oral antidiarrhea drugs when bowel movements were > 10/day

The patients were advised to abstain from alcohol, cold drinks, ice cream and to reduce their intake of fats and fibers for least the first 8-10 months in order to avoid episodes of severe diarrhea. They were also advised to avoid excessively high temperatures, irregular heating habits and periods of heavy physical exercise in order to prevent rapid dehydration.

During the period of weight loss (18-24 postoperative

months) the patients underwent monthly checkups through the outpatient department.

## Results

- Weight loss: two years postoperatively, 38.7% of the initial weight had been lost by 90.7% of the patients with mean reduction of the excess weight of 75%. The weight loss was maintained for more than five years. Insufficient weight loss (< 20% initial weight) was observed in 1.8% of patients.
- Diarrhea: for 2-3 months patients reported an average of four-five bowel movements per day. However, diarrhea quickly reduced and the faeces became less irritating and increased in consistency.
- Obesity-related diseases: there was an overall improvement of all co-morbidities, with the majority of patients experiencing complete resolution of their problem such as hypertension (86%), diabetes (90%), sleep apnea (100%).
- Early complications (Table I): severe diarrhea (1.2%) was usually caused by dietary errors and was associated with electrolyte and vitamin unbalance. Antidiarrhea agents solved quickly the problem. Anal inflammation

TABLE I – Biliointestinal bypass. Early complications: personal experience.

– Severe diarrhea	1.2%
– Electrolyte unbalance	1.2%
– Haemorrhoids	7.5%
– Anal fissure	2.5%
– Perianal abscess	1.2%

TABLE II – Biliointestinal bypass. Late complications: personal experience.

– Incisional hernia	19.3%
– Abdominal bloating	2.9%
– Oxalic nephrolithiasis	3.7%
– Cholelithiasis	2.5%
– Severe diarrhea	2.5%
– Electrolyte unbalance	2.5%
– Persistent K <sup>+</sup> malabsorption	1.2%

gradually disappeared with the reduction of the diarrhea.

- Late complications (Table II): severe diarrhea with electrolyte unbalance were solved easily with conservative methods. Cholelithiasis occurred in 2.5% of our patients, was silent and associated with a stenosis of the cholecystojejunal anastomosis. Oxalic nephrolithiasis affected 3.7% of patients, in particular those who did not have a regular supplementation of calcium, who did not introduce adequate liquids and who did not avoid oxalate-rich foods. Abdominal bloating was observed in 2.9% of our patients: the severity and the intensity was greatly reduced in comparison with the same phenomenon after jejunoileal bypass. Postoperative incisional hernia occurred in 19,3% of cases.

To date we have not observed the more severe metabolic complications related to malabsorption procedures, such as liver failure, persistent intestinal malabsorption, interstitial oxalate nephropathy. No deaths have occurred. There were three reversals: one for the onset of Gardner's syndrome, one for psychologic reasons and one for intestinal dysmicrobism. There was one conversion to adjustable gastric banding for persistent malabsorption of potassium.

## Discussion

We initially restricted the BIBP to superobese patients with history of liver disorders. The good results stimulated us, at the beginning of 1990, to perform BIBP routinely in those patients candidate to malabsorption procedure<sup>5</sup> and since 2001 we performed the surgical intervention only by laparoscopic approach. The analysis of our results allowed to state that BIBP can meet Fobi's criteria.

Weight loss was significant, sustained with reversal of the co-morbidities. Operative and postoperative morbidity was much less than 20%. The most prominent late complications were: cholelithiasis, oxalate nephrolithiasis and abdominal bloating but they don't certainly affect 20% of the patients. We can prevent cholelithiasis with a large cholecystojejunal anastomosis using a 28/31 mm circular end-to-end stapler or a 45-60 mm EndoGIA stapler, oxalate nephrolithiasis with oral calcium supplements, abdominal bloating with diet modifications and antibiotics such as metronidazole or tetracycline for four-five days. Our good results with BIBP are confirmed by other Authors<sup>6-10</sup>.

In our experience in comparison with JIBP, a higher percentage of BIBP patients had satisfactory weight loss (90,7% vs 83%)<sup>11</sup>; the frequency of diarrhea in BIBP patients was significantly less than in JIBP<sup>2,4,11</sup>; the absence of death and most severe metabolic complications is another advantage of BIBP.

Biliopancreatic diversion (BPD)<sup>12</sup> is much more known and used than BIBP, but we want to emphasize that BIBP can provide good results with an acceptable complication rate, is completely reversible and less aggressive than the other malabsorption operations.

Since 2001 we could perform BIBP with laparoscopic technique. It is common knowledge<sup>13,14</sup> that laparoscopic approach can provide many benefits, including shorter recovery with an earlier return to normal activity, less pain, less cardiorespiratory, thromboembolic and wound-related complications.

In conclusion, we think that BIBP can still play an important role in bariatric surgery in particular:

- for superobese patients (BMI>50)
- for patients who resist drastic long-term food restriction
- for patients with compulsive bulimia
- following unsuccessful gastric restrictive surgery.

## Riassunto

**OBBIETTIVO:** Obiettivo del nostro lavoro è stata la valutazione dei risultati a medio e lungo termine dell'intervento di Bypass Biliointestinale (BPBI) che noi abbiamo utilizzato sistematicamente dal 1990 e che eseguiamo per via laparoscopica dal 2001.

**MATERIALI E METODI:** La nostra esperienza comprende 102 pazienti dell'età media di 35,4 anni, del peso preoperatorio medio di Kg 148,3 e con BMI preoperatorio medio di 54,1 Kg/m<sup>2</sup>.

**RISULTATI:** A 5 anni dall'intervento chirurgico il peso si assesta mediamente sugli 89 Kg e il BMI medio è 31 Kg/m<sup>2</sup>; il calo ponderale risulta soddisfacente in più del 90% dei pazienti operati.

**DISCUSSIONE:** I risultati della nostra esperienza dimostrano che il bypass biliointestinale è una metodica malassorbitiva in grado di ottenere un ottimo calo ponderale

al pari di altre metodiche ma con una incidenza di effetti collaterali e complicanze minori ed una completa reversibilità chirurgica. L'adozione della tecnica laparoscopica consente di ridurre i tempi di degenza e di convalescenza con innegabili risvolti positivi per il paziente e la società. CONCLUSIONI: L'approccio laparoscopico è in grado di migliorare ulteriormente l'affidabilità e ridurre l'incidenza di alcune complicanze postoperatorie del BPBI.

## Bibliografia

- 1) Fobi MAL: *Operations that are Questionable for Control of Obesity*. *Obes Surg*, 1993; 3:197-200.
- 2) Doldi SB, Lattuada E, Zappa MA, Restelli A, Pieri G, Micheletto G: *Biliointestinal bypass: another surgical option*. *Obes Surg*, 1998; 8:566-69.
- 3) Corradini SG, Eramo A, Lubrano C, Spera G, Attili AF, Badiali M: *Comparison of changes in lipid profile after bilio-intestinal bypass and gastric banding patients with morbid obesity*. *Obes Surg*, 2005; 15:367-77.
- 4) Hallberg D, Holmgren U: *Biliointestinal shunt. A method and a pilot study for treatment of obesity*. *Acta Chir Scand*, 1979; 145:405-08.
- 5) Doldi SB: *La chirurgie de l'obésité morbide: des court-circuits intestinaux à l'anneau gastrique ajustable*. *Ann Chir*, 1998; 52:125-31.
- 6) Eriksson F: *Biliointestinal bypass*. *Int J Obes*, 1981; 5:437-47.
- 7) Benhamou G, Kasawat F, Harari H: *Does Bilio-intestinal Bypass still have a role in the treatment of Super-obesity?* *Obes Surg*, 1996; 6:151-54.
- 8) Boman L, Linder J, Ericson M: *Do arthralgias occur after bilio-intestinal bypass for morbid obesity*. *Obes Surg*, 1998; 8:261-64.
- 9) Nyhlin H, Brydon G, Danielsson A: *Bile acid malabsorption after intestinal bypass surgery for obesity. A comparison between jejunoileal shunt and biliointestinal bypass*. *Int J Obes*, 1990; 14:47-55.
- 10) Badiali M, D'Agostini A, Filippis AM: *Patency of anastomoses after biliointestinal bypass: radioisotope demonstration*. *Obes Surg*, 2001; 11:611-18.
- 11) Doldi SB, Micheletto G, Perrini MN: *27 anni di chirurgia bariatrica*. *Atti XX Cong. Naz. SIPAD*, Alghero 30/05-02/06-2001:471-75.
- 12) Scopinaro N, Adami GF, Marinari GM: *Biliopancreatic Diversion*. *World J Surg*, 1998; 22:936-46.
- 13) Chee FM, McIntyre RC: *Laparoscopic bariatric surgery*. *Surg Endosc*, 1999; 13:547-49.
- 14) Deitel M: *Surgery for morbid obesity. Overview*. *Eur J Gastroenterol Hepatol*, 1999; 11:57-61.