Bilopancreatic diversion

BILIOPANCREATIC DIVERSION is one of the surgical procedures for the treatment of morbid obesity. This technique has been performed in our service for over 20 years in over 1 800 patients. Since 2002 this procedure is mainly performed via laparoscopy (via 6 or 7 small keyholes). Most patients leave hospital after only 5 or 6 days.

Below is a detailed explanation of this procedure with the benefits, but also the most common side effects.

Introduction

Obesity is a chronic disorder that is determined by multiple factors and that poses a threat to health in many ways, including a threat to psychological and social functioning.
(Tijdschr.v.Geneesk., 53 , No.19,1997)

There is a growing conviction that heredity plays an important role.

Despite numerous efforts to maintain an acceptable weight, some people develop MORBID OBESITY, which can be life-threatening! However, when conservative treatment fails, a surgical procedure may be necessary!

Different surgical techniques have been studied for over 30 years.

The aim of surgery is to achieve a permanent weight loss with a final weight in the proximity of the ideal weight. This is accomplished by denying the body excessive calories in a permanent manner, so a new balance can be achieved.

This can be achieved in 3 ways:

- 1°restrictive techniques, such as VERTICAL BANDED GASTROPLASTY according to MASON, GASTRIC BANDING (including the so-called LAP BAND), and others.
  In this situation the patient can only consume small amounts of food. This is actually a dietary aid!
- 2°malabsorption techniques, such as BILIOPANCREATIC DIVERSION according to SCOPINARO.
  This technique was described by Scopinaro and has been practiced since 1976.
  In this group the issue is not the number of calories consumed by the patient, but the number he can absorb.
- 3° the combined technique, such as GASTRIC BYPASS. This technique is also chiefly restrictive, but with better results in the long term due to the gastroenterostomy between

a very small pouch and the jejunum. This induces a dumping syndrome after consumption of sweet food.

Indications for surgery

Weight

We recommend an excess weight of 45 kg of more or a BMI (body mass index) > 40 kg/m²

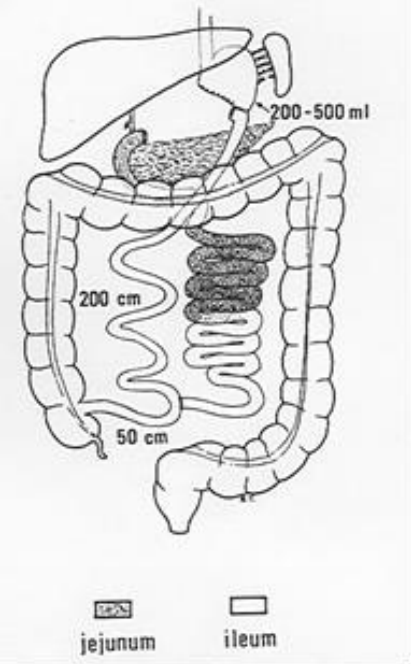
In the case of a severe medical (diabetes, hypertension, orthopaedic symptoms, severe psychological problems due to the excess weight, and others) BMI can be lowered to 35 and the excess weight can be reduced to below 45 kg.

Age

- children should have reached bone maturity
- there is no upper limit so far. The procedure is considered to be useful if the patient involved is mobile and has sufficient chances of survival to enjoy the results of the procedure.

Technique

- a ½ to 2/3 gastrectomy
- duodenal section at a distance of 250 cm of the caecum
- gastroileostomy (Roux-en-Y)
- the free section of the jejunum is implanted 50 cm from the caecum
- cholecystectomy: this is for preventive reasons since obese patients
- are more at risk of developing cholelithiasis. In view of the biliopancreatic
- diversion the gallbladder loses its function here.
- Appendectomy

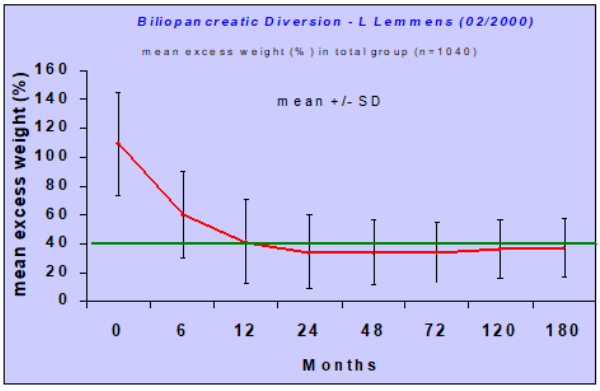


Results

Weight loss

This procedure aims to achieve a permanent weight loss with mean final weight approaching 30% excess weight. This final weight depends largely on the initial excess weight. In extremely obese patients with

> 120 % excess weight the final weight can be 40% excess weight. With an initial excess weight below 100 % the final weight may even be less than 20% excess weight.



The effect of this surgical procedure is due to two mechanisms: a temporary mechanism resulting in weight loss and a permanent mechanism to maintain this loss. The mechanism of weight loss is based on the smaller gastric volume after distal gastrectomy. The contents empty rapidly into a distal intestinal segment via a broad gastroenterotstomy. The patient presents a temporary loss of appetite, occasionally in combination with a «postcibal syndrome» (epigastric cramping sensation after food intake).

The mechanism of weight control is based on the biliopancreatic diversion itself, which causes permanent and elective malabsorption of fat and carbohydrates.

Weight loss is most significant in the first 6 months. The final result is achieved after 12 to 18 months.

Eating habits

During the first 3 to 4 months after surgery, most BPD patients have little or no appetite and present symptoms of early satiety, sometimes associated with epigastric pain and/or vomiting. These symptoms are characteristic of the "postcibal syndrome " and are caused by rapid gastric emptying and subsequent dilation of the postanatomic intestinal loop. Patients are therefore advised to eat small, frequent meals, to eat slowly and to avoid drinking during meals as well as avoiding large amounts of fluids. They are advised in particular to reserve the limited eating capacity for protein-rich food.

All these symptoms soon disappear in time. One year after surgery, appetite has recovered fully, patients can consume large meals and often eat more than before surgery.

Patients with a BPD should be aware that they can absorb almost no fat, few carbohydrates, sufficient protein, but almost all mono- and disaccharides, short chain triglycerides and alcohol. They should also understand that when their weight has stabilized (depending on the fat/carbohydrate absorption capacity of the remaining intestinal tract), the intake of these foods can be adapted according to individual weight adjustments.

Stool pattern

After full recovery of food intake, BPD-patients pass loose stools 2 to 4 times daily. Most patients suffer from malodorous faeces and many suffer from flatulence, depending on dietary habits. Only 1 out of ten patients sees this as a problem and symptoms can be treated with oral neomycin, metronidazole (Flagyl 500, 2 x 1/day) or quinolones (Tavanic 500 ½ to 1/day). This phenomenon improves with time, with stool frequency decreasing and consistency increasing.

Diarrhea usually occurs in the context of the postcibal syndrome and is due to rapid gastric emptying after ingestion of large quantities of fluid, in particular during meals. These loose stools soon disappear with time and are reported as "frequent" by less than 1% of the patients one month after surgery and as "persistent" by less than 1% after 1 year. Sporadically, acute gastroenteritis can occur, in particular in the summer. This problem is generally solved rapidly by Tavanic ½ to 1 per day. Plasma prothrombin levels should be monitored in these cases, since the bacterial flora in the colon is the main source of vitamin K in BPD patients. Since the colon is also

of importance in protein digestion and absorption in these patients, a prolonged period of diarrhoea can result in reduction of serum protein levels.

Bile salt diarrhea is very rare. The enterohepatic cycle is maintained by the common 50 cm limb. In this case, the problem can be solved by Questran, 3 to 4 sachets daily.

Beneficial results

In addition to weight loss, BPD is responsible for several other beneficial results.

These are presented in the following table from an article by Scopinaro.

Patients were only considered to be "cured" when the beneficial effects were maintained in all further investigations.

Table II. Other beneficial effects of AHS BPD

	Minimum follow-up (mo)	*Disappeared (%)*	*Improved (%)*	*Unchanged (%)*	*Impaired (%)*
Pickwickian syndrome* (2%)	1	100	—	—	—
Somnolence† (5%)	1	100	—	—	—
Hypertension‡ (37%)	12	81	13	6	—
Fatty liver§ (48%)	24	87	9	4	—
Leg stasis‖ (27%)	12	45	39	16	—
Hypercholesterolemia¶ (53%)	1	100	—	—	—
Hypertriglyceridemia (32%)	12	95	5	—	—
Hyperglycemia (14%)	4	100	—	—	—
Diabetes mellitus (7%)	4	100	—	—	—
Diabetes mellitus requiring insulin (2%)	12	100	—	—	—
Hyperuricemia (18%)	4	94	—	3	3
Gout (2%)	4	100#	—	—	—

%, Percent of patients with condition.
*Somnolence with cyanosis, polycythemia, and hypercapnia.
†In absence of one or more of characteristics of Pickwickian syndrome.
‡Systolic ≥155, diastolic ≥95 mm Hg, or both.
§More than 10%.
‖Moderate or severe.
¶More than 200 mg/ml (17% more than 240 mg/ml).
#Serum uric acid normalized, no more clinical symptoms.

Adverse effects and complications

Non-specific complications

Only 5 postoperative deaths occurred after over 1 800 surgical procedures: 2 due to pulmonary embolism, 1 due to pneumonia, 1 due to intestinal infarction and 1 with no direct relationship to the technique itself .

Wound infection, eventration and intestinal obstruction tend to be rare.

A potentially dangerous complication is jejunal obstruction (biliopancreatic tract), since this obstruction does not present a typical clinical picture of intestinal obstruction. This diagnosis should always be considered in patients with relatively acute abdominal colic-type pain. An erect plain abdominal film does not show conventional air-fluid levels, occasionally part of the abdomen may be grey. The diagnosis can only be confirmed by ultrasound investigation or a CT scan of the abdomen, which will reveal clearly dilated intestinal loops filled with fluid only. In some cases a dilated duodenum is also visible. This obstruction is potentially dangerous because pancreatitis can be induced by overpressure in the duodenum.

Anaemia

Gastrectomy with exclusion of the jejunum is responsible for this possible complication.

Exclusion of the chief sight of iron absorption is the cause of relative iron malabsorption.

Less frequently, anaemia can be caused by folic acid deficit and rarely by vitamin B12 deficiency.

Anaemia occurs only in patients with chronic physiological (menstruation) or pathological (haemorrhoids, stoma ulcer) loss of blood. Depending on the cause, the anaemia is usually microcytic, less frequently normocytic and only now and again macrocytic.

The general incidence of anaemia is 35% (25% in my personal series), but periodic iron, folic acid or vitamin B12 supplements can reduce the frequency to less than 5%. As time goes by, fewer supplements are required.

Stoma-ulcer

The incidence with a minimal follow-up of 2 years is 6.9% and is strongly influenced by alcohol and smoking behaviour in particular. The incidence of ulcers increases from 2% in the case of double abstinence to 17.1% in patients who drink and smoke, to even 25.8% in patients who consume alcohol and smoke over 40 cigarettes daily.

Most ulcers (67%) appear in the first postoperative year and the remainder in the next year. They usually respond well to conservative treatment (94% cure rate with H2-blockers) and rarely recur in patients who have stopped smoking (12.5% recurrence in the event of smoking cessation compared to 30.7% in patients who continue to smoke).

Hypoproteinaemia

Hypoproteinaemia, in particular hypoalbuminaemia, is the most severe complication of BPD. It may be associated with anaemia, oedema, asthenia and hair loss. In some cases readmission may be necessary for TPN (total parenteral nutrition). In most cases, there is a single episode in the first and occasionally the second postoperative year, occurring in particular after a prolonged period of diarrhoea or reduced food intake.

Hypoproteinaemia occurred in less than 10% of the cases in our group.

This complication emphasizes the importance of regular laboratory investigations in the first two postoperative years.

In the event of a serious drop, treatment can be started immediately with medication such as in Creon,

2 to 3 capsules per meal, in rare cases 10 capsules or more daily. In general a period of a few months, until the intestine has further adapted, is sufficient.

In the event of recurring hypoproteinaemia the common limb can be elongated by 1 meter (less than 4%). In less than 1% complete restoration of the transit is necessary.

Patient cooperation, with regular controlled food intake, a diet high in protein, and fat restriction in the case of diarrhoea play an important role in the prevention of this complication.

Peripheral neuropathy

This is an extremely rare early complication that is due to a marked lack of food intake. It can easily be prevented by administration of thiamine (vitamin B1) in patients with a very limited food intake during the first weeks.

Bone demineralization

All our patients are advised to take minimum 1 gram Calcium per day (only a minority follows this advice), since Calcium is better absorbed in the excluded part of the tract, in particular the duodenum and the proximal part of the jejunum.

Another cause of bone demineralization may be a lack of vitamin D, which can result in bone pain (osteomalacia). Vitamin D is a liposoluble vitamin and is therefore less well absorbed in these

patients. In our group of patients we noted a reduction of 25 OH vitamin D in 9% of the cases. Oral vitamin D (D-cure 1 to 3 ampoules per week) for a few months is generally sufficient to cure this hypovitaminosis. If the response is insufficient, Dedrogyl drops 3 x 10 to 15 drops per meal are administered. Only a few patients who failed to attend follow-up visits, developed osteomalacia. In exceptional cases this resulted in spontaneous rib fractures.

These problems all occur mainly in the first 4 postoperative years and apparently disappear later.

Late deaths (<1%)

These are extremely rare and occur mainly in patients who fail to attend the necessary follow-up visits.

Specific corrective surgery: elongation and restoration

In the event of persistent malnutrition or untreatable diarrhoea, corrective surgery may be necessary. The aim of these surgical procedures is not to eliminate any unpleasant adverse effects, but to correct an excessive effect of the initial operation. Since a permanent change in intestinal absorption is involved, it is important to be certain that the small intestine has adapted fully after surgery. Therefore, we always try to wait for 11/2 to 2 years before deciding on corrective surgery.

Scopinaro mentions elongation of the common limb (as illustrated on the right) in 3.2% of the patients

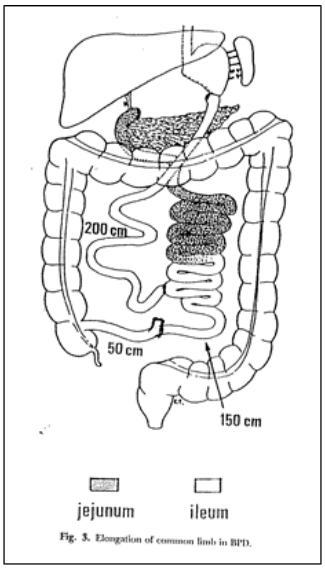


Fig. 3. Elongation of common limb in BPD.

Full restoration, performed in only 0.8 % of the patients, leaving an intact gastroileostomy, with its inhibiting effect on food intake, restores normal absorption in patients with lifelong food intake restriction.

We refer to the article by Scopinaro himself for specific technical data.

Protein absorption was permanently restored in all cases.

These figures correspond fully with our own results.

usion

With over 25 years of experience in over 3 000 patients in the case of Scopinaro and 20 years of personal experience in over 1 800 patients, BPD presents the best results in 20 years in the history of obesity treatment.

In spite of the extreme excess weight at the time of surgery the postoperative recovery after this procedure is very rapid in most cases.

Since patients have normal eating patterns, usually without any diet, the procedure is socially very acceptable (quality of life!).

BPD is also potentially dangerous due to the extreme weight loss. Consequently, regular follow-u is required, both clinically and with monitoring of the main haematologic parameters. These examinations should be performed frequently in the first two postoperative years in particular. In the case of a favourable evolution, the interval between these follow-up visits can be increased.

References

1. Scopinaro N. et al. Biliopancreatic diversion for obesity at eighteen years. Surgery March 1996, 261-268.
2. Lemmens L. Biliopancreatic diversion in a 7-year follow-up. Obesity surgery 1993 ;3 :179-180.
3. Lemmens L. Biliopancreatic diversion : 378 patients in a ten year follow up. The 9th Intern. Symposium on Obesity Surgery 1995, Stockholm, Sweden.
4. Our personal experience in over 1 800 patients over a 20-year period.

Some practical advice for follow-up

Patients are admitted to hospital the day before surgery at 9 a.m., unless earlier observation is required. After surgery they remain in postoperative care or in intensive care for one day. They are discharged from the department after 5 to 7 days.

Discharge medication consists of: Motilium 15 minutes before meals, Loperamide, Alvityl plus one a day and Cacit 1000 one a day, Omeprazole 20 one a day, Fraxiparine 0.8 for 10 to 20 days.

Further follow-up is as follows

Laboratory control once a month for the first 3 months, subsequent controls after 2 months and every 3 months afterwards for the first 2 years. Later too, we recommend laboratory controls 2 to 3 times annually. These controls can be performed by the general practitioner or by myself, but we like to be kept informed about the evolution, in particular in the event of problems.

Attention should be paid to the following elements

Cytology with Fe, ferritin, Vitamin B12 and folic acid for early detection of iron deficiency or megaloblastic anaemia; total protein with albumin, as well as a few hepatic function tests; electrolytes, calcium, phosphorus and magnesium; vitamins: 25 OH vitamin D, vitamin A and parathormone.

Vitamin B1 dosage is performed only in the event of severely restricted food intake.

How to solve problems?

- iron deficiency anaemia: high doses of Fe (Ferrograd 500, Ferricure or Losferron 2 or more per day).
- megaloblastic anaemia: 1.000 E. vit.B12 I.M. 1 per month (Vit. B 12 1000)
- hypocalcaemia: 1 g Ca of more per day (Cacit 1000 is best)
- hypovitaminosis D: this may be responsible for osteomalacia! If levels drop below normal values, D-cure can be administered orally; 2 or more drinkable ampoules per week. Generally, treatment for a few months is sufficient.

  Parenteral treatment is rarely necessary, but should be performed under supervision.

- Hepatic function is frequently impaired in the first postoperative months, but usually normalizes afterwards. Occasionally fluctuations in hepatic function tests are observed later, but are not usually of clinical significance. In the case of more severe disorders, more extensive investigation is required.

Other possible problems

- Stoma-ulcer: these patients do not present conventional epigastric pain, but tend to suffer from pain in the lower abdomen. The pain is often rhythmic with meals. In case of doubt, a gastroscopy should be performed in order to initiate treatment as soon as possible. This treatment should also be continued for a longer period of time, preferably for 1 year. If the result is not satisfactory, the medication should be adjusted, possibly with a dose increase.
- Small bowel obstruction: in the event of acute abdominal pain this diagnosis should always be considered. Obstruction of the ileum, which is responsible for normal transit, should be distinguished from obstruction of the jejunum, which is responsible for biliopancreatic transport. The first case is characterized by a conventional obstruction pattern with vomiting and intestinal air-fluid levels. In the second case, transit can still be entirely normal in spite of cramping symptoms. Only ultrasound investigation or a CT scan can confirm the diagnosis. These investigations reveal dilated intestinal loops filled with fluid only. Emergency hospitalisation is required, possibly followed by laparotomy to remove the adhesions.
- Diarrhea: a significant increase in stool frequency is usually due to bacterial overgrowth and should therefore be treated immediately. We have obtained the best results with e.g. Tavanic 500 1 per day or Flagyl 500, 1 or 2 per day. Prolonged diarrhoea can result in hypoproteinaemia.
- Hypoproteinaemia: take care of problems of food intake and diarrhoea. Creon 2 caps or more divided over the meal to be repeated at each meal. (See also p.4).

Of course, we are always available for advice and further action if problems occur. If other surgery is planned in particular, we feel it is important to discuss matters first.