

Original

Preoperative determinants of outcomes of laparoscopic gastric bypass in the treatment of morbid obesity

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Abstract

Introduction: Laparoscopic gastric bypass (LGBP) is the predominant technique in surgical treatment of morbid obesity.

Objectives: To evaluate the results of LGBP and measure the validity of some hypothetical variables as predictors of these outcomes.

Methods: We carried out a historical cohort study which included 50 morbidly obese patients operated with LGBP. The results were assessed by the Bariatric Analysis and Reporting Outcome System (BAROS), which measures the following parameters: the percentage of excess weight loss (EWL), changes in co-morbidities, quality of life and complications. The independent variables were age, body mass index (BMI), sex, history of depression and presence of more than one cardiovascular risk factor (CVRF).

Results: Following LGBP, 11% of the results was classified as excellent, 54% as very good, 25% as good and 9% as fair (median follow-up period: 17 months, 7-37). The best scores were found among younger patients. The EWL (mean: 55.4 ± 16.6%) was higher in patients with lower BMI and with no more than one cardiovascular risk factor. We obtained rates of resolution of CVRF of 43.7 to 68.7%, complication rates < 10% and improvement of quality of life.

Conclusions: We believe that, following LGBP in morbidly obese patients, when EWL, improvement in co-morbidities and quality of life as well as complications are jointly assessed, the best results are obtained in younger patients.

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Key words: *Morbid obesity. Gastric bypass. Weight loss. Cardiovascular risk factors.*

DETERMINANTES PREOPERATORIOS DE RESULTADOS DEL BYPASS GÁSTRICO LAPAROSCÓPICO EN EL TRATAMIENTO DE LA OBESIDAD MÓRBIDA

Resumen

Introducción: El bypass gástrico laparoscópico (BPGL) es la técnica predominante en el tratamiento quirúrgico de la obesidad mórbida.

Objetivos: Evaluar los resultados del BPGL y medir la capacidad de algunas variables como hipótesis predictoras de estos resultados.

Métodos: En un estudio de cohorte histórico se han incluido 50 obesos mórbidos intervenidos mediante BPGL, valorando los resultados según el sistema BAROS; este considera el porcentaje de sobrepeso perdido (PSP), evolución de comorbilidades, calidad de vida y complicaciones. Las variables independientes han sido la edad, índice de masa corporal (IMC), sexo, presencia o no de historia depresiva y de más de un factor de riesgo cardiovascular (FRCV).

Resultados: La clasificación de los resultados del BPGL fue: 11% resultado excelente, 54% resultado muy bueno, 25% resultado bueno y 9% resultado regular (mediana de seguimiento postoperatorio: 17 meses, 7-37); las mejores puntuaciones correspondieron a enfermos con menor edad. El PSP (media: 55,4 ± 16,6%) fue mayor en pacientes con menor IMC y con no más de un FRCV. Se obtuvieron unas tasas de resolución de los FRCV del 43,7-68,7%, unos índices de complicaciones < 10% y mejoró la calidad de vida.

Conclusiones: Cuando se valora de forma conjunta PSP, evolución de comorbilidades, calidad de vida y complicaciones de los obesos mórbidos intervenidos mediante BPGL, los mejores resultados se obtienen en los pacientes más jóvenes.

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Palabras clave: *Obesidad mórbida. Bypass gástrico. Pérdida de peso. Factores de riesgo cardiovascular.*

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Abbreviations

BAROS: Bariatric Analysis and Reporting Outcome System.

LGBP: Laparoscopic gastric bypass.

CVRF: Cardiovascular risk factors.

BMI: Body mass index.

EWL: Percentage of excess weight loss.

OSAS: Obstructive sleep apnea syndrome.

OHS: Obesity hypoventilation syndrome.

Introduction

Obesity has reached epidemic proportions in most industrialized countries, to the point of becoming a significant problem in public health. Morbid obesity affects 0,5% of the adult Spanish population¹ and is associated with a decrease in life expectancy.² The best strategy against obesity is prevention,³ but when we see morbidly obese patients, conservative treatment with hygienic-dietary measures and drugs has a high failure rate.⁴ For this reason, bariatric surgery is used with increasing frequency.⁵

Laparoscopic gastric bypass (LGBP) is considered the procedure of choice for obese patients who meet the criteria for bariatric surgery, especially those with a body mass index (BMI) ≤ 50 kg/m.^{2,6} Several articles have described a percentage of excess weight loss (EWL) of around 65-80% to 12-24 months after LGBP.⁷⁻⁸ In a study of 466 obese patients undergoing LGBP, results after 3 years were excellent or very good in 77,1% of patients. In this study the Bariatric Analysis and Reporting Outcome System (BAROS) was used; it measures weight loss, improvement in co-morbidities and quality of life as well as complications.⁹

It is unclear the reason why some patients lose more overweight than others after LGBP, why in some patients the results are excellent or very good, while in others the results are worse. In the present context, where the high number of LGBP candidates exceeds the usual potential of care services, the knowledge of the influence of certain variables in the outcomes of LGBP may help in the preoperative management of these patients and ultimately may contribute to a better use of public health resources, as it would provide us with criteria to prioritize the surgical technique in some patients and for its delay in others, until acting on factors related to worse outcomes and achieve their improvement.

The objectives of this study were: 1) To assess the outcomes of LGBP in a sample of morbidly obese patients, using standardized BAROS. 2) To measure the validity of the following hypothetical variables as predictors of success or failure after LGBP: the age of patients undergoing surgery, their baseline BMI, sex, history of depression or cardiovascular co-morbidity before surgery.

Methods

We conducted a historical cohort study of 50 morbidly obese patients undergoing LGBP according to Higa technique,¹⁰ by the same surgical team, between October 2006 and April 2009, in the Canary University Hospital, whose geographic area of reference is the north of the islands of Tenerife and La Palma in the Canary Islands. Before surgery, patients were assessed in the Nutrition Consultation of the same hospital, ensuring that they met the criteria for bariatric surgery proposed by the Spanish Society of Obesity Surgery in the year 2003:¹¹ 1) BMI ≥ 40 kg/m², or BMI ≥ 35 kg/m² in the case of the following associated co-morbidities: type 2 diabetes mellitus, hypertension, dyslipidemia, cardiovascular disease, obstructive sleep apnea syndrome (OSAS), obesity hypoventilation syndrome (OHS) and severe osteoarthropathy. BMI was calculated as weight in kilograms divided by the square of height in meters. Clinical suspicion of OSAS and OHS was confirmed by polysomnography. 2) Failure of monitored conservative treatment. 3) Adequate psychological profile. Assessment from Psychiatry Service was requested for most patients.

At hospital discharge after LGBP, patients were referred back to the Nutrition Consultation, where they were recalled every three months in the first year after surgery, every six months in the second year and annually thereafter in favourable cases. In visits prior to surgery and in the subsequent follow-up, we proceeded to an assessment of anthropometric parameters (height and weight), a review of cardiovascular risk factors (CVRF) and a basic analytical study with lipid profile; all data were recorded in the medical history of each patient. Besides, after LGBP, vitamin supplements were prescribed widely, potential deficits of iron, folic acid, vitamin B₁₂ and calcium were monitored to replace them in particular cases, and the specific nutrition education begun in the preoperative period was continued by the Nursing staff.

The outcomes of LGBP were assessed according to standardized BAROS,¹² as indicated in table I. This facilitated making comparisons between different working groups.¹³ To our knowledge, BAROS is the only currently available method that examines the four important aspects of the outcomes after bariatric surgery: weight loss, changes in co-morbidities, complications and quality of life. To fill in the quality of life questionnaire we contacted patients by telephone; the remainder of data necessary to complete the BAROS was taken from the medical records.

BAROS score, obtained for the last visit to the Nutrition Consultation, was explored in terms of continuous independent variables, such as age or baseline BMI, and categorical independent variables, such as sex, the presence of depressive history and the existence of more than one CVRF. Finally, we conducted a separate study of each variable defining the BAROS (EWL, points awarded based on the improvement in co-mor-

Table I
Evaluation of outcomes of laparoscopic gastric bypass according to the BAROS

	Score awarded	Condition	
Percentage of excess weight loss (EWL)*	-1	Increase of weight	
	0	EWL = 0-24%	
	+1	EWL = 25-49%	
	+2	EWL = 50-74%	
	+3	EWL = 75-100%	
Comorbidities [†]	-1	Worsening	
	0	No changes	
	+1	Improvement, without resolution	
	+2	Resolution of 1 mayor co-morbidity, improvement of minor co-morbidities	
	+3	Resolution of all mayor co-morbidities, improvement of minor co-morbidities	
Complications [‡]	-0.2	Each minor complication	
	-1	Each major complication	
	-1	Each surgical revision	
Quality of life (questionnaire of Moorehead-Ardeldt) [§]	-3 a -2.1	Much worse	
	-2 a -1.1	Worse	
	-1 a +1	No changes	
	+1,1 a +2	Better	
	+2,1 a +3	Much better	
Final evaluation (Sum of 4 previous sections)	Failure	-3 a 1	0 or less
	Fair	> 1-3	> 0-1.5
	Good	> 3-5	> 1.5-3
	Very good	> 5-7	> 3-4.5
	Excellent	> 7-9	> 4.5-6

*EWL = (baseline weight - current weight)/(baseline weight-ideal weight) x 100.

Considering ideal a BMI of 21 kg/m² in the case of women and 22 kg/m² in the case of men, ideal weight is calculated as the square of height in meters multiplied by 21 or 22, according to the sex.

[†]A major co-morbidity is resolved when its control has been achieved without medication. Minor co-morbidities studied were fatty liver, gallstones, gastroesophageal reflux, menstrual disorders and varicose veins.

[‡]Complications were classified as early if they occurred in the first 30 days after the bypass, as late if they occurred after these initial 30 days and as major in the case of life threatening or need to surgical revision.

[§]This questionnaire studies the self-esteem, physical activity, social activity, work activity, sexual activity and attitude toward food. Patients assessed all these items on a scale ranging from -0.5 to +0.5. At the end the points for each item were added up.

bid conditions, presence or absence of complications, points achieved with regard to the quality of life questionnaire) according to the before mentioned independent variables. When there was a normal distribution of the sample, statistical analysis was performed using the Student's *t* test or ANOVA (when comparing more than 2 groups), and with the χ^2 test for categorical variables. When variables did not fit the normal curve, we used the Mann-Whitney test, or Kruskal Wallis test when comparing more than 2 groups. We also calculated Pearson correlation between BAROS scores and age, between BAROS scores and baseline BMI, between EWL and age, between EWL and baseline BMI. The correlation between the points awarded according to the evolution of comorbidities and age, and the correlation between this score and baseline BMI were calculated with the Spearman's correlation coefficient. Statistical analysis of data was performed using SPSS version 17 (Chicago, ILL.). A significance level of $p < 0.05$ bilateral was fixed for all tests.

Results

The outcomes in 44 patients out of the 50 included in the initial sample were analyzed. The median postoperative follow-up period was 17 months (7-37). Among the 6 excluded, 1 died and the other 5 stopped attending or never went to the Nutrition Consultation after LGBP. The patients' average age was 43 ± 10 years, 70% were women and the mean baseline BMI was 47.3 ± 5.3 kg/m². The patient who died was 50 years old at the time of bariatric surgery and the cause of death was a complicated intestinal volvulus 16 months after surgery.

The outcome of LGBP according to BAROS was excellent in 11% of patients, very good in 54%, good in 25% and fair in 9%. The best scores were achieved in younger patients ($r = -0.405$, $p = 0.006$), without finding a specific age below which the improvement was statistically significant.

The mean EWL was $55.4 \pm 16.6\%$. EWL was found higher in patients with lower baseline BMI ($r = -0.403$,

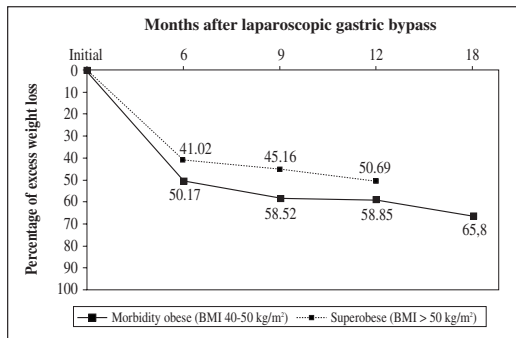


Fig. 1.—Evolution of the percentage of excess weight loss after laparoscopic gastric bypass in morbidly obese and super obese patients.

$p = 0.007$) and with no more than one CVRF (60.2% versus 50.3% of those with more than one CVRF, $p = 0.047$). Figure 1 shows that the EWL was always higher in the morbidly obese than in the superobese, regardless of time elapsed after LGBP.

Initially, 36.3% of patients had diabetes or impaired fasting glucose, 81.8% hypertension, 36.3% dyslipidemia, 25% OSAS and 34% severe osteoarthritis. After LGBP, the following rates of resolution of these co-morbidities were obtained: diabetes 68.7%, hypertension 47.2%, dyslipidemia 43.7% and OSAS 36.3%. An improvement was observed in these percentages of patients: diabetes 31.2%, hypertension 30.5%, dyslipidemia 18.7% and OSAS 27.2%. There were no data about the evolution of osteoarthritis in 86.6% of patients with this co-morbidity. Obese patients without a history of depression experienced after LGBP higher rates of resolution of co-morbidities (86.7% versus 13.3% of those with prior depression, $p = 0.014$).

Regarding early complications, there were 4 leakage at anastomosis (9%), 2 anastomotic obstructions (4.5%), 2 haemorrhages (4.5%) and 3 catheter infections (6.8%). Concerning late complications, there were 5 patients with persistent vomiting (11.3%), 1 intestinal obstruction (2.2%) and 2 cholelithiasis (4.5%). A total of 4 early surgical revisions, 2 late surgical revisions and 4 endoscopic dilatations of anastomotic obstructions were performed. Vitamin B₁₂ deficiency required parenteral supplementation in 3 patients (6.8%), the rest of nutritional deficits were replaced by oral supplementation: 24 cases required iron (54.5%), 13 folic acid (29.5%) and 38 calcium (86.3%).

The mean BAROS score for quality of life was 1.95 ± 0.6 . The following averages were achieved for each quality of life axis: 0.41 for physical activity, 0.35 for self-esteem, 0.34 for attitude toward food, 0.31 for work activity, 0.3 for social activity and 0.21 for sexual activity. There was no evidence of statistical relationship between independent variables and test scores for quality of life, or the appearance of complications.

Discussion

In this paper we have tried to show the excellent or very good outcomes in over half of morbidly obese patients undergoing LGBP, with a mean EWL of more than 50%, high rates of resolution of the CVRF, assumable complication rates and improved quality of life according to Ardeltd-Moorehead criteria. These results obtained by means of a standardized methodology such as BAROS, correspond to a median postoperative follow-up of 17 months and are comparable to those reported in other recent studies.⁸⁻¹⁰

We believe that our finding that the best results were achieved in younger patients may be of interest. Livingston et al.¹⁴ reported that patients over 55 years of age suffer mortality rates three times higher than those of younger patients after gastric bypass. The mean age of the obese patients included in the present study, 43 ± 10 years, is comparable to that of participants in other studies in recent years: 39.9 years, 18-64 (M Suter et al., 2006),⁹ 41 ± 12 years (P Menéndez et al., 2009),⁶ 39.4 ± 10.5 years (Ocon J et al., 2010).⁸ The finding that the best scores occur in younger patients, seem to us particularly important today, given the shift in the incidence of morbid obesity towards people increasingly younger.¹⁵

Greater EWL was obtained in patients with lower baseline BMI. This highlights the interest of introducing very low calorie diets in the months before LGBP, especially in those patients with a BMI in the range of super obesity. Not considering the change in weight prior to surgery as a hypothetical predictor of outcomes could be a limitation of our study.

The inverse relationship between EWL and baseline BMI and the fact that EWL is significantly higher in patients with no more than one CVRF, invite us to rethink scoring systems for scheduling and prioritization of surgical waiting lists like the proposed by Alastrué et al.,¹⁶ in which patients with higher BMI and with more co-morbidities receive more points and therefore are given more priority to surgery. Besides taking into account the usually chronological waiting lists, with an eye on the results achieved after LGBP, it should be considered whether or no the patient has already reached a healthy BMI during the preoperative period. In this sense, Menéndez et al.⁶ point that gastric bypass is effective in obese with a BMI ≤ 50 kg/m².

The finding that obese patients without a history of depression have higher rates of co-morbidities resolution reminds us of the role that certain psychopathological variables can play in the evolution of these patients. Future studies could further explore the hypothesis already suggested by Sallet et al.,¹⁷ that the existence of binge eating disorder in obese candidates for bariatric surgery affects the outcome of surgery.

Conclusion

LGBP, in appropriately selected patients with morbid obesity, achieves very good results when over-

weight reduction, resolution of co-morbidities, complications and quality of life after surgery are evaluated jointly. The best results are obtained in younger patients, in which the incidence of morbid obesity is increasing at present.

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