

Health-related quality of life 6 years after bariatric surgery: factors influencing outcome

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Abstract

Purpose: Bariatric surgery is the only proven treatment to significantly improve obesity and its associated comorbidities. The success of bariatric surgery goes beyond weight lost: quality of life (QoL) is acquiring relevance when evaluating outcomes after bariatric surgery but few studies evaluated factors influencing QoL at long term. The main objective of this study is to identify factors that could affect QoL more than 5 years after bariatric surgery.

Methods: We performed an observational study in which we apply “Moorehead-Ardelt Quality of Life Questionnaire” to 94 patients that were submitted to bariatric surgery with more than 5 years of follow-up. Patients questionnaire score was compared to several variables: age, sex, main surgical procedures, primary or revisional surgery, complications, weight loss, and improvement of comorbidities (diabetes, dyslipidemia, hypertension, musculoskeletal disorders, and psychiatry pathology).

Results: QoL was significantly influenced by weight loss outcomes (%excess weight loss, %total weight loss, and final body mass index). QoL was neither significantly influenced by sex or age, type of surgery nor previously failed bariatric surgeries or complications. Improvement of hypertension was related to increased QoL, but improvement of other associated comorbidities did not had significant impact on patient’s QoL at long term.

Conclusion: It appears that the main factors influencing long-term QoL after bariatric surgery are related to weight loss outcomes.

Keywords: bariatric/metabolic surgery, comorbidities, health-related quality of life, obesity, predictors

Introduction

Obesity is a major public health concern. The exponential rising of obesity is reflected in higher incidence of other diseases such as diabetes, dyslipidemia, high blood pressure, sleep apnea, musculoskeletal disorders, depression, and some types of cancer. Quality of life (QoL) and survival are inversely correlated with higher grades of obesity, and the financial burden associated is substantial.¹

Bariatric surgery is the only proven treatment to achieve significant weight loss at long-term as well as improving comorbidities when compared to lifestyle changes and pharmacotherapy.^{1,2} For those reasons the number of bariatric and metabolic surgeries performed have been increasing worldwide in the last few decades.²

The definition of success after bariatric surgery must surpass weight lost and improvement of comorbidities.² One of the main goals of bariatric surgery is to improve QoL and this may be considered a major parameter to evaluate its success. However, there is a paucity of published data about the factors that may

influence QoL after bariatric surgery,³ particularly several years after surgery (long-term follow-up).

Recognizing that QoL is a multidimensional complex subject,⁴ the aim of our study is to identify factors influencing the QoL of patients 6 years after bariatric surgery.

Materials and methods

This observational study was performed in a specialized high-volume bariatric unit. Patients submitted to bariatric surgery in 2013 were selected from an electronic database. We had an initial database of 325 patients. The inclusion criteria were adult patients (age >18 years) submitted to sleeve gastrectomy (SG) or gastric bypass with a follow-up of more than 12 months. We had 299 eligible patients. We applied our questionnaire 6 years after the surgical procedure. In a first phase (from September 2018 to August 2019) the questionnaire was given at the patient’s appointments (nutrition, surgery, endocrinology, or multidisciplinary obesity consultation). In a second phase we call the rest of the patients and schedule a hospital meeting to apply the questionnaire. Five patients answered by email. Our response rate was 31.4% ending up with a total of 94 patients.

Several other variables were retrospectively reviewed: age, sex, anthropometric data—weight, height, body mass index (BMI)—before and after surgery, type of surgery (gastric bypass, SG, primary or revisional procedure), complications after surgery, and resolution of comorbidities.

Measurement of QoL

We used the “Moorehead-Ardelt Quality of Life Questionnaire” (MAII) which is a part of the Bariatric Analysis and Reporting Outcome System.⁵ MAII is a self-applied questionnaire designed

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specifically to study QoL on bariatric surgery patients. It is a 6-item questionnaire which evaluates 6 parameters: self-esteem, physical activity, social contacts, work capacity, pleasure on sexual relations, and relationship with food. The classification is given to each question on a scale of -0.5 to $+0.5$. The total score classify the patient's QoL as: very poor, poor, fair, good, and very good.³

Factors influencing outcome

To evaluate the proposed factors that may influence QoL we analyzed the patient's electronic records. Weight loss success after surgery was defined as percentage of total weight loss (%TWL) $>20\%$, percentage of excess weight loss (%EWL) $>50\%$ and BMI $<30\text{ kg/m}^2$ (or BMI $<35\text{ kg/m}^2$ if initial BMI $>50\text{ kg/m}^2$). Roux-en-Y Gastric Bypass (RYGB) was performed as a standardized technique, with a small gastric pouch, calibrated 12 mm gastrojejunal anastomosis, biliopancreatic limb of 70 cm, and alimentary limb of 150 cm. Both anastomosis were performed in a semiautomatic fashion, tested for leaks using methylene blue dye and the mesenteric defects were closed. SG were calibrated using a 54F bougie and the antrum was preserved (first stapler applied 6 cm proximal from the pylorus). Reinforcement of the stapler line was not routinely used. A drain was left in place after both surgeries for 3 days after surgery. Oral intake was initiated 24 hours after surgery and patients were discharged home 3 days after surgery, per protocol.

Primary surgery was defined as the first surgical attempt to treat obesity or its comorbidities. Nutritional, pharmacological or endoscopic treatments were disregarded in this definition. Revisional surgery was defined as a subsequent surgery after a failed previous bariatric surgery (either because of insufficient weight loss, significant weight regain, or surgical complications). Removal of adjustable gastric band was performed previously as a separate procedure.

The criteria used to evaluate the remission/improvement of diabetes, dyslipidemia, hypertension, and the definition of complications were adapted from the American Society for Metabolic and Bariatric Surgery consensus statement "Standardized outcomes reporting in metabolic and bariatric surgery".²⁷ Complete remission of diabetes was defined as having normal measurements of glucose metabolism (Glycated hemoglobin A1c [HbA1c] $<6\%$, fasting blood glucose [FBG] $<100\text{ mg/dL}$) in the absence of antidiabetic medications. The presence of subdiabetic hyperglycemia (HbA1c $6\%–6.4\%$, FBG $100–125\text{ mg/dL}$) in the absence of antidiabetic medications classified the patient as having a partial remission. Improvement was considered if the patient had a significant reduction of HbA1c or FBG not meeting criteria for remission or decrease in antidiabetic medications requirement. Dyslipidemic patients were classified as having a complete remission if they had no abnormalities at the lipid panel (low-density lipoprotein, high-density lipoprotein, or triglycerides) without any medication. On the contrary, no improvement was observed if the patient had the same lipid values with a lower dosage of the medication or if they had no improvement of the panel but were still on medication. Patients with hypertension were described as a full remission (blood pressure values $<120/80$ without medication), partial remission (values $120–140/80–89$ without medication) or no improvement (patient needing a lower dosage of medication or a reduction of the usual values on medications). Improvement of psychiatric pathology and osteoarticular pathology was considered if the patient was off medication or as the subjective perception of the patient.

Statistical analysis

IBM SPSS Statistics Inc (Chicago, IL) was used to statistical analysis. Continuous variables were summarized using mean values and discrete variables were represented using absolute frequency and percentage. We used the Kolmogorov-Smirnov and Shapiro-Wilk test to access the normality of the distribution of QoL scores. Mann-Whitney *U* tests were used to compare continuous variables and categorical variables. Regression analyses were conducted when continuous variables were assumed as outcomes, namely in weight loss outcomes.

Results

Patients characteristics

The mean age was 43.9 ± 9.9 years and 83 (88.3%) patients were women. Patient characteristics are summarized in Table 1. RYGB was performed on 75 (79.8%) patients and 21 (22.3%) surgeries were revisional: 18 after adjustable gastric band. Diabetes was present in 38 (40.4%) patients.

Result after surgery

The mean follow-up period after bariatric surgery was 66.7 ± 14.9 months. All surgeries were performed by laparoscopy, without any conversion. Early complications were observed in 3 patients: 2 patients (2.1%) required reoperation (1 anastomotic dehiscence and 1 hemoperitoneum). No late surgical complications were detected. No mortality was observed at long term in the selected patients.

The mean %EWL was $67.4\% \pm 23.9\%$ at the last follow-up and 94 (77.7%) patients achieved %EWL >50 . The mean %TWL was $27.8\% \pm 10.2\%$ and 94 (77.7%) patients reached %TWL >20 . Final mean BMI was $31.2\% \pm 5.1\%$ and 44 (46.8%)

Table 1
Global characteristics of patients

Variables	N (%) (unless otherwise specified)
Age	
<50	64 (68.1)
≥ 50	30 (31.9)
Mean	43.9 ± 9.9 years
Sex	
Female	83 (88.3)
Male	11 (11.7)
Surgery performed	
Sleeve gastrectomy	19 (20.2)
Roux-en-Y gastric bypass	75 (79.8)
Primary surgery	73 (77.7)
Revisional surgery	21 (22.3)
Weight (mean)	$112.0 \pm 13.6\text{ kg}$
BMI (mean)	$43.4 \pm 5.2\text{ kg/m}^2$
Surgical complications	
Early	4 (4.3)
Late	0 (0)
Reoperation	3 (3.2)
Commodities	
Diabetes	38 (40.4)
Dyslipidemia	45 (47.9)
Hypertension	47 (50.0)
Psychiatric pathology	41 (43.6)
Osteoarticular pathology	44 (46.8)

BMI = body mass index.

Table 2	
Results after surgery	
Variables	N (%) (unless otherwise specified)
Diabetes	
Complete remission	22 (57.9)
Partial remission	9 (23.7)
Improvement	5 (13.2)
No improvement	2 (5.3)
Dyslipidemia	
Complete remission	20 (51.3)
Improvement	18 (46.2)
No improvement	1 (2.6)
Hypertension	
Complete remission	4 (19)
Partial remission	4 (19)
Improvement	8 (38.1)
No improvement	5 (23.8)
Psychiatric pathology	
Improvement	49 (54.4)
No improvement	41 (45.6)
Osteoarticular pathology	
Improvement	43 (50.6)
No improvement	42 (49.4)
Weight	
%EWL (mean)	67.4% ± 23.9%
%TWL (mean)	27.8% ± 10.2%
BMI (mean)	31.2 ± 5.1

BMI = body mass index, %EWL = percentage of excess weight loss, %TWL = percentage of total weight loss.

patients were below BMI 30 or 35 (according to initial BMI). Table 2.

The mean QoL score at the end of the follow-up period was 1.38 ± 1.28. The score did not present a normal distribution.

Thirty-three (35%) patients were categorically classified as having a good QoL, and 31 (33%) patients as having a very good QoL. Only 7 (7.4%) were classified as having poor QoL and none had very poor QoL (Fig. 1).

Improvement of diabetes was observed in 36 (94.7%) patients with diabetes of which 22 (57.9%) patients had complete remission. Complete remission of dyslipidemia was observed in 20 (51.3%) patients with dyslipidemia with only 5.3% having no improvement. Hypertension was improved in 16 (76.2%) patients with previously diagnosed hypertension and psychiatric diseases was improved in 8 (20%) patients.

Factors influencing QoL

The patient’s sex or age below 50 years had no significant association with QoL ($P = .252$ and $P = .081$, respectively).

There were no significant differences between revisional surgery versus primary surgery on QoL; however, it appeared that patients submitted to revisional surgery had a tendency toward worse QoL, although not reaching statistical significance ($P = .052$).

Furthermore, the type of the surgery performed did not had significant impact on QoL (SG QoL mean = 1.2 ± 1.5 vs. RYGB QoL mean = 1.4 ± 1.2 , $P = .850$). The presence of early complication ($P = .091$) and the need for re-intervention ($P = .546$) also had no significant impact on QoL.

All the standard indicators of weight loss success after bariatric surgery (%EWL, %TWL, and final BMI) had a significant correlation to QoL score ($P = .001$, $P = .001$, and $P = .013$, respectively) (Table 3 and Figs. 2–4).

Only improvement/resolution of hypertension was significantly associated with QoL score (mean QoL for complete remission was 2.7 ± 0.4 and 1.8 ± 1.0 for no remission, $P = .04$). Resolution or improvement of the other reported comorbidities did not correlate significantly to QoL score.

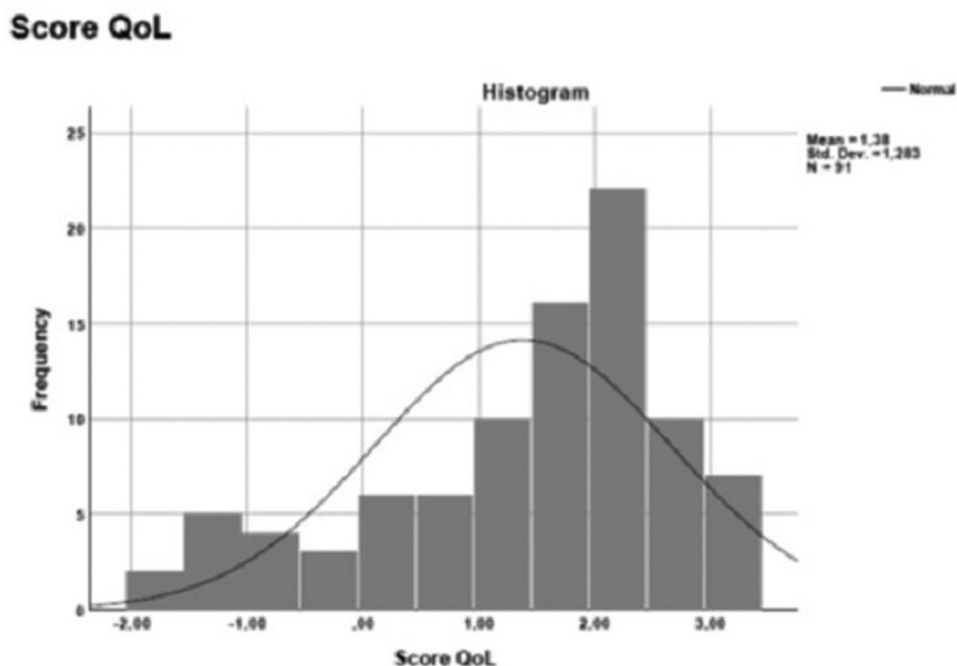


Figure 1. Score QoL 6years after bariatric surgery. QoL = quality of life.

Table 3**Correlation between quality of life and weight outcomes**

Continuous weight loss variables	
%TWL	$P=.001$ $R^2=0.122$ Beta coefficient=0.044, 95% CI [0.019; 0.069]
%EWL	$P=.001$ $R^2=0.121$ Beta coefficient=0.019 95% CI [0.008; 0.03]
Final BMI	$P=.013$ $R^2=0.067$ Beta coefficient=−0.069 95% CI [−0.124; −0.015]
Success defined by	
%TWL >50% 94 (77.7%) patients	$P=.006$ $R^2=0.082$ Beta coefficient=0.916; 95% CI [0.269; 1.562]
%EWL >20% 94 (77.7%) patients	$P=.022$ $R^2=0.057$ Beta coefficient=0.752; 95% CI [0.110; 1.394]
Final BMI <30 kg/m ² (or 35 kg/m ² if initial BMI >50 kg/m ²) 44 (46.8%) patients	$P=.003$ $R^2=0.094$ Beta coefficient=0.784 95% CI [0.272; 1.296]

BMI = body mass index, CI = confidence interval, %EWL = percentage of excess weight loss, %TWL = percentage of total weight loss.

Discussion**Global view on quality of life**

The reported QoL score 6 years after bariatric surgery was classified as good (mean 1.4 ± 1.3). It is important to stress that we did not had a baseline QoL score before surgery nor an evolution curve. Some authors claim that there is a deterioration of QoL 5 years after bariatric surgery.⁶ This tendency begins between 2 and 5 years after surgery, related to weight stabilization and cessation of the so called “honeymoon” effect, but it is always better than QoL initially reported.² Consequently, our long-term QoL results might reflect more accurately the definitive impact of bariatric surgery.

Factors influencing outcome

Age and sex. Some studies argue that outcomes after bariatric surgery may be superior at ages below 50 years old. The weight loss pattern at younger ages may be different due to the specific characteristics of this population metabolism. Furthermore, the adherence rate to therapy and the motivation to keep the follow-up is different in this group. Janik et al,³ considered that these results might just be a confounder factor. In our study patients under 50 years had similar QoL outcomes compared to those patients above 50 years. Adult patients from all ages lost weight and showed an improvement on their comorbidities. Furthermore, even though some studies describe that female gender could be a factor positively influencing patient’s QoL, in our study no gender variation was found considering QoL after bariatric surgery. Janik et al again described it as a possible confounder.

Characteristics of the surgery

Primary versus revisional. The indication for revisional bariatric surgery implies either complications from previous procedures or unsatisfactory results regarding weight loss or resolution of comorbidities. Consequently, it is expected that patients with indication for revisional surgery may have lower QoL than those patients submitted to primary surgery. However, in our study, no differences in QoL were observed when comparing patients submitted to primary versus revisional bariatric surgeries. This finding may be time dependent: considering that both groups (primary and revisional procedures) presented satisfactory weight loss outcomes, it seems that after 6 years patients tend to overlook the circumstances that dictate bariatric surgery. We must stress that our study was not designed to draw conclusions about this topic, mainly because QoL assessment was not performed before or early after surgery.

Sleeve Gastrectomy Versus Roux-en-Y Gastric Bypass.

Presently, the most frequent bariatric procedures performed worldwide are SG and RYGB. These procedures are considered equally effective regarding weight loss, at least at short/medium term. However, RYGB seems to have better outcomes regarding resolution/improvement of associated comorbidities due to its metabolic and hormonal effects.³ Our results revealed that those

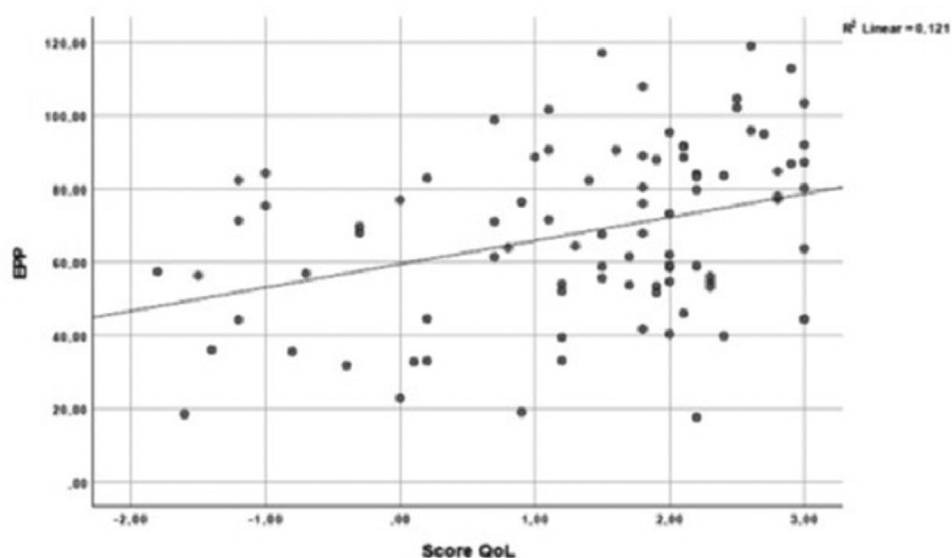


Figure 2. Correlation between QoL and percentage of excess weight loss (%EWL). EWL = excess weight loss, QoL = quality of life.

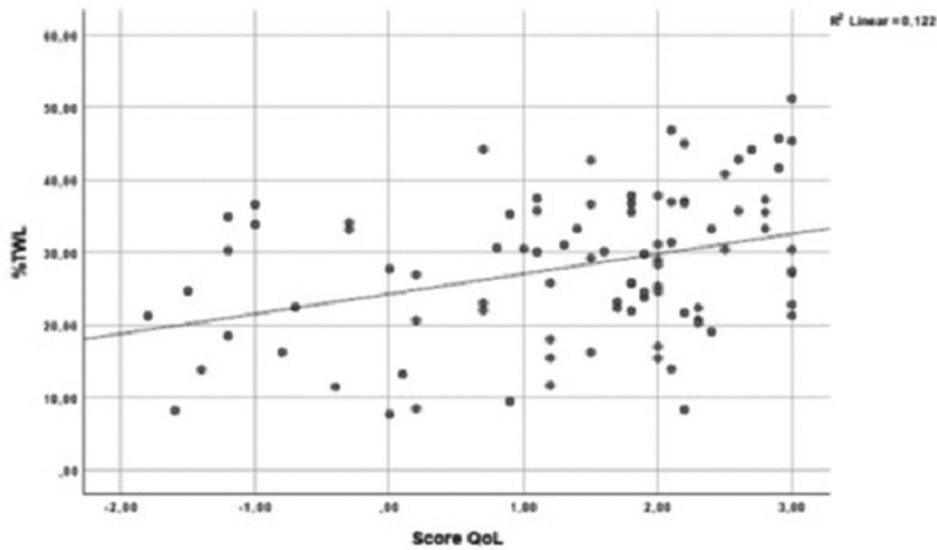


Figure 3. Correlation between QoL and %TWL. QoL = quality of life, %TWL = percentage of total weight loss.

differences apparently had no significant impact on patients’ QoL at long term.

Complications. As Schouten et al., claim that reoperation during follow-up does not significantly influence QoL. Bariatric surgery, when performed in high-volume specialized centers, presents low morbidity and rare mortality.⁷ Surgical complications after bariatric surgery does not seem to influence QoL of patients at long term. In our study 2 patients required reoperation to treat early complications (one anastomotic dehiscence and one hemoperitoneum) and apparently no significant impact on QoL score were reported in these few patients.

Weight loss. Some published data report that QoL (measured by MAII and SF-36) is not related to %EWL or %Excess Body Mass Index Loss.^{3,8} However, these data report only short-term

follow-up (12–18 months) evaluated with MAII questionnaire and using a different group of patients for control before bariatric surgery. Contrarily, Montpellier et al,⁹ showed a correlation between %TWL and the improvement of QoL. These results come from a study that used IWQOL-lite and RAND-36 applied to the same patient’s group 24 months before and after surgery.¹¹ In our perspective weight loss was the most important factor influencing patient’s QoL. Furthermore, all the standard weight loss success criteria were significantly associated with QoL: final BMI was the criteria that explained a larger part of the QoL improvement ($R^2=0.094$).

Comorbidities. New guidelines on diabetes treatment now include bariatric surgery as a treatment option.¹² It is widely accepted that bariatric surgery has a profound effect on glycemia homeostasis that may lead to the improvement or remission of

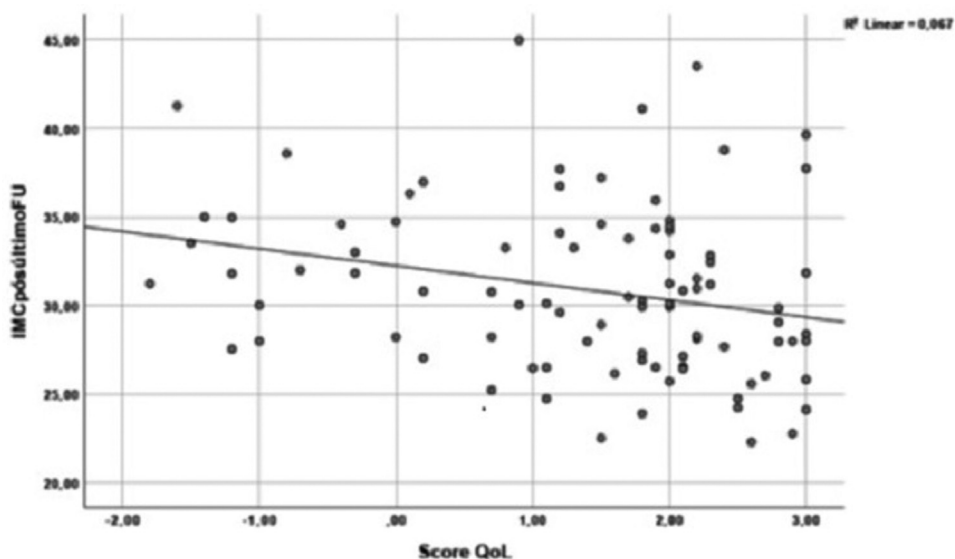


Figure 4. Correlation between QoL and final body mass index (BMI). QoL = quality of life.

diabetes.¹³ Remission of diabetes occurs independently of weight loss.¹⁴ Almost all diabetic patients included in our study had an improvement on their glycemic control and more than half of them experienced complete remission. Nonetheless this improvement did not translate into a significantly higher QoL comparing to those patients with diabetes unresponsive after surgery.

Lipid profile is also amenable to improvement after bariatric surgery¹⁵ and patients with dyslipidemia were reported to have lower levels of QoL.¹⁶ In our series 97.4% of patients with dyslipidemia had an improvement 6 years after surgery, and 51.3% were without medication. Despite these excellent results, improvement of dyslipidemia did not significantly influence QoL.

Obesity is also associated with high systolic blood pressure and in this setting hypertension is usually difficult to control.¹⁷⁻¹⁹ As previously reported bariatric surgery provides a significant reduction in blood pressure even in nonhypertensive patients.²⁰ In our study 76.2% of the hypertensive patients had an improvement of their blood pressure control with 38.1% being off medication. This was the only analyzed comorbidity that correlated significantly with QoL score. This influence might be due to the negative effects of the antihypertensive drugs and the needed lifestyle changes as stated by Trevisol et al.²¹

Patients with musculoskeletal disorders especially those with associated pain and mobility impairment have lower QoL scores.²² There is an intrinsic association between obesity and musculoskeletal disorders.²³ Bariatric surgery can lead to a significant improvement on global function of these patients and it may also enhance outcomes after posterior orthopedic surgeries.²⁴ Only 7.7% of our patients had an improvement on their musculoskeletal pathology after 6 years of follow-up, which had no statistical correlation to QoL. Natural aging and the emergence of new comorbidities during the follow-up may be confounders of this results.

Bariatric surgery produces major changes in self-esteem, auto-image and social behavior. As a result, mental health usually improves after bariatric surgery leading to an improvement in QoL.²⁵ Twenty percent of the patients with psychiatric pathology showed an improvement on their mental state. Despite of that it does not come across as being a factor that influences the general QoL of patients. According to Lindekilde et al,²⁶ bariatric surgery has great impact on the physical components of QoL, and it seems to affect psychological components in a lesser degree.

Final considerations

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Bariatric surgery is a safe and efficient treatment for obesity and its associated comorbidities, but there is scarce published data about QoL after these surgeries, especially at long-term follow-up.

It seems that the major outcome that influence long-term QoL after bariatric surgery is weight loss. Furthermore, our study suggests that final BMI may be superior to %TWL or %EWL when evaluating the impact of weight loss outcomes on QoL. This is an important conclusion because the criteria used to define weight loss success after bariatric surgery are controversial and none of them are evidence based.¹⁰

In our series, QoL was not significantly influenced by the type of surgery (SG or RYGB) or complications after surgery. As described for weight loss outcomes, revisional bariatric surgery tends to be related to less impressive results regarding QoL, but not reaching statistically significance in our study.

Sex and age did not influence QoL as well. Apart from the improvement of hypertension, improvement of associated comorbidities appears to have no significant impact on patient's QoL at long-term.

We acknowledge that our study has several limitations. This is an observational study of long-term follow-up, but it lacks a baseline QoL score before surgery and the short-/medium-term follow-up to assess evolution throughout time after surgery. The self-applied nature of the questionnaire also raises some questions regarding how patients understands and reliably answers questions. It is important to recognize that the goal of many medical treatments is to improve patient's QoL. This a subjective and hard-to-measure outcome that is not always related with other outcomes.

From the patient perspective, QoL is often a major priority and bariatric surgery outcomes should reflect more this perspective. More studies are needed to fully address this subject.

Conflicts of interest

The authors declare no conflicts of interest.

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