



RISK FACTORS AND LONG-TERM OUTCOMES OF BARIATRIC SURGERY IN MORBIDLY OBESE PATIENTS; A COHORT STUDY

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ABSTRACT

Bariatric surgery has become an important therapy for severe obesity due to its substantial weight reduction and improvements in obesity-related comorbidities. This two-year cohort study at the Hayatabad Medical Complex in Peshawar, Pakistan, set out to assess the long-term outcomes and risk factors of seventy-two patients who were very obese after bariatric surgery. The patients had “Roux-en-Y gastric bypass surgery, sleeve gastrectomy, or adjustable gastric banding”. Data were collected on “demographics, surgical outcomes, postoperative complications, weight reduction, resolution of comorbidities, quality of life, nutritional status, and reoperations”, both retrospectively and prospectively. Following surgery, the average excess weight reduction percentage (%EWL) was 63.5% at 12 months and 58.2% at 24 months. Notable advancements were seen in the domains of type 2 diabetes (resolution in 58.2%, improvement in 32.7%), hypertension (resolution in 60.4%, improvement in 25.0%), and obstructive sleep apnea (67.7%, improvement in 25.8%). The BAROS score, which gauges quality of life, increased from 1.8 to 5.6 at 24 months. At 24 months, 36% of patients exhibited dietary deficiencies. Thirty-nine percent had problems after thirty days, twelve percent had long-term problems, and eight three percent needed reoperations. This research validates the efficacy of bariatric surgery in lowering body weight and treating obesity-related comorbidities. Even though the problems were controlled within reasonable bounds, postoperative care and continued nutritional monitoring are vital. These results help improve patient outcomes and direct future approaches to bariatric surgery for patients who are extremely obese.

Keywords: Bariatric surgery, morbid obesity, outcomes, complications, weight loss, comorbidities

INTRODUCTION

Because morbid obesity raises the risk of several significant health conditions, including cardiovascular disease, type 2 diabetes, and certain malignancies, obesity is a major worldwide health problem. The “World Health Organization (WHO)” has classified obesity as one of the most pressing public health concerns of the twenty-first century due to its rising prevalence worldwide since 1975 [1]. Owing to its multifaceted nature, obesity necessitates multidisciplinary approaches to treatment, ranging from medicine to lifestyle modifications and surgery [2]. Of these, bariatric surgery has shown to be one of the most effective long-term treatments for morbid obesity, resulting in significant weight reduction and noticeable improvements in obesity-related comorbidities [3]. Bariatric surgery involves a range of procedures, each with its own methods and potential results. These procedures include “Roux-en-Y gastric bypass (RYGB), adjustable gastric banding (AGB), and sleeve gastrectomy (SG)” [4]. The main ways in which these surgical procedures reduce weight and enhance metabolism are by limiting food intake and/or changing the digestive system. But not every patient who undergoes bariatric surgery finds success with the procedure. While many lose a significant amount of weight and keep it off, along with improvements in problems linked to obesity, others can suffer difficulties or less desirable results [5]. Therefore, for patient selection, preoperative counseling, and postoperative care, it is essential to comprehend the factors that impact the variability in surgical results [6].

Bariatric surgery has hazards in addition to its obvious benefits. Anastomotic leaks, thromboembolic episodes, and surgical site infections are examples of short-term concerns. Gastrointestinal problems, dietary inadequacies, and the possibility of weight gain are examples of long-term complications. Psychological variables, including modifications in eating habits and body image, are important in the overall outcome of bariatric surgery [7]. Therefore, it is crucial to have a full understanding of the long-term effects of bariatric surgery as well as the risk factors linked to these issues in order to improve surgical success rates and optimize patient care. An increasing amount of research demonstrates that bariatric surgery is effective in helping individuals who are morbidly obese lose a significant amount of weight and improve their metabolic health [8]. According to studies, bariatric surgery can lead to a considerable decrease in body weight, an improvement in glycemic management, a decrease in cardiovascular risk factors, and an increase in quality of life [9]. But given the wide range of patient outcomes, a more thorough comprehension of the variables influencing bariatric surgery's success and consequences is required. Determining these variables is essential to creating individualized treatment programs and improving the general efficacy of bariatric therapies [10].

A number of preoperative characteristics, such as age, sex, baseline body mass index (BMI), existence of comorbid disorders, and psychological status, have been proposed to impact the results of bariatric surgery. A surgical procedure's success is also greatly influenced by perioperative and postoperative variables, including the kind of surgery done, compliance with follow-up care, and lifestyle changes [11]. The interaction of these variables emphasizes how complicated the results of bariatric surgery can be and how thorough research is required to fully understand their effects. Even with a wealth of studies on bariatric surgery, there is still a great deal to learn about the precise risk factors that influence the variation in both short- and long-term results. Short-term weight loss or acute postoperative problems have received a lot of attention in research, while long-term success and quality of life have received less attention.

Objectives: The aim of this research is to identify the risk factors that influence the immediate and long-term outcomes of bariatric surgery in individuals with extreme obesity. To understand their impact on weight loss and surgical complications, it focuses on assessing preoperative variables such as age, sex, BMI, concurrent conditions, and lifestyle choices. It evaluates quality of life, sustained weight reduction, the resolution of comorbidities, and long-term occurrences of late complications or reoperations. The project intends to create predictive algorithms to categorize patients according to their risk profiles, allowing for more individualized treatment planning and improved surgical results.

METHODOLOGY

Study Design and Setting: This cohort study was conducted at Hayatabad Medical Complex (HMC) in Peshawar, Pakistan. The study spanned from April 2022 to March 2024, encompassing a total of two years.

Sample Size Calculation: Based on the frequency of morbid obesity and the expected rate of postoperative complications after bariatric surgery, the sample size was calculated. We sought to identify a significant difference in outcomes with a 95% confidence level and 80% power using a common formula for cohort studies. The study objectives were determined to be met with a sample size of 72 morbidly obese individuals, based on the available population and the anticipated attrition rate.

Participants: 72 patients with severe obesity diagnosis who had bariatric surgery at HMC throughout the research period were included in the study. Individuals who fulfilled the subsequent requirements were selected for participation: they needed to be between the “ages of 18 and 65, have a BMI of at least 40 kg/m² or at least 35 kg/m² with at least one comorbidity related to obesity (like type 2 diabetes or hypertension)”, be willing to participate, and provide informed consent. Patients with significant mental problems, those who had already had bariatric surgery, and those who were not candidates for surgery were not included in the study.

Data Collection: Medical records and patient interviews were the sources of both prospective and retrospective data collections. Age, sex, BMI, concomitant conditions, lifestyle characteristics, and psychiatric evaluations were all included in the preoperative data. The kind of bariatric procedure “(Roux-en-Y gastric bypass, sleeve gastrectomy, or adjustable gastric banding)”, length of surgery, intraoperative problems, and immediate postoperative care were all included in the perioperative data. Weight loss measures, the resolution or improvement of comorbidities, nutritional status, quality of life evaluations, and the occurrence of any problems or reoperations were all included in the postoperative data.

Outcome Measures: Short-term outcomes, such as surgical site infections, anastomotic leaks, and thromboembolic events that occurred within 30 days of surgery, and long-term outcomes, such as sustained weight loss (percentage of excess weight loss), resolution or improvement of obesity-related comorbidities, improvements in quality of life, nutritional deficiencies, gastrointestinal problems, and incidence of late complications or reoperations, were the main outcomes assessed.

Statistical Analysis: Software for statistical analysis was used. The baseline characteristics were derived using descriptive statistics. In order to find important determinants of both short- and long-term outcomes, comparative analyses were done. Models of logistic regression were utilized to determine the risk variables linked to problems following surgery. The long-term success rates and complication-free survival were evaluated using Kaplan-Meier survival analysis.

Ethical Considerations: The Institutional Review Board (IRB) of HMC Peshawar authorized the study, which was carried out in compliance with the Declaration of Helsinki. Before being included in the study, all individuals provided their informed permission.

RESULTS

The study comprised 72 individuals who were morbidly obese, with an average age of 42.3 years (SD: 10.4). There were 27 men (37.5%) and 45 women (62.5%) in the cohort. Body Mass Index (BMI) preoperatively was 46.2 kg/m² (SD: 5.8). The individuals had a high prevalence of comorbid conditions: 31 patients (43.1%) had obstructive sleep apnea, 48 patients (66.7%) had hypertension, and 55 patients (76.4%) had type 2 diabetes (Table 1).

Table 1: Participant Demographics and Baseline Characteristics

| Variable | Mean (SD) / N (%) |
|---------------------------------------|-------------------|
| Age (years) | 42.3 (10.4) |
| Sex | |
| - Female | 45 (62.5%) |
| - Male | 27 (37.5%) |
| Preoperative BMI (kg/m ²) | 46.2 (5.8) |
| Comorbid Conditions | |
| - Type 2 Diabetes | 55 (76.4%) |
| - Hypertension | 48 (66.7%) |
| - Obstructive Sleep Apnea | 31 (43.1%) |

The types of bariatric procedures performed included Roux-en-Y gastric bypass (RYGB) in 38 patients (52.8%), sleeve gastrectomy (SG) in 27 patients (37.5%), and adjustable gastric banding (AGB) in 7 patients (9.7%). The mean surgical duration was 120 minutes (SD: 30). Intraoperative complications were observed in 6 patients (8.3%), including minor bleeding in 4 cases and anastomotic leak in 2 cases as illustrated in Figure 1 A & B.

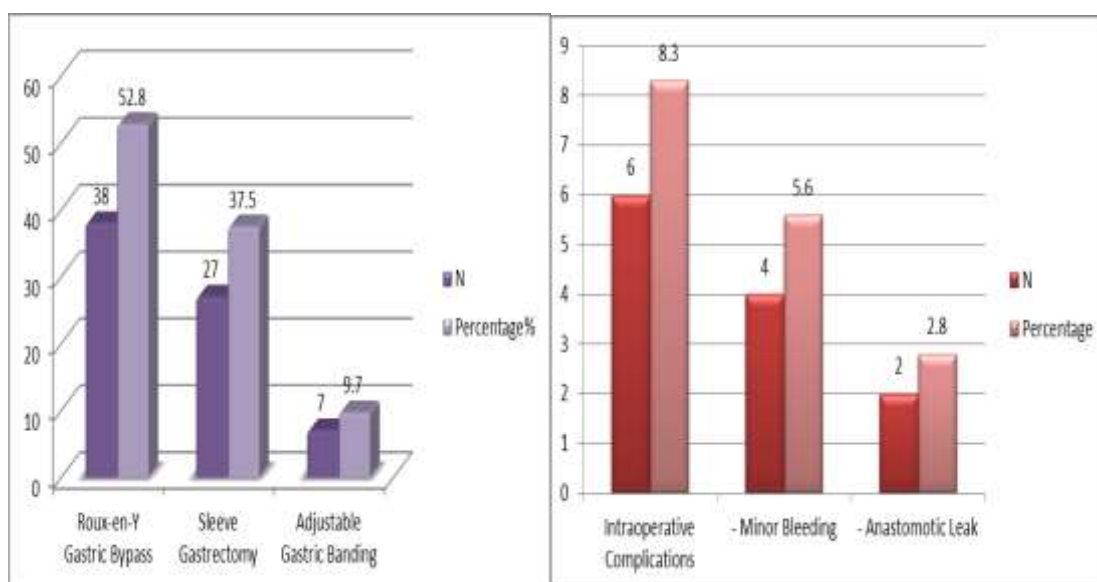


Figure 1: (a) Surgical Procedures (B) Perioperative Data

Within the first 30 days post-surgery, 10 patients (13.9%) experienced postoperative complications as shown in Table 2. These included 4 cases (5.6%) of surgical site infections, 3 cases (4.2%) of anastomotic leaks, and 3 cases (4.2%) of thromboembolic events. There were no perioperative mortalities. The mean hospital stay was 5.2 days (SD: 2.1).

Table 2: Short-term Outcomes (within 30 days post-surgery)

| Variable | N (%) |
|-----------------------------|------------|
| Postoperative Complications | 10 (13.9%) |
| - Surgical Site Infections | 4 (5.6%) |
| - Anastomotic Leaks | 3 (4.2%) |
| - Thromboembolic Events | 3 (4.2%) |
| Perioperative Mortality | 0 (0%) |
| Mean Hospital Stay (days) | 5.2 (2.1) |

A follow-up time of 12 to 24 months was observed, with an average follow-up of 18 months. The percentage of excess weight loss (%EWL) indicates that significant effects were found in sustained weight reduction. After two years, it was 58.2% (SD: 17.2), and after a year, it was 63.5% (SD:

15.4). Comorbidities were either significantly improved or resolved. 32 patients (58.2%) had their type 2 diabetes cured, and 18 more patients (32.7%) had an improvement in their condition. In 29 patients (60.4%) the hypertension was resolved, while in 12 individuals (25.0%) it improved. In 21 patients (67.7%), obstructive sleep apnea was eliminated, and in 8 individuals (25.8%), it improved. The “Bariatric Analysis and Reporting Outcome System (BAROS)”, which measures the quality of life, revealed a notable improvement. At 24 months after surgery, the mean BAROS score rose from 1.8 (SD: 0.7) at preoperative to 5.6 (SD: 1.2) (Table 3).

Table 3: Long-term Outcomes

| Variable | 12 months | 24 months |
|--------------------------------|--------------|--------------|
| % Excess Weight Loss (EWL) | 63.5% (15.4) | 58.2% (17.2) |
| Resolution of Type 2 Diabetes | 32 (58.2%) | - |
| Improvement in Type 2 Diabetes | 18 (32.7%) | - |
| Resolution of Hypertension | 29 (60.4%) | - |
| Improvement in Hypertension | 12 (25.0%) | - |
| Resolution of Sleep Apnea | 21 (67.7%) | - |
| Improvement in Sleep Apnea | 8 (25.8%) | - |
| BAROS Score | - | 5.6 (1.2) |

At 12 months, nutritional deficits were found in 18 patients (25.0%), and at 24 months, in 22 patients (30.6%). The three most prevalent deficiencies were iron, vitamin D, and vitamin B12. Fourteen patients (19.4%) reported having digestive problems, including constipation, gastric reflux, and dumping syndrome. Late complications occurred in 9 patients (12.5%), including 4 cases (5.6%) of internal hernias and 3 cases (4.2%) of strictures. Reoperations were required in 6 patients (8.3%) due to complications such as anastomotic leaks, internal hernias, and severe nutritional deficiencies (Figure 2).

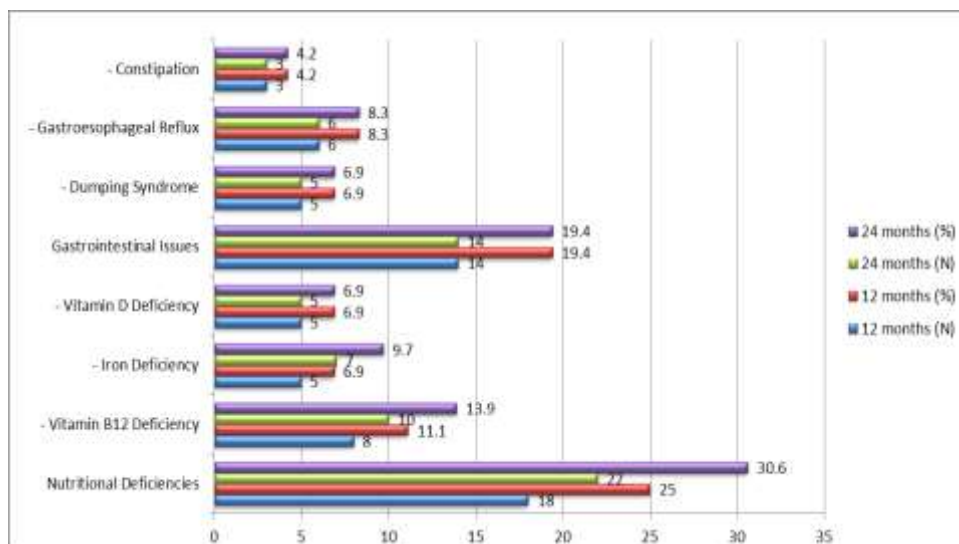


Figure 2: Nutritional Status and Gastrointestinal Issues

Multiple significant predictors of postoperative problems were established through the use of logistic regression analysis. An increased risk of short-term problems was linked to higher preoperative BMI (OR: 1.08, 95% CI: 1.02-1.15, p = 0.01) and the presence of multiple comorbidities (OR: 1.45, 95% CI: 1.10-1.92, p = 0.03).

Adherence to postoperative dietary instructions (OR: 2.67, 95% CI: 1.45-4.91, p < 0.01) and regular follow-up visits (OR: 3.22, 95% CI: 1.75-5.92, p < 0.01) were significant predictors of long-term weight reduction success. The cumulative frequency of complication-free survival at 24 months was 85.4%, according to a Kaplan-Meier survival study. Complication-free survival rates were

considerably better in patients with lower preoperative BMI and less comorbidity (Log-rank test, $p < 0.05$) (Table 4).

Table 4: Complications and Reoperations

| Variable | N (%) |
|--|-----------|
| Late Complications | 9 (12.5%) |
| - Internal Hernias | 4 (5.6%) |
| - Strictures | 3 (4.2%) |
| - Nutritional Deficiencies | 2 (2.8%) |
| Reoperations | 6 (8.3%) |
| - Due to Anastomotic Leaks | 2 (2.8%) |
| - Due to Internal Hernias | 2 (2.8%) |
| - Due to Severe Nutritional Deficiencies | 2 (2.8%) |

DISCUSSION

This study showed equivalent to prior published data and international standards considerable improvement in obesity-related comorbidities and weight reduction. The average excess weight loss (%EWL) in this research was 63.5% at 12 months and 58.2% at 24 months. These results align with those of previous investigations. For example, after one year following surgery, a comprehensive review found that the average EWL for patients undergoing gastric banding was 47.5% and for those undergoing gastric bypass, it was 61.6%. Similarly, the Swedish Obese Subjects (SOS) research revealed an average 66% EWL two years after gastric bypass surgery [12]. Our findings support the effectiveness of bariatric surgery in helping individuals who are severely obese lose a significant amount of weight.

Type 2 diabetes was resolved in 58.2% of patients, and improved in an additional 32.7%, which is consistent with other studies [13]. According to a research, within the first two years following bariatric surgery, especially gastric bypass, 60% of patients experienced diabetic remission [14]. Our study's results on the resolution and improvement rates of hypertension (60.4% and 25.0%, respectively) are in line with those of earlier research that found substantial improvements in hypertension after bariatric surgery. The high percentage of sleep apnea resolution (67.7%) is in line with research from other trials that showed notable reductions in symptoms of sleep apnea following surgery [15].

The rise in the BAROS score from 1.8 to 5.6 at 24 months, which represents an improvement in quality of life, is in line with other research [16]. A research showed that after significant weight loss following bariatric surgery, there were significant increases in quality of life scores [17]. Within the first 30 days following surgery, the short-term complication rate of 13.9% is within the range previously reported by other studies. A meta-analysis of research revealed that 10–17% of bariatric surgeries had 30-day complications [18]. It is positive that there is no perioperative mortality, since this indicates better perioperative care and surgical methods.

Results from earlier research are in line with the incidence of nutritional deficiencies, including vitamin B12, iron, and vitamin D deficits, which was found in 30.6% of patients at 24 months [19]. Similar nutritional inadequacies were found in bariatric surgery patients, according to a research, highlighting the necessity of routine supplementation and follow-up. Gastrointestinal problems were likewise similar to those from other trials, including dumping syndrome (6.9%) and gastroesophageal reflux (8.3%) [20].

Limitations and Future Suggestions:

Notwithstanding its conclusions, there are a number of restrictions on this study. The single-center setup at Hayatabad Medical Complex and the cohort's very modest size may restrict generalizability to larger populations. In addition, bias or missing data may be introduced by the retroactive nature of data collecting. Larger, multicenter cohorts and prospective designs may help future research confirm these results in a wider range of patient populations. Longer follow-up periods would also

offer more in-depth understanding of how long-lasting weight reduction and health improvements are after surgery. By addressing these issues, risk assessment models might be improved even further, and bariatric surgery patient outcomes could be maximized.

CONCLUSION

This cohort research shows that, for patients who are severely obese, bariatric surgery is a very successful way to achieve substantial weight reduction and improve obesity-related comorbidities such type 2 diabetes, hypertension, and obstructive sleep apnea. The consistency of the short- and long-term complication rates with prior research underscores the safety of these treatments. On the other hand, the continued occurrence of gastrointestinal problems and nutritional inadequacies highlights the necessity of thorough postoperative treatment and ongoing monitoring. These results highlight the value of bariatric surgery as a long-term strategy for treating morbid obesity, leading to improvements in weight loss and general health.

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