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Original Research Article

Weight Loss with Bariatric Surgery and Quality of Life in the Absence of Comorbidities

Iracema Islas Vega[1], Jesús Carlos Ruvalcaba Ledezma[1*], Juan Roberto González Santamaría[2], Josefina Reynoso Vázquez[3], Olga Rocío Flores Chávez[4], Alelí Julieta Izquierdo Vega[5], María del Carmen López Zermeño[6], Pedro Negrete Rivera[7], Alfonso Reyes Garnica[5], Zayda Arlette Trejo-Osti[5], Claudia Teresa Solano-Pérez[5]

[1]Academic Area of Nursing Technological University of Tulancingo [UTEC] Hidalgo, Mexico
[1*]Former Full-Time Professor at [ICSa-UAEH] Institute of Health Sciences-Autonomous University, Mexico
[2]Department of Medicine in National Autonomous University of Mexico, Bariatric Surgery at the High Specialty Regional Hospital of Zumpango, Mexico
[3]Academic Area of Pharmacy and Master in Public Health. Health Sciences Institute Autonomous University of State of Hidalgo, Mexico
[4]Department of Nursing of Health Sciences Institute Autonomous University of State of Hidalgo, Mexico
[5]Academic Area of Medicine, Health Sciences Institute Autonomous University of State of Hidalgo, Mexico
[6]CUCS University Center for Health Sciences. Regional Public Health Research Institute. University of Guadalajara Mexico
[7]Division of Surgery, HGZ 89 IMSS, Guadalajara Jalisco, Mexico

Corresponding Author: Jesús Carlos Ruvalcaba Ledezma
Email: dcspjcarlos@gmail.com

Article Information:
Received: 22 February 2026 | Revised: 25 March 2026 | Accepted: 21 April 2026 | Published: May 28, 2026

Cite this article:
Iracema Islas Vega, Jesús Carlos Ruvalcaba Ledezma, Juan Roberto González Santamaría, Josefina Reynoso Vázquez , Olga Rocío Flores Chávez, Alelí Julieta Izquierdo Vega, María del Carmen López Zermeño, Pedro Negrete Rivera, Alfonso Reyes Garnica, Zayda Arlette Trejo-Osti and Claudia Teresa Solano-Pérez (2026). Weight Loss with Bariatric Surgery and Quality of Life in the Absence of Comorbidities *Public Health Open Journal*. 11(1):497–506. https://doi.org/10.17140/PHOJ.11.01.506

Abstract

Objective: Determine the impact of loss of excess weight in patients undergoing bariatric surgery regarding quality of life with no comorbidities.

Materials and methods: A quasi-experimental epidemiological study carried out with 42 patients who underwent bariatric surgery with Da Vinci robotic and laparoscopic technique of gastric sleeve and bypass types. In [HRAEZ - Regional Highly Specialized Hospital of Zumpango, Estado de Mexico].

Results: The patients intervened with the robotic technique 59%, the laparoscopic technique 41%, the bypass 61% and sleeve type 39%. In addition, 45% of the intervened patients had type 2 diabetes mellitus, 19% had systemic arterial hypertension, 32% had depression, 23% had gastroesophageal reflux and dyslipidemia. At the end denotes remission of complications due to obesity of the 10 patients, loss of minimum excess of weight was 40.9%, a maximum was 110%, with an average of 65.69%; this is within the quality standards of bariatric surgery. As part of the outcomes, the quality of life was very good and good. The comparative analysis, HA is accepted.

Conclusion: The percentage of loss of excess weight after surgery was accurate according to the parameters established in prior specialized theoretical frameworks; bariatric surgery improved the quality of life of patients with obesity.

Keywords: Bariatric surgery, percentage of loss of excess weight, comorbidities, quality of life.

1. Introduction

According to the World Health Organization [WHO], obesity is a chronic disease, characterized by an increase of body fat, associated with increased health risk [1] [3]. It is defined as a disease the result of an imbalance between the energy ingested and expended, characterized by an excessive increase of body fat, whose magnitude and distribution compromises the health of organs and systems. Obesity has a multifactorial origin in which genetic susceptibility, lifestyles and environmental characteristics are involved, with the influence of various underlying determinants, such as globalization, culture, economic status, education, urbanization and political and social environment [4].

The Organization for Economic Cooperation and Development [OECD] places Mexico in second place for global obesity in adults, surpassing the USA. Some studies have mentioned that the proportion of normal weight in the Mexican population is declining and it is projected that by 2050 there will be more people with major obesity. An analysis of the epidemiological transition in Mexico found that chronic non-communicable diseases caused 75% of all deaths and 68% loss of potential years of life [4]. This epidemiological scenario allows us to measure the seriousness that obesity represents in Mexico and justifies the management of profitable and successful health programs and projects to help solve this problem [5] [6].

In Mexico, attention to obesity and its complications generated an expense of 42 billion pesos a year, plus 25 billion associated with losses due to low productivity. Obesity is a serious health problem whose growth in recent decades has increased considerably. It is responsible for serious physical, psychological, and social problems, affecting the quality of life [QoL] of the people who suffer from it. Bariatric surgery has proven to be the best obesity treatment, even in its most severe degrees. Besides reducing excess weight, a high rate of improvement and remission of metabolic comorbidities take place, which have an impact on the quality of life and improve the life expectancy of intervened patients [7].

Bariatric surgery is a surgical procedure performed on the stomach and/or intestines that helps to lose weight in a morbidly obese person. It allows a complete resolution or improvement of: diabetes mellitus, hyperlipidemia, systemic arterial hypertension and obstructive sleep apnea [7]. Existing scientific evidence, which endorses that currently only surgery allows an effective and sustained treatment over time, with the consequent benefits for patients even in cases of extreme obesity [8] [9] [10] [11] [12].

The Official Mexican Standard [NOM-008SSA3-2010] was updated, which establishes the health criteria to regulate the treatment of excess weight and obesity. This standard establishes the indication for bariatric surgery in adult individuals with a BMI greater than or equal to 40 kg/m^2 or greater than or equal to 35 kg/m^2 associated with comorbidities, whose origin, in both cases, is not purely endocrine and with a history of recent comprehensive medical treatment. In addition to the above, in the case of people between 16 and 18 years of age, surgical treatment may be performed exclusively on those who have completed their physical, psychological and sexual development. The selection of the type of surgical technique must be based and justified on the evaluation of a multidisciplinary health team, made up of at least, but not limited of: a surgeon, an anesthesiologist, an internist, a nutritionist and a clinical psychologist; this indication must be established in a medical prescription [3].

Scientific progress has allowed, through new technologies such as the Da Vinci system, to be an efficient support for surgeons, obtaining better results. However, there are still some disadvantages in the use of robot: 1] a single trading company [monopolistic], 2] high cost of both the robot and its maintenance and instruments, 3] difficult application in multiquadrant surgeries. 4] absence of tactile feedback, 5] large size of the carriage and wide radius of rotation of the arms [13].

Bariatric surgery techniques are traditionally divided into 3 types: restrictive surgery, malabsorptive surgery and mixed restrictive-malabsorptive techniques [11]. Restrictive techniques consist of reducing the capacity of the stomach, thus restricting the food intake. On the other side, malabsorptive techniques reduce the capacity of the stomach by half and produce a crossing with the intestine. Mixed techniques consist of reducing the stomach to 15–30 milliliters, together with a crossing in the intestine that induces a certain degree of malabsorption protein and vitamin deficiencies are very scarce [14] [15] [16] [17] [18] [19] [20].

Pathologies associated with Obesity

Weight loss leads to an improvement in the comorbidities associated with obesity and is directly related to the decrease in mortality, with bariatric surgery currently being the most effective treatment for morbid obesity [21]. Among the major comorbidities, the following are identified: type 2 diabetes mellitus, hypoventilation-obesity syndrome, obstructive sleep apnea syndrome, high blood pressure, cardiovascular disease, some types of neoplasms [endometrium, breast, liver] and degenerative arthropathy of load-bearing joints. Among the minor comorbidities, dys-

lipidemia, gastroesophageal reflux, cholelithiasis, fatty liver, infertility, polycystic ovary syndrome, urinary incontinence, nephrolithiasis, other types of cancer [esophagus, colon-rectum, prostate, gallbladder], venous insufficiency, atrial fibrillation, congestive heart failure, certain types of dementias and benign intracranial hypertension [22]. Schauer [2001] identifies an average of 6.8 comorbidities per patient [23].

Diabetes mellitus type 2

DM2 is 5 times more frequent in obesity grade 1 and 10 times more frequent in obesity grade 2 and in morbid obesity, compared to the non-obese population [24] [25] [26] [27]. The International Diabetes Federation recommends surgical treatment for people with type 2 diabetes associated with obesity [BMI $\geq$35 kg/m^2] and, under some circumstances, for patients with a BMI between 30 and 35 kg/m^2, such as glycosylated Hb 7.5%, despite being treated with optimal conventional therapy, especially if weight is increasing or some comorbidities cannot be controlled with standard therapy [6]. After a 16-year follow-up, a DM2 remission rate of 83%, an improvement in DM2 complications, and a reduction in mortality were confirmed compared with a cohort of patients who refused surgery and patients with the same epidemiological parameters than those intervened [1% vs 4.5%, p$<$.0001] [27].

Hypertension

The risk of mortality from cardiovascular disease is increased in obesity. The American Heart Association classifies obesity as a major risk factor for coronary heart disease. Obesity accounts for 78% and 65% of essential hypertension in men and women, respectively. This correlation varies with age, sex, and race and is strongest in subjects under 40 years of age, especially in men [28]. An increase in BMI of 1.7 kg/m^2 in men and 1.25 in women or an increase in abdominal circumference of 4.5 cm in men and 2.5 in women represents a 1 mmHg increase in systolic blood pressure. Obesity triggers a series of adaptive disorders that individually and synergistically produce hypertension and other cardiovascular pathologies. For instance, obesity control eliminates 48% of hypertension in Caucasians and 28% in Blacks [29].

Dyslipidemia

The alterations in the lipid profile observed in people with visceral obesity are due to alterations in the homeostasis of glucose and insulin. The most characteristic alterations are hypertriglyceridemia — Triglyceride levels $>$150 GS/dl — and a decrease in high-density lipoprotein cholesterol [HDL-C] [29].

Depression

Certain psychiatric illnesses are risk factors for obesity, such as bulimia and anxiety disorders. In return, obesity is a predisposing factor for psychiatric disorders such as depression. For this reason, morbid obesity should not only be considered a physical disease, but also a mental one, and healthcare specialists should ensure a treatment that encompasses both aspects [30].

Gastroesophageal reflux disease [GERD] is closely related to obesity; in fact, up to 45% of morbidly obese patients suffer from it. In these cases, surgery is recognized as the most effective treatment for severe and refractory disease. Currently, fundoplication continues to be the gold standard for Severe GERD [31].

Quality of life

In terms of health, it is especially important in people with advanced age, the chronically ill [such as those suffering from morbid obesity], terminal and disabled populations, medicine associates it with the psychosomatic health of the organism, functionality, symptomatology, or the absence of disease. The World Health Organization [WHO] has defined quality of life as an individual's perception of one's position in life within the context of the cultural and value system in which one lives and in relation to one's goals, hopes, norms and concerns [32] [33] [34].

Quality of life in bariatric patients

Instruments for measuring quality of life in bariatric patients

- Obesity not only has an impact on morbidity and mortality, but also on the quality of life of those who suffer from it [22]. It is understood as a subjective perception, influenced by their health status and the ability to carry out activities that are important in their lives. [35] [36].
- The health-related quality of life of the obese is affected in at least four aspects:
- Problems directly related to problems of [impaired physical performance], mental ones [impaired self-esteem, depression] or social ones [impaired relationships with others, social integration, sexual relationships, etc].
- Complications derived from obesity, such as chronic degenerative diseases.
- Problems related to the vital prognosis and possible disease that they can end their lifes.
- Changes in health-related quality of life in light of the results of a generally long treatment, with slow results and frequent relapses.
- Therefore, the quality of life is not aimed at eliminating the disease but rather at improving the

quality of life related to the health of patients during survival time [22] [34].

The BAROS score [Bariatric Analysis and Reporting Outcome System], has been validated as the best system for comprehensive and objective assessment of the benefits of bariatric surgery, since that considers different variables such as loss of excess weight, correction of diseases associated with severe obesity, morbidity and mortality of the procedure in the short and long term, and above all, incorporates the evaluation of postoperative quality of life [37]. From this last instrument arises the Test Moorehead-Ardelt instrument that evaluates 5 dimensions: self-esteem, physical activity, social relationships, work performance, and sexuality [38], the Spanish version of this instrument adds a sixth dimension that takes into account eating habits [34].

It is worth mentioning that, in none of the validated instruments, the past is compared with the present, considering only the present, diagnosed with a score; it is suggested to implement studies and instruments to know what the quality of life of the patients was like and to consider the personal opinion of the patients. In the case of morbid obesity, quality of life becomes even more important, since it is a highly prevalent disease in our environment and consumes a large amount of resources in the Health Care System [34]. The results should not be assessed only according to the initial loss or delayed weight gain, complications or sequelae of one technique or another, or the subsequent need for cosmetic surgery, but rather a series of factors derived from the patient himself should be taken into account which, together, define quality of life [17]. However, more important than the number of kilos lost is the improvement in comorbidities associated with excess weight [21].

Objective: To determine if the loss of excess weight in patients undergoing bariatric surgery is a parameter for improving quality of life and reducing comorbidities.

Hypothesis.

- H0 = There is no significant difference between the percentage of loss of excess weight with improvement in quality of life and control of comorbidities.
- HA = There is a significant difference between the percentage of loss of excess weight, with improvement in quality of life and control of comorbidities.

2. Materials and Methods

2.1 A quasi-experimental epidemiological study was carried out in 42 patients. A non-probabilistic sampling was used for the inclusion of consecutive cases. Information from the electronic file was collected, using the "SorianMedSuite" electronic system and the application of the MOOREHEAD-ARDELT II - Questionnaire Adapted to Spanish, during follow-up checkups at the Regional Highly Specialized Hospital of Zumpango, Estado de Mexico, in Mexico, whose data was recorded on a spreadsheet for its analysis.

Subsequently, the data collected from the intervened patients with a bariatric surgery [6 months afterwards] was evaluated at the Regional Highly Specialized Hospital of Zumpango, Estado de Mexico, in México through the criteria of inclusion, exclusion and elimination of the representative sample. The percentage of weight lost in patients will be identified and an association will be sought with the quality of life they currently have and the presence of comorbidities.

2.2 Study Variables

The variables used were: age, gender, presence of presurgical comorbidities associated with obesity, initial anthropometric data, post-surgical anthropometric data, laboratory studies before and after surgery, evaluation of quality of life, and mortality.

2.3 Statistical Analysis

Statistical analysis was performed by frequency distribution, percentages, measures of central tendency and dispersion, for quantitative variables and chi-square for qualitative variables. Statistical analysis was carried out by means difference for variables that denote anthropometric indicators and for biochemical indicators, based on a value of $p<0.05$ and CI of 95%, the statistical analysis was performed in SPSS version 23.

2.4 Ethical Aspects of Research

The research and ethical guidelines of the Helsinki principles were complied with to conduct this study. According to the study carried out, what is established in the Regulations of the General Health Law on Research for Health in Article 7. The project was approved by the research committee of the Regional Highly Specialized Hospital of Zumpango, Estado de Mexico in Mexico. (CI/HRAEZ/2018/12)

3. Results

Information from 42 patients who underwent bariatric surgery at the HRAEZ [Regional Highly Specialized Hospital of Zumpango, Estado de Mexico] was analyzed, from which preoperative data was obtained from 31 patients and postoperative data where 23 were female and 8 were male, aged 25 to 71 years and an average of 44 years old, the most performed surgical technique with 59% was robotic, in relation to the laparoscopic

Figure 1. Selection criteria for the study.

Inclusion criteria:	-Patients undergoing laparoscopic or robot-assisted bariatric surgery procedures, such as gastric sleeve and gastric bypass. -Patients intervened with bariatric surgery with follow-up equal to or greater than 6 months with complete pre- and post-studies. -Patients aged 18 years or older undergoing bariatric surgery. -Patients who sign the informed consent.
Exclusion criteria:	-Bariatric surgery patients under 18 years of age. -Patients treated with endoscopic gastric balloon. -Patients with perioperative complications that required surgical re-intervention.
Elimination criteria:	-Female patients with pregnancy during 6 months after the surgical procedure. -Patients in whom it was impossible to collect sufficient data. -Patients who refuse participation in the study.

with 41%. The two types of surgery that were applied were bypass and gastric sleeve in 61% and 39%, respectively. Of the intervened patients, 45% presented a diagnosis of type 2 diabetes mellitus, 19% a diagnosis of systemic arterial hypertension, 32% depression, 23% gastroesophageal reflux disease as well as dyslipidemia.

According to preoperative anthropometric data, it was found that the minimum height was 1.40 m, the maximum 1.83 m. and the average of 1.63 mt. [SD =10.59], the preoperative weight ranged between were 84.5 kg. and 188 kg., with an average of 129.76 kg. [SD = 26.93]. The minimum ideal excess of weight is 48 kg, the maximum 83.38 kg, the average 66.78 kg. [SD= 7.63]. The excess of weight of patients compared to their ideal weight ranges from 25.4 kg. and 108.19 kg. with an average of 62.98 kg. [SD =24.18]. The minimum initial excess of weight percentage was 43.09%, the maximum 221.69% and the mean 94.91% [SD=38.73]. The minimum preoperative body mass index was 35.6 kg/mt^2 and the maximum was 80 kg/mt^2 with a mean of 48.5 kg/mt^2 [SD = 9.64], which indicates that the patients had grade III obesity [Table 1].

Source: Sorian MedSuite electronic file, 2019.

In the postoperative results, it was observed that the obesity complications of the 10 patients were remitted, of which 4 patients had presented a preoperative diagnosis of type 2 diabetes mellitus, 2 systemic arterial hypertension, 1 depression, 1 gastroesophageal reflux disease and 2 dyslipidemia; the information of the other patients was not obtained due to lack of registration and updating of data for their contact.

In relation to the postoperative anthropometric measurements, of the 10 patients it was obtained that the minimum final weight was 61.6 kg, the maximum was 126.3 kg, obtaining an average of 83.97 kg. [SD= 20.54], the minimum BMI was 24.0 kg/mt^2, the maximum was 48.72 kg/mt^2 with a mean of 32.47 kg/mt^2 [SD= 7.42]. A minimum weight loss of 26 kg and a maximum of 72 kg was achieved. With an average of 42.21 kg. [SD= 14.10], represented in a minimum loss of excess weight percentage of 40.9%, a maximum of 110% and a mean of 65.69%, which indicates that it is within the quality standards of bariatric surgery [Table 2].

Source: Sorian MedSuite electronic file, 2019.

The quality of life was evaluated by the score and the result was very good in 8 patients and good in 2. The results regarding the hypothesis test differed with a value of t=8.96 between the variable initial weight and final weight and a value of p= .000, in the same way the initial BMI and the final BMI have a value of t= -3.412 with a value of p= .008. Between the variable percentage of initial excess of weight and percentage of loss of excess of weight there was a significant difference with a value of t= 7.06 and a value of p= .000. Likewise, between the initial glucose values and the final glucose, a value of t= 4.22 and a value of p= .002 were obtained, between the variable of the initial LDL levels and the final LDL levels, a value of t= 5.52 and a value of p=.000. and % excess weight loss – Quality of life a value of p=9.545 and a value of p=0.005. (Table 3).

Significance value of $p < 0.05$ CI 95%

Based on the results obtained given that the value of p is $<$0.05 and CI 95%, for the variables studied, where the research hypothesis indicates that there is a significant difference between the percentage of loss of excess of weight, with improvement in quality of life and control of comorbidities and it is rejected that there is no significant difference between the percentage of loss of excess weight with improvement in quality of life and control of comorbidities.

4. Discussion

Attempts have been made to isolate certain variables, such as gender and age as predictors of desertion to

Table 1. Descriptive analysis of pre-surgical anthropometric variables

Variable	N	Minimum	Maximum	Half	Standard deviation [SD]
Size [mt]	31	1.40	1.83	1.65	.09334
Initial weight [kg]	31	84.5	188	129.76	26.93
Maximum ideal weight [kg]	31	48	83.38	66.78	7.63
Excess of weight [kg]	31	25.44	108.19	62.98	24.18
% initial excess of weight	31	43.09	221.69	94.91	38.73
Initial BMI [kg/mt^2]	31	35.69	80.10	48.53	9.64

Table 2. Descriptive analysis of postoperative anthropometric variables

Variable	N	Minimum	Maximum	Half	Standard deviation [SD]
Finished weight [kg]	10	61.6	126.3	83.97	20.54
Final BMI [kg/mt^2]	10	24.0	48.72	32.47	7.42
Final lost weight [kg]	10	26.0	72.0	42.21	14.10
% loss of excess weight	10	40.9	110.18	65.69	21.3

Table 3. Comparison of impact indicators in Bariatric Surgery.

Variable	t Value	p Value
Initial weight – Final weight	8.96	0.000*
Initial BMI – Final BMI	-3.412	0.008*
% Initial excess weight - % Final excess weight	7.06	.000*
Initial glucose – Final glucose	4.22	.002*
Initial LDL – Final LDL	5.52	0.000*
% excess weight loss – Quality of life	9.545	.005*

postoperative care programs, finding preliminary results indicating that female gender, younger age, and serious psychiatric disorders [such as personality disorders] are associated with higher dropout rates [39]. Regarding our study, a higher percentage of bariatric surgeries were performed to women in 74% of the cases and 26% in men, with ages between 25 and 71 years and an average of 44 years, which suggests that the vast majority of the intervened patients were women and this is associated with greater dropout rates in post-surgical treatment, leading to losing part of our sample.

In the study, the robotic surgical technique was employed in 59% of the patients, in relation to the laparoscopic technique with 41%, which matches the one from the study by Ahlering, T.E. [2003] [40]. Although laparoscopy revolutionized the field of surgery, today, robotics has revolutionized the field of minimally invasive surgery since many of the laparoscopic procedures are highly technically demanding and technology has provided a means by which endoscopic surgical performance could be improved [41]. The use of robotic surgery is expanding in the field of bariatric/metabolic surgery, and the first studies carried out during its technological development confirm its safety, achieving a reduction in complications, but with a longer surgical time and higher costs [42].

The two types of surgery that were applied in this study were bypass and gastric sleeve in 61% and 39% respectively, which is related to what David Pacheco Sánchez and others [2019] mention in prior studies, where most of the surgical techniques described in the past decades have been abandoned and currently the gastric sleeve and gastric bypass in “Y de Roux” both with laparoscopic approach are, in this order, the two most used techniques. Both have similar results in terms of weight loss and resolution or improvement of comorbidities and a similar safety profile [42].

According to the results obtained, the patients presented at least one comorbidity associated with obesity, which were type 2 diabetes mellitus, systemic arterial hypertension, depression, reflux disease, and dyslipidemia, as described by Zugasti and Moreno [2005] regarding obesity, especially obesity distribution. central, represents a significant increase in morbidity due to its association with diseases that affect most of the body’s systems [hypertension, dyslipidemia, type 2 diabetes, coronary disease, cerebral infarction, biliary pathology, obstructive sleep apnea syndrome, osteoarthropathy, and certain types of cancer] [29].

In relation to the anthropometric data, the patients presented a mean BMI of 48.5 kg/mt^2, where the minimum was 35.6 kg/mt^2 and the maximum was 80 kg/mt^2, which complies with the guidelines established by the official Mexican standard NOM-008-SSA3-2010, for the comprehensive treatment of excess weight and obesity,

where it states that surgical treatment will be indicated in adult individuals with a BMI greater than or equal to 40 kg/m² or greater than or equal to 35 kg/m² associated with comorbidity, whose origin in both cases is not purely endocrine [7].

From the postoperative results, the comorbidities of the patients that could be evaluated were identified as, type 2 diabetes mellitus, systemic arterial hypertension, depression, gastroesophageal reflux disease, and dyslipidemia. In relation to the remission of diabetes, Papapietro [2012] points out that in addition to the reduction of excess weight, the most beneficial effect of bariatric surgery has been the improvement in glycemic control of patients with DM2, which is observed early after surgery. In addition, it mentions a Buchwald meta-analysis that included 136 studies with a total of 22,094 patients, where it was shown that DM2 remitted in 76.8% of the patients [hypoglycemic agents were discontinued] and improved [the dose of hypoglycemic agents was reduced] in the 86.0% of cases. The same study showed that complete remission of DM2 occurred in 48% of patients after GBP, 84% after GBP, and 95% after DBP. In general, recurrence of diabetes after surgery has been uncommon in follow-up studies up to 10 years after GBP or DVP [2]. García Caballero [2010] describes a 16-year follow-up study, where he confirmed a DM2 remission rate of 83%, an improvement in DM2 complications, and a reduction in mortality compared to a cohort of patients who refused surgery and had the same epidemiological parameters as those intervened on [1% vs 4.5%, $p<.0001$]. The results of bariatric surgery in obese patients show that the resolution of diabetes does not depend on weight loss, since the resolution of diabetes is “almost instantaneous” [27].

In this study, systemic arterial hypertension was controlled in postoperative patients. Other studies have also confirmed the decrease in mortality associated with cardiovascular risk in patients with bariatric surgery. A significant reduction in the incidence of preeclampsia, hypertensive disease, and diabetes during pregnancy has also been observed in women with a history of bariatric surgery.

Regarding dyslipidemia, in this study it was found that after the intervention there was control in LDL [low-density lipoprotein] levels, as shown in the study the assessment of the evolution of comorbidities of morbid obesity, where it is specified that abnormalities in blood lipids may also improve as a result of bariatric surgery. Moreover, dyslipidemia, generally improves in 85% of the intervened patients, and results in an improvement of over 95% in those who have been intervened with malabsorption techniques [2]. In this investigation, it was found that gastroesophageal reflux disease also remitted in operated patients. This finding matches that of the study by Spaventa Ibarola [2013], where all patients showed significant improvement in GERD; however, the greatest improvement in reflux was seen in patients who underwent gastric bypass, followed by gastric banding and finally gastric sleeve surgery. Under this perspective, the authors conclude that all common bariatric procedures improve GERD [31].

According to the anthropometric results Méndez Martínez [2013] points out that, although most patients achieve success in weight loss after surgery [defined as loss of more than 50% of excess of weight], there have been reports in the literature that around 20% of patients fail to achieve this goal a year after surgery [24]. A meta-analysis of weight loss after bariatric surgery showed a reduction in the percentage of loss of excess weight of 61.2% [25]. After 5 years, the average excess of weight loss is 50–60%, and the incidence of inadequate weight loss after bariatric surgery is 20–25% [26]. In 1981, Halverson and Koehler [1981] were the first to classify the results based on the percentage of loss of excess weight, considering as success those cases in which the loss was greater than 50% [43]. Two years later, Lechner and Elliot [1983] considered the result as good if weight loss is between 50% and 79% of the excess of weight and failure, if it is between 25 and 49% [44], and Martín et al [1985] separate the successes in 2 groups: good if weight loss exceeds 70% of excess weight, and satisfactory if weight loss is between 40 and 60% [45]. In 1982, Reinhold introduces the evaluation of the results based on the final loss of excess weight and the ideal weight, indicating that if the excess of weight is less than 25% with respect to the ideal weight, the result is excellent; if the excess of weight remains between 25 and 50%, the result is good; if it is between 50 and 75%, the result is acceptable, and if it is greater than 75%, it is considered a failure 25 [46]. Following a similar trend, MacLean et al [1990] consider a result as good if the final weight exceeds the ideal weight by no more than 30%; satisfactory if the weight loss is greater than 25% of the initial weight, and unsatisfactory if the weight lost is less than 25% of the initial weight [17] [47]. Therefore, anthropometrically, the indicators of success in bariatric surgery of patients in relation to the literature are within acceptable parameters, which demonstrate the quality of treatment.

In relation to the loss of the sample, the implementation of an instrument must be taken into account to have an adequate adherence to the treatment for at

least 5 years as mentioned by Larand [2014] who describes that it is the minimum time accepted for any assessment. Pataky, Carrard & Golay [2011], in a review of studies, show that intensive follow-up is a crucial factor in preserving post-surgery weight loss, including regular visits to a specialist and participation in lifestyle change programs [39] [48].

Finally, in this study the quality of life of the patients after surgery was obtained at a certain percentage, in which 8 were very good quality and 2 were good according to the score criteria employed; demonstrating that in the treated patients the quality of life resulted as adequate, meaning that not only the percentage of loss of excess weight, but also take into account the quality of life of patients took place. Therefore, these factors were considered important parameter in the success of surgery [17].

In the questionnaire to assess quality of life, it was found that all the patients had a good relationship with food, which may match with the family support of the patients, as mentioned in the study of bariatric surgery in adults: facilitators and those who hinder weight loss from the perspective of the patients, where they value that the change in eating habits of their closest family members and the fact that they could adapt to the restrictions that are imposed on food after surgery, helps the patient not to feel alone in this process of changing habits. On the other hand, the change in eating habits is related to the fear of gaining weight again, which is a new concern, which refers to the measurement of calories in the food, and therefore greater control over what is eaten and how it is eaten [39].

5. Conclusions

- The patients presented a higher percentage of the comorbidity of Type 2 Diabetes Mellitus in relation to Hypertension, GERD, Dyslipidemia and Depression and once the bariatric surgery was performed, the comorbidities were remitted.
- More surgeries are performed by means of the Robot than by laparoscopy in this study, the same occurs with bypass surgeries with respect to gastric sleeve surgeries.
- The percentage of loss of excess weight after surgery was correct according to the parameters established in the specialized bibliography. Bariatric surgery improves the quality of life of patients with obesity.
- The adherence of the patients to the multidisciplinary health group is needed to have better control for at least 5 years, and thus be certain that they will have a good quality of life. And the implementation of a program that commits the patient to this follow-up is suggested.
- The comparative analysis by mean difference between anthropometric and biochemical indicators denotes a significant difference $p<0.05$, which allows us to point out that their state of health and quality of life improved, for which the H0 is accepted.

Authors' contributions: All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Acknowledgments. The authors are deeply grateful to the Hospital Regional de Alta Especialidad de Zumpango, State of Mexico, to the participating patients, to the personnel assigned to the area of surgery, as well as a special mention of thanks to the company Intuitive Surgical, creator of the Da Vinci surgical robot for their participation in the surgeries of the patients, since without all their support it would not have been possible to carry out this research, to CONACYT/grant holder 860003 to study the Master of Public Health at UAEH and to Yesenia Elizabeth Ruvalcaba Cobián for her collaboration in the translation and edition of this article. situation that increases the possibility of transferring scientific knowledge.

Conflict of interests: The authors declare no conflict of interest.

Artificial Intelligence. The authors declare that no artificial intelligence was used in any of the sections.

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