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Impact of Age on Long-Term Complications after Biliopancreatic Diversion

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Background: The aim of the study is to evaluate the importance of age on the mid- and long-term results and complications after biliopancreatic diversion (BPD).

Methods: Our study comprises 132 morbidly obese patients who underwent Scopinaro BPD from February 1995 to April 2001, with follow-up from 24 to 96 months. The patients, 53 males (40%) and 79 females (60%), with mean preoperative BMI 50.2 (35.4-81.5), and mean age 42 (20-65), were divided in 4 groups. *Group A* age 20-35, 43 patients; *Group B* age 36-45, 33 patients; *Group C* age 46-55, 31 patients and *Group D* age >55, 25 patients. Incidence of long-term specific complications after BPD were analyzed, including protein malnutrition, reversals, anastomotic ulcer, and incisional hernia.

Results: Mean postoperative BMI was similar in all Groups. After 60 months the following BMI values were observed. Group A 30.8, Group B 34.9, Group C 35.9, Group D 32. Incidence of long-term complications were not significantly different (χ^2) in the 4 Groups, and were respectively: protein malnutrition 6.9%, 12.1%, 6.4%, 16.0%; anastomotic ulcer 11.6%, 9%, 6.4%, 16.0%; reversal 2.3%, 9.0%, 1.32%, 8.0%; ventral hernia 34.8%, 45.4%, 54.8%, 32.0%.

Conclusions: From the preliminary results, it appeared that the incidence of the complications was higher in group D (>55 years old), whereas group C (46-55 years old) showed a lower complication rate. However, the prevalence of complications in all groups was not statistically different on χ^2 analysis. No age limit for bariatric surgery could be determined from the age ranges studied.

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Introduction

Morbid obesity is a chronic pathological condition, which is increasing.[1] Treatment of the disease is aimed at achieving a return towards normal body weight and the long-term maintenance of weight loss. Scopinaro's biliopancreatic diversion (BPD) has been the most successful operation in achieving both these results in the management of morbid obesity.[2,3]

Currently, in general, an age >60 years could be a contraindication in patient selection. However, in these cases, indications for surgery generally depend on the clinical condition of the patient rather than on age. In our criteria for BPD, the upper age limit has been 65. It has been our conviction that after 60 years of age, the long-term results could be compromised by age-related "physiological behavioral factors".

The aim of the present work was to assess the effect of age on the results of BPD and on the incidence of the main medium- and long-term complications.

Materials and Methods

The study involved 132 consecutive morbidly obese patients, 53 males (40%) and 79 females (60%), who underwent BPD between February 1995 and April 2001. Mean preoperative BMI was 50.2 kg/m^2 (range 35.4 - 81.5). The associated metabolic diseases were as follows: type 2 diabetes 32.8% plus impaired glucose tolerance 12.2%; hypercholesterolemia 56.4%; hypertension 43.5%; pluri-metabolic syndrome 26.7%. All patients underwent BPD by Scopinaro's method with "ad hoc" stomach,[2,4] performed by the same surgeons in the same hospital.

The choice of BPD was decided not only by the weight factor but also by the serious associated pathological conditions, which affected the patients' quality of life. The degree of compliance of the patients was evaluated, and they were educated regarding the postoperative dietary and behavioral rules, the need to follow an appropriate lifestyle after BPD and the importance of strict observance of follow-up visits.

All patients had a preoperative psychiatric examination, and some also needed one postoperatively. Mean follow-up was 60 months: minimum 24, maximum 96 months.

The mean age of the group was 42, range 20-65 years. The patients were subdivided by age into 4 main groups (Table 1).

In follow-up, weight loss was evaluated but particular importance was given to the most serious medium- and long-term complications of BPD such as protein deficiency, recurring malnutrition requiring a second operation, anastomotic ulcers and incisional hernias, to determine a difference in incidence between the groups in relation to age. The prevalence of long-term specific BPD complications was analyzed to establish the statistical difference between all groups.

Table 1. Age groups of patients at time of BPD

Group A: age 20 - 35 years: 43 patients
Group B: age 36 - 45 years: 33 patients
Group C: age 46 - 55 years: 31 patients
Group D: 56 - 65 years: 25 patients.

Results

Group A

Group A was made up of 43 patients between 20 and 35 years old, 16 males (37.2%) and 27 females (62.7%), with preoperative BMI 50.7 kg/m^2. The results of BPD in this group of younger patients were excellent, with a postoperative BMI at 24 months of 30.3 kg/m^2 (42 patients) which remained constant at further check-ups with insignificant variations: 30.2 at 48 months (30 patients) and 30.8 at 60 months (22 patients) postoperatively (Table 2).

Regarding postoperative complications (Table 3), protein deficiency was observed in 3 patients (6.9%). One was a male who began taking psychotropic drugs (heroin, cocaine, benzodiazepine, methadone) in the postoperative period, uncontrollably changing his eating habits towards anorexia, and preferring food rich in sugar to products with a high protein content. A young woman presented serious protein-calorie insufficiency after not eating during depression caused by a death in her family; her condition resolved after support therapy and total parenteral nutrition (TPN), with no subsequent recurrence. The third patient with protein deficiency, had an asymptomatic stenosis of the gastro-ileal anastomosis, which resolved after radiological pneumatic dilatation, with no recurrence.

An anastomotic ulcer was found in 5 patients (11.6%). In most cases this was due to intake of alcohol, including spirits, or smoking. These cases responded well to therapy with proton pump inhibitors.

Incisional hernias were observed in 15 patients (34.8%) in Group A.

Only one reversal operation was performed in this age group (2.3%). This was in a patient who was a

Table 2. Long-term BMI values in the four age groups

Group	Preoperative BMI (patients)	24 mons BMI (patients)	48 mons BMI (patients)	60 mons BMI (patients)
A	50.7 (43)	30.3 (42)	30.2 (30)	30.8 (22)
B	52.2 (33)	31.8 (32)	32.7 (28)	34.9 (20)
C	49.8 (31)	32.1 (31)	33.5 (20)	35.9 (15)
D	49.5 (25)	31.1 (24)	30.2 (14)	32.0 (12)

Table 3. Incidence of complications in the four age groups

Group	Protein Malnutrition	Reversal Operation	Anastomotic Ulcer	Incisional Hernia
A	3 (6.9%)	1 (2.3%)	5 (11.6%)	15 (34.8%)
B	4 (12.1%)	3 (9%)	3 (9%)	15 (45%)
C	2 (6.4%)	1 (3.2%)	2 (6.4%)	17 (54.8%)
D	4 (16%)	2 (8%)	4 (16%)	8 (32%)

A: age 20-35 (43 patients); B: age 36-45 (33 patients); C: age 46-55 (31 patients); D: 56-65 (25 patients).

drug addict, and was made necessary by his continual drug abuse and the recurrence of severe episodes of protein deficiency.

Group B

The second group comprised 33 patients aged between 36 and 45, 11 males (33.3%) and 22 females (66.6%), with mean preoperative BMI 52.2 kg/m^2. Results in this BPD group were extremely satisfactory, with a postoperative BMI at 24 months of 31.8 kg/m^2 (32 patients). However, in successive follow-up assessments, a slight tendency to gain weight was observed in the later stages of adjustment to the malabsorption, with postoperative BMI values of 32.7 at 48 months (28 patients) and 34 at 60 months (20 patients) respectively.

Four patients (12.1%) showed postoperative protein insufficiency, which could be attributed to the low socio-economic status of the patients.

An anastomotic ulcer was found in three cases (9%), and an incisional hernia developed in 15 cases (45.4%).

Three reversal operations became necessary (9%). In two patients, this was after at least three attempts to save the BPD by hospitalizing the patient and providing TPN. The other patient suddenly lost both his job and house, which made it impossible for him to observe the postoperative requirements.

Group C

The third group consisted of 31 patients aged between 46 and 55, 16 males (51.6%) and 15 females (48.3%), with mean preoperative BMI 49.8 kg/m^2. The results after BPD were satisfactory in the whole group, with postoperative BMI at 24 months of 32.1 kg/m^2 (31 patients). A stronger tendency to gain weight was observed in this group during the later follow-up assessments, with postoperative BMI 33.5 at 48 months (20 patients) and 35.9 at 60 months (15 patients).

Protein deficiency was found in two patients (6.4%) who voluntarily missed several clinical check-ups and did not adhere to the dietary rules. An anastomotic ulcer was present in two patients (6.4%), related to alcohol and smoking. A midline hernia was observed in 17 patients (54.8%). One case of restoration surgery was necessary (3.2%).

Group D

The fourth group consisted of 25 patients >55 years old, 9 males (36%) and 16 females (64%), with mean preoperative BMI 49.5 kg/m^2. Excellent results followed BPD in this group, with postoperative BMI at 24 months of 31.3 kg/m^2 (24 patients), maintained in subsequent check-ups, with insignificant variations: 31.1 at 36 months, 30.2 at 48 months (14 patients), and 32 at 60 months (12 patients). Postoperative complications included four cases of protein deficiency (16%): one was from severe renal insufficiency existing before the operation, and the other three were caused by lack of teeth and senile loss of appetite. An anastomotic ulcer was present in 4 patients (16%), and a ventral hernia was found in 8 patients (32%).

Two restoration operations were necessary (8%), one in the case of renal insufficiency and the other in a patient who was toothless and unwilling to wear dentures, with a consequent absence of meat in his diet. Although hospitalized for long periods and given support therapy and TPN, the total lack of compliance on the part of this patient made take-down surgery necessary.

On χ^2 analysis of the complications, no significant difference was found in the four groups (Table 4).

Discussion

Morbid obesity is a serious and complex health problem, resulting largely from genetic factors and

Table 4. Analysis of Complications (Chi squared)

Male/Female	χ^2=2.65	*P*=0. 4483
Protein malnutrition	χ^2=1.66	*P*=0.6458
Anastomotic ulcer	χ^2=1.17	*P*=0.6458
Reversal	χ^2=2.08	*P*=0.554
Incisional hernia	χ^2=1.69	*P*=0.6395

particularly lifestyle. Although the number of overweight adolescents is increasing, obesity mainly affects people between age 40 and 60. About 45% of Italians are overweight and 8 million are obese, and 10% of health service funds are used to treat obesity-related diseases. About 35% of hospital admissions to medical wards are for obesity-related diseases.[4]

Morbid obesity directly affects mortality rate which is 12 times higher in young adults and up to 6 times higher in middle age (33-44 years).[4] It is generally accepted and supported by data that BPD by Scopinaro's method is a bariatric surgical technique which, although complex, produces very good results with regard to both weight loss and the correction of the metabolic dysfunction associated with morbid obesity. Reports in the literature and our personal experience indicate that this operation is currently the most successful in managing morbid obesity with BMI ≥40 and serious associated diseases such as respiratory insufficiency, arterial hypertension, ischemic cardiopathy, type 2 diabetes even when treated with insulin, hypercholesterolemia and hypertriglyceridaemia.[5-9] Obviously, the price to be paid must be evaluated in relation to the benefits, because potentially serious complications may arise, although these are fortunately rare and can be foreseen and treated.[10-13]

Furthermore, it has been widely demonstrated that the BPD[14-16] and its variant, the duodenal switch,[17-19] can be performed as a laparoscopic operation, which generally avoids ventral hernias.

BPD is an advanced surgical technique which should be performed only by specialized surgeons with specific training who are aware of the potential metabolic-behavioral alterations and are experienced to deal with the complications that may arise.[6,11,20-23]

Thus, we considered it of interest to determine whether any further restrictions should be placed on performing BPD in older patients, particularly those >55 years old. In fact, our retrospective study suggests that patients in this age group are more likely to be affected by the metabolic consequences of the BPD. An apparent increase was observed not only in cases of protein malnutrition but also in anastomotic ulcers and the need for take-down surgery because of recurring malnutrition.

The data suggest that patients in the older age group are at increased risk of these complications, which could be a direct consequence of the natural aging process. These patients could have more difficulty in masticating and swallowing food because of lack of teeth, or could eat less owing to depression or alterations in their sense of taste and smell.

However, simple χ^2 analysis did not releave statistically significant differences in the prevalence of the main specific BPD complications in relation to age. These results suggest that age is only a minor factor in the occurrence of long-term complications after BPD.

It is our intention to perform BPD in patients over 55 if they have serious and incapacitating associated diseases and the benefits of weight loss and alleviating the co-morbidities are greater than the risks of occurrence of post-BPD metabolic complications. The higher incidence of complications in Group D (>55 years old) appeared to be related to the greater difficulty that patients in this group had in changing their eating habits, aggravated by physiological disorders of aging, such as loss of appetite, impairment of sense of taste, lack of teeth, and a common, often hidden, depression syndrome. All these factors influence the patient's compliance with the post-BPD dietary rules. The fewest complications were in Group C (46-55 years old), likely related to the socio-economic status of the patients in this group, because it was comprised mainly of professional people with families and a high sense of responsibility. The latter circumstances may make patients undergoing a bariatric operation more willing to comply with postoperative requirements.[8,11,12,22-24]

GianCarlo Tonolo, MD, PhD, Diabetology Unit, Clinica Medica Universita' Di Sassari, carried out the statistical analysis.

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