# Bariatric analysis and reporting outcome system (baros) following biliopancreatic diversion



Ann. Ital. Chir., LXXV, 4, 2004

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## Introduction

The evaluation of outcome in bariatric surgery is one of the major concerns for surgeons (1). An objective analysis is hindered by the absence of a standard for comparison of data, and by restricted periods of follow-up usually analysed. In fact, different parameters have been proposed in order to assess the outcome after bariatric surgical procedures, as well as the weight loss, the percentage of initial weight loss, the excess weight lost, the reduction of the Body Mass Index (BMI) (2). These different methods of estimation led the surgeons to adopt dissimilar criteria to define the outcome of a treatment, with the consequence that comparison of series results sometimes complicated (3-12). Many reports have underlined the improvement of obesity-related medical conditions after surgery, suggesting their relevance for a correct evaluation of outcome (12-14); moreover, many Authors stressed the role of a routine assessment of quality-of-life (QOL), because of the important physical and psychological modifications following the weight loss (1, 15, 16). In order to overcome this imbalance, Oria and Moorehead have recently elaborated the Bariatric Analysis and Reporting Outcome System (BAROS) (17), an evidence-based method for an objective, scored definition of outcome after a bariatric treatment, taking into account changes in weight, comorbidities, postoperative complications and the QOL. We report the BAROS results of a series of patients undergone biliopancreatic diversion (BPD) in our Department.

#### Riassunto

Il "Bariatric Analysis and Reporting Outcome System" (BAROS) è uno strumento recentemente introdotto per standardizzare l'analisi delle variazioni di peso, delle comorbilità e della qualità della vita nei pazienti sottoposti a chirurgia bariatrica. Nel presente studio gli Autori analizzano con l'ausilio del BAROS l'outcome di una serie consecutiva di pazienti con obesità patologica sottoposti a chirurgia bariatrica.

Dal novembre 1998 al febbraio 2001 30 pazienti con obesità patologica sono stati sottoposti a diversione biliopancreatica (BPD). I pazienti sono stati valutati a 1, 3, 6, 9 e 12 mesi dall'intervento e in seguito annualmente. Nel corso del follow-up sono state rilevate le variazioni del Body Mass Index (BMI), la percentuale di perdita dell'eccesso di peso iniziale (IEW%L), le comorbilità e la natura e l'incidenza delle complicanze. Il BAROS è stato utilizzato dopo un follow-up minimo di 18 mesi oppure in assenza di modificazioni dell'IEW%L dopo 2 visite di controllo consecutive.

Come previsto dal BAROS, l'outcome è stato classificato come "Eccellente" nel 10% dei casi "Molto buono" nel 63.3%, "Buono" nel 20% e "Discreto" nel 6.7%; nessun paziente ha avuto esito sfavorevole. In tutti i casi vi è stato un miglioramento delle condizioni cliniche generali e nel 93% i pazienti hanno presentato risoluzione di almeno una delle maggiori comorbilità. La qualità della vita è molto migliorata nel 55% dei casi, migliorata nel 35% e non è cambiata nel 10%.

La BPD ha determinato una significativa perdita di peso, regressione o risoluzione delle maggiori comorbilità e incremento della qualità della vita nelle pazienti con obesità patologica. BAROS rappresenta uno strumento utile per la determinazione dell'outcome dopo chirurgia bariatrica.

Parole chiave: Chirurgia bariatrica, BAROS, qualità della vita.

#### Abstract

Background: The Bariatric Analysis and Reporting Outcome System (BAROS) has been recently introduced to assess the modifications of weight, comorbidities and quality of life (QOL) after bariatric surgery, in order to achieve a standard for comparison in the treatment of obesity. This study reports the Authors' experience, analyzing with BAROS a consecutive series of morbidly obese patients.

Pervenuto in Redazione il 14 Febbraio 2003

Methods: From November 1998 to February 2001, 30 patients with morbid obesity underwent biliopancreatic diversion (BPD) in our Department. Patients were followedup after 1, 3, 6, 9, 12 months and than yearly. Modifications of the Body Mass Index (BMI), percentage of the initial excess weight loss (IEW%L), comorbidities and type and incidence of complications were measured. The course and QOL were assessed using BAROS after a minimum follow-up of 18 months, or in absence of IEW%L modification at two consecutive scheduled visits.

Results: According to the BAROS, the outcome was classified as Excellent in 10% of cases, Very Good in 63.3%, Good in 20%, Fair in 6.7%; no patients had Failure course. Ninety-three percent of patients had resolution of at least one of their major comorbidities, and an improvement of the medical conditions was registered in all the cases. The QOL was greatly improved in 55%, improved in 35% and did not change in 10% of the patients.

Conclusion: BPD provides effective weight loss, improvement or resolution of major co-morbidities and increases the QOL of morbidly obese patients. BAROS is an useful tool to assess the outcome after bariatric surgery. Key words: Bariatric surgery, BAROS, quality of life.

#### Patients and methods

From November 1998 to February 2001, 33 morbidly obese patients underwent BPD at the First Department of General Surgery, University of Brescia (Italy). Twentyeight percent of patients were male and 72% female; their mean age was 35 years (range 23-47) and the mean BMI was 56.2 Kg/m<sup>2</sup> (range 44-77). Twenty-three patients underwent BPD with "ad hoc" stomach resection as described by Scopinaro (18), and 10 BPD with "duodenal switch" as described by Vassallo (19, 20). The patients were followed-up at 1, 3, 6, 9 and 12 months after surgery, then yearly, reporting changes in the BMI, percentage of the initial excess weight loss (IEW%L), comorbidities and type and incidence of complications. Only the patients with a minimum follow-up of 18 months, or without IEW%L modifications at two consecutive scheduled visits, were included in the study; thus 30 patients were finally available for analysis. The data were scored according to BAROS. The Moorehead -Ardelt QOL questionnaire was mailed to the patients, or filled during follow-up visits.

Data have been expressed using mean  $\pm$  standard deviation or range. Comparison of data was performed with Fisher's exact test. A value of  $p \le 0.05$  was considered significant.

### Results

The mean BMI was  $31\pm4.6$  Kg/m<sup>2</sup> and the mean IEW%L was  $64.1\pm6.2$  by the first 18 months after surgery. The post-operative major complications rate requi-

Tab. I – BAROS RESULTS ACCORDING TO THE TYPE OF SURGICAL PROCEDURE

	Excellent	Very good	Good	Fair	Failure
Scopinaro bpd	20%	50%	20%	10%	0%
Vassallo bpd	10%	60%	25%	5%	0%

Tab. II – INCIDENCE AND CHANGES OF MAJOR BAROS-DEFINED COMORBIDITIES AFTER BPD

Comorbidity	Incidence (nr. of patients)	Resolution	Improvement
Hypertension	8	62.5%	37.5%
Cadiovascular disease	0	0%	0%
Dyslipidemia	11	100%	0%
Type II diabetes	17	58.8%	41.2%
Sleep apnea	3	33.3%	66.7%
Ohs	0	0%	0%
Osteoarthritis	3	33.3%	66.7%
Infertility	0	0%	0%

ring operation was 3.3%, minor early complications were observed in 6.6%; the mortality rate was 0%.

All the patients filled the QOL questionnaire. The data scored by BAROS showed an EXCELLENT outcome in 10% of cases, VERY GOOD in 63.3%, GOOD in 20%, FAIR in 6.7%; no patients had FAILURE course; the mean score was 5.08 (range 2.1-8).

No significant differences were found comparing the BA-ROS scores after each type of surgical procedure (Tab. I). Twenty-two patients (73.4%) were affected by major pathological conditions related to obesity, according to BAROS classification. All these patients had an important improvement after BPD. In 93% at least one of the major comorbidities was resolved, and in 33.3% all of them were worked out (Tab. II).

As shown in Tab. III, the BAROS showed a tendency to be related with BMI: patients with a BMI > 50 Kg/m<sup>2</sup> had an excellent outcome in 22.2% of cases versus 9.5% in patients with BMI <50 Kg/m<sup>2</sup>; furthermore, in the first group the percentage of fair outcome was zero, while in the second group it was 9.5%.

The Moorehead - Ardelt questionnaire showed that QOL improved in 90% of patients: particularly, it was greatly improved in 55%, improved in 35% and it did not change in 10% (mean score 1.98). No patients had decreasing in QOL after surgery.

#### Discussion

In occasion of the National Institutes of Health Consensus Conference in 1991, some controversies regarding the evaluation of results in bariatric surgery were

Tab. III – BAROS RESULTS ACCORDING TO THE BMI

	Excellent	Very good	Good	Fair	Failure
BMI > 50	22.2%	55.6%	22.2%	0%	0%
BMI < 50	9.5%	57.2%	23.8%	9.5%	0%

emphasized (1). The key-problems were: the lack of a standard for the comparison of results in weight loss; the absence of a clear definition of success or failure of treatments, and how to consider the re-operations due to complications or unsuccessful procedures. Moreover, it was recommended for a whole outcome analysis to take into account the improvement or resolution of the pathological conditions related to the obesity, as well as the evaluation of QOL and psychosocial changes during the weight loss and maintenance.

In reply to these requirements Oria and Moorehead have introduced the BAROS (17), an evidence-based method proposed as standard tool for the estimation of outcome in bariatric surgery. The BAROS is a point scale that assigns to each patient different scores on the basis of the percentage of excess weight loss, the changes in comorbidities and the QOL after surgery. Points are deducted in presence of re-operations and major or minor complications. The total score characterizes five groups of outcome (excellent, very good, good, fair and failure), providing an objective definition of success or failure of a treatment.

In our series we report the BAROS analysis of 30 consecutive patients undergone BPD. In more than 90% the result was positive, in absence of failed outcome, without significant differences between the two types of BPD. No extensive BAROS data after BPD have been reported yet. Only BAROS results regarding gastrorestrictive procedures or gastric by pass are available (21-26): they show a percentage of successful course (excellent, very good, good) ranging from 48% to 98% of patients, and unsatisfactory outcome (fair or failure) in 10-50%. It should be mentioned that the outcome can be influenced by the length of follow up and by the surgeons' learning curve (21). Thus, more extensive periods of study and stratified results are needed in order to achieve a correct comparison of data.

In our series, the BAROS results were also affected by the BMI: surprisingly, all the super-obese patients had a successful outcome, while 9.5% with a BMI less than 50 Kg/m<sup>2</sup> had a fair course. This unexpected relation has been already described (21) and probably it is due to the BAROS ability to analyze several factors sole for each patient.

It is well known that BPD may yield benefits on pathological conditions related to obesity, especially on cardiovascular diseases and hypertension, dyslipidemia, glucose metabolism alterations, and respiratory function disorders (27-31). Using BAROS classification it is possible to obtain a precise definition of improvement or resolution of comorbidities after bariatric surgery. Our data confirm previous reports: no patients had worsening of their conditions after surgery, but all of them improved (Tab. II). It is remarkable that 33.3% of patients solved all their major co-morbidities, and 93% solved at least one.

Remarkable improvements in QOL have been described after bariatric surgery (15, 32, 33); however, the routine postoperative use of the QOL questionnaires is very limited and the response rates are low; this is probably due to the absence of a standard test for this specific surgery and to the excessive length and complexity of the available instruments (2). The Moorehead - Ardelt QOL questionnaire enclosed in BAROS is a simple, short test which investigates five main domains referred to physical, psychological and social changes after the weight loss. In our series, all the patients filled the questionnaire: we did not observe decreasing in QOL, while the percentage of improvements was 90%. The modifications in QOL have become one of the most important determinants of demand for care in the last years, and the attention of the health care professionals is focalized on the consideration of the patient's point of view (34). In an era of risk-benefits analysis, we think that similar improvements of QOL could represent themselves a strong validation for malabsorbitive surgery and these results should be enclosed in the preoperative informative interview with the patients.

## Conclusion

In our limited experience, the BPD results a safe procedure which provides an effective weight loss with an high percentage of improvement or resolution of the obesity – related diseases. Moreover, the BPD may greatly increase the QOL of the patients. However, longer period of follow-up after surgery is needed to confirm these findings. The BAROS is an useful instrument for a standard evaluation of outcome and it should be widely adopted.

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420 Ann. Ital. Chir., LXXV, 4, 2004