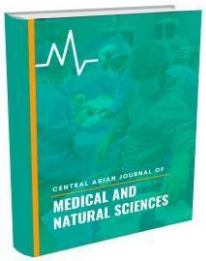

CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES
https://cajmns.casjournal.org/index.php/CAJMNS
Volume: 07 Issue: 04 | October 2026 ISSN: 2660-4159

.

Articley

Evaluation of Surgical Outcomes in Patients Undergoing Bariatric Surgery for Obesity Treatment: A Comprehensive Review of the First Decade of Practice at Tikrit Teaching Hospital

Mohammed Saleh Qadoori[1], Faisal Hassan Ehmaid[2], Rabah Ali Husein[3], Ihsan Mohammed Khalaf[4], Thaer Jasim Mohammed[5]

1,5 Department of Surgery, College of Medicine, Tikrit University, Tikrit, Iraq
2,3,4 Department of Surgery, Tikrit Teaching Hospital, Salah Al-Din Health Directorate, Tikrit, Iraq
* Correspondence: mohammad.s@tu.edu.iq

Citation: Abbas M. N., Kareem K. R. Sex-Based Differences in the Prevalence and Antimicrobial Resistance of Uropathogenic Proteus spp. and Evaluation of VITEK 2 Identification in Al-Najaf Al-Ashraf Hospitals. Central Asian Journal of Medical and Natural Science 2026, 7(4), 175-189.

Received: 25th May 2026
Revised: 15th Jun 2026
Accepted: 08th Jul 2026
Published: 05th Aug 2026

Abstract: Background: Obesity is a chronic relapsing condition with a strong association to a variety of cardiometabolic, respiratory, hepatic and gastrointestinal comorbidities. Although bariatric surgery is an effective treatment, there is limited local outcome data from Iraqi centers. The aim: To assess early and late outcomes as well as complications, nutritional deficiencies and weight loss effectiveness following bariatric surgery in Tikrit Teaching Hospital. Patients and Methods: This was a descriptive study, analytical, retrospective, hospital-based study which included all patients undergoing bariatric surgery between 1st of October 2024 and 31st July 2025 at Tikrit Teaching Hospital. Sixty-eight patients with complete perioperative and follow-up data that fulfilled the strict criteria for bariatric surgery were enrolled. Information was collected in the operating room, inpatient records, bariatric clinic notes, and laboratory information systems. Demographic, preoperative comorbidities, type of procedure, intraoperative events, early complications (≤72 hours), readmission, late complications (up to 6 months), infections, nutritional deficiencies, gastrointestinal symptoms and indices of weight loss (ΔBMI, total weight loss, %TBWL, %EWL) were included. Results: The mean age was 39.2 ± 9.1 years; most patients were female 47 (69.12%). Mean preoperative BMI was 47.0 ± 5.9 kg/m² and mean weight 127.1 ± 18.9 kg. Common comorbidities included NAFLD 38 (55.88%), hypertension 30 (44.12%), type 2 diabetes mellitus 25 (36.76%), dyslipidemia 23 (33.82%), GERD 17 (25.00%), obstructive sleep apnea 9 (13.24%), and smoking 13 (19.12%). Laparoscopic sleeve gastrectomy was performed in 58 (85.29 %) patients and Roux-en-Y gastric bypass in 10 (14.71 %). Most early complications were mild, with 21 (30.88%) having nausea/vomiting, 7 (10.29%) having tachycardia, suspected leak in 2 (2.94%) and confirmed leak in 1 (1.47%). 2 (2.94%) patients required intervention for bleeding, 2 (2.94%) were admitted to the ICU, 1 (1.47%) was re-operated and 3 (4.41%) were readmitted early, mostly for dehydration. Late complications were GERD, which was worsened in 7 (10.29%) children, gallstones in 5 (7.35%) children, and any nutritional deficiency in 8 (11.76%). Specific deficiencies were vitamin D in 15 (22.06%), iron in 9 (13.24%), and vitamin B12 in 6 (8.82%). There were no intra-abdominal infection or sepsis reported, and only 3 (4.41%) wound/port-site infections were noted. The most common gastrointestinal side effects were constipation (17.65%) and reflux/heartburn (14.71%). At follow-up, mean BMI decreased to 37.0 ± 5.0 kg/m², with a mean total weight loss of 26.0 ± 9.2 kg, %TBWL of 20.9 ± 6.3, and %EWL of 53.3 ± 15.6. Conclusion: This high-risk group of obese patients had an impressive initial weight loss from bariatric surgery at Tikrit Teaching Hospital and very low occurrence of serious complications, leaks and infection. Some nutritional deficits and functional gastrointestinal symptoms were present, but the majority of these were mild and treatable. The

results not only confirm the safety and effectiveness of the bariatric program but also stress the need for proper perioperative care and long-term nutritional follow-up.

Keywords: Bariatric Surgery, Obesity, Surgical Outcomes, Weight Loss, Postoperative Complications.

1. Introduction

Obesity has emerged as one of the most difficult health problems in the world and has been recognized as a chronic recurrent and not just a lifestyle problem. It is highly correlated with a wide range of comorbidities, including hypertension, type 2 diabetes, dyslipidemia, obstructive sleep apnea, non-alcoholic fatty liver disease, degenerative joint disease and numerous cancers [1]. These co-morbidities have had adverse impacts on the quality of life, cost of healthcare and cardiovascular and all-cause mortality [2], [3].

Surgical procedures, in conjunction with an integrated multidisciplinary psych behavioral interventions involving partial dietary modifications, physical activity and cognitive behavioral therapy, are involved in the approach for helping selected patients lose weight essentially, while for the majority of patients, only moderate weight loss is achieved via lifestyle interventions [4]. With any pharmacotherapy always there is a concern about cost, access, longer-term adherence and safety. Limited appeal for surgical procedures (LSG and RYGB) is also observed with increased long-term clinical effectiveness, as seen with most recent systems and systems [5]. This has helped them to be accepted by insurance providers. In the most frequently performed surgeries, such as LSG and RYGB, the results of surgeries performed worldwide were outstanding, revealing a total weight loss of 25-35 percent of body weight as well as high remission or improvement rates for type 2 diabetes, hypertension, dyslipidemia, and sleep apnea [6].

Bariatric surgery works in part by gastric restriction, via changes in nutrients and via changes in gut hormones that affect the appetite-regulating mechanisms, the regulation of satiety, and glucose metabolism. These restrictive operative techniques are concerned mainly with reducing stomach area and depressing the levels of ghrelin in circulation among others. This technique reduces levels of hunger and helps reduce food intake [7]. The stepwise effects, in addition to the reduction in the provision of food, in RYGB result in an alteration of the absorption of nutrients and a resulting increase in the response of incretins, which, when implemented, will translate into a general increase in the sensitivity of insulin and a better glycemic control. To conclude, surgery to reduce the size of the stomach is known as a surgery that can not only help in losing weight but also cure everything from obesity to metabolic disorders, making it very important in relation to the interaction between the endocrine system and the cardiovascular system [8], [9].

A short summary of a fairly complete and up to date text about complications following bariatric surgery. May it be clever enough to take an argument within these few paragraphs that bariatric surgeries can bring an efficient and rich peril by leads that should ideally fall into the gold standard acceptances not yet found. Instead, they are scarcely to be merged into outrageous predispositions that manifest an absolute aversion. Complications are increased at the stage of onset, particularly at junior level and may include hemorrhage, anastomotic leak, venous thromboembolism and respiratory problems. These smooth dead candidates are extended with a list of infiltrated irritations, the awkward ones later on, with the bland term-wise phraseology "deficiency" [10], [11], [12]. The study aimed to comprehensively evaluate the surgical outcomes of patients undergoing bariatric surgery for obesity treatment at Tikrit Teaching Hospital includes assessing postoperative weight-loss effectiveness, early and late complications, and nutritional deficiencies.

2. Materials and Methods

Study design

This study is a descriptive, analytical and a hospital based retrospective study conducted at Tikrit teaching hospital. It included every bariatric procedure that was carried out between 1st October 2024 and 31st July 2025. In the hospital, 68 bariatric surgeries were performed during the study period and all of the eligible cases were included in the final analysis, along with the assessment of surgical outcomes and clinical parameters.

Study Setting

The study was carried out at Tikrit University Hospital, Salah Al-Din Governorate in Iraq. The hospital is the primary referral hospital in the region and has a significant number of patients with high BMI, seeking access to holistic services for bariatric surgery. The program has become quite mature and has been conducting high-technology procedures - basically laparoscopic sleeve gastrectomy (LSG) and laparoscopic Roux-en-Y gastric bypass RYGB). To ensure that all the information was comprehensive and consistent, data was collected from various sources in the institutions. The sources of data were patient files from the surgical ward, records in the operation theater and records in the General Surgery Department. Residual information was collected through electronically stored documents like the follow-up notes in the database of the hospital's bariatric clinic and standardized laboratory data accessible following several checks using Laboratory Information System (LIS). This information has triggered nearly everything to be assessed in the outcomes of bariatric surgery.

Sample Size and Case Distribution

In this study, 68 patients who had bariatric surgery at Tikrit teaching hospital during the study period were included. 58 (85.3%) of patients had a Laparoscopic Sleeve Gastrectomy (LSG) performed, and 10 (14.7%) had Roux-en-Y Gastric Bypass (RYGB) performed. This distribution corresponds with the normal practice of bariatric surgery and the annual number of surgeries performed in the institute's surgical unit, where LSG is still the preferred surgical approach for the management of obesity.

Inclusion and Exclusion Criteria

Patients were included if they were between 18 and 65 years of age, and had a body mass index (BMI) of 40 kg/m² or more, or a BMI of 35 kg/m² or more with at least one obesity-related comorbidity. The patients who were eligible for the study had been operated either with laparoscopic sleeve gastrectomy or Roux-en-Y gastric bypass during the study period at Tikrit Teaching Hospital. Eligible patients were operated either with laparoscopic sleeve gastrectomy or Roux-en-Y gastric bypass during the study period in Tikrit Teaching Hospital. Furthermore, all patients included in this study had complete medical, surgical, and laboratory data, and at least one documented postoperative visit with body weight, BMI, or obesity-related comorbidities information were available.

Patients less than 18 years old or more than 65 years old were excluded, as were those with incomplete or missing medical records, those that had previously undergone bariatric surgery, and those who had undergone bariatric surgery at other institutions. The study did not include pregnant women, or women with documented severe mental illness in the anesthesia and/or psychological assessment records. In addition, patients without any documented postoperative outpatient follow-up after surgery were excluded in order to provide sufficient postoperative outcome data to analyze.

Ethical Considerations

The study was conducted in accordance with the ethical clearance obtained from the Ethics Committee of Tikrit Teaching Hospital and Scientific Research Unit in Salah Al-Din Health Directorate. Ethical clearance was obtained from the Ethics Committee of Tikrit Teaching Hospital and the Scientific Research Unit in Salah Al-Din Health Directorate. Due

to the retrospective nature of the research, it was not required to obtain patient consent. In addition, there was no communication with patients was done and no treatments were given. All identifiers of the patients were carefully removed when the data were extracted and were assigned a study code to maintain confidentiality. Data management and storage adhered to the ethical principles of Helsinki Declaration, which emphasized respect for the privacy, security and responsible use of patient data throughout the study.

Data Collection Procedure

Data collection was performed with the help of a duly created structured data extraction sheet that was specially designed for this study. Appropriate data were compiled from the hospital records, electronic medical records, operation logs, and the clinic notes from the bariatric clinic. All efforts of the extraction process went into gathering data for each patient throughout the study, commencing from the preoperative period and ending with any intra-, or post-operative, investigations or outcomes.

Preoperative Data Collected

Data preoperatively collected from notes were age and gender, anthropometric data including height, anthropometric weight and BMI. The waist circumference was recorded if recorded in the notes. Other variables included were the presence of cigarette smoke, the length of time the patient had been obese (as recorded in clinical notes), and pretty good medical history. Comorbid disease conditions such as type 2 diabetes mellitus, hypertension, dyslipidemia, obstructive sleep apnea, non-alcoholic fatty liver disease and gastroesophageal reflux were assessed on more charts of assessments (Table 3). Patient charts and a review of the lists of pre-anesthetic evaluations were done to observe patients for weight loss before surgery.

Preoperative Laboratory Investigations

Laboratory results were hurriedly skimmed through and taken before the surgery. The specific tests were complete blood count, fasting blood glucose and glycated hemoglobin (HbA1c). The levels of total cholesterol, LDL-c, HDL-c and triglycerides were noted from them. Liver function tests (ALT, AST), blood urea and creatinine for kidney function and lastly TSH and FT4 for thyroid function were also taken. All patients' coagulation profiles were checked to make sure that all patients were "surgically safe".

Operative Data Collection

Data obtained from surgical notes and operating theatre log from the operation room were used for the operational data. They contained the type of bariatric surgery that was done (either laparoscopic sleeve gastrectomy or roux-en-Y gastric bypass), the length of surgery and blood loss as an estimate. In cases of sleeve gastrectomy, the size of the stapler for the gastric resection was recorded. When gastric bypass was performed, the lengths of any bypass limbs documented were reported. Any intraoperative complications, including bleeding and injury to organs, were recorded and, if applicable, the change from the laparoscopic approach to the open approach was recorded.

In-Hospital Postoperative Data

Data on subsequent hospitalization was gathered through the inpatient department and comprised the number of days in hospital (after surgery). First 72 hours post-operatively complications that arose were identified and documented. These comprised postoperative bleeding, clinical suspicion of leak, tachycardia, fever, and postoperative nausea and vomiting. Recorded were also the need for intensive care unit (ICU) admission and a need for re-intervention during the same hospitalization episode.

Follow-Up Data History

Historical data and sources were extracted from accurate records that were collected under each available postoperative clinic visit demonstrating a minimum of 3 months of follow-up data leading to operational success measured by weight loss as the percentage of initial weight loss beyond the BMI sum overweight of 35.0-34.9. The notes of follow-ups

recorded in the database showed that weight-BMI calculation is needed for inadequate yield computation for follow-up, postoperative evaluation and outcome. It was not clear at all that the integrated postoperative database contained information on the improvement in patients' disease statuses, including the improvements in diabetes, hypertension, dyslipidemia and other obesity-related problems. The identification strategy was developed on the basis of: physical examination; laboratory biochemical study; and various imaging studies that could prove of value in establishing the disturbed presence of chronic obesity-distilled and compiled on record as a primary baseline indicator on each patient in the studied period, as a drunk and sober reevaluation.

Outcome Measures

Historical follow-up data were used to calculate:

Body Mass Index Change

$$\Delta BMI = BMI_{post} - BMI_{pre}$$

Percentage of Total Body Weight Loss (%TBWL)

$$\%TBWL = \frac{Weight_{pre} - Weight_{post}}{Weight_{pre}} \times 100$$

Percentage of Excess Weight Loss (%EWL)

$$\%EWL = \frac{Weight_{lost}}{Excess\ weight\ above\ BMI\ 25} \times 100$$

Absolute Weight Loss (kg)

$$\Delta Weight = Weight_{pre} - Weight_{post}$$

Secondary Outcomes (Comorbidity Improvement or Remission)

Specific outcomes of comorbidity were encountered within the evaluation and were chosen based on the information recorded in the patient's clinical notes after surgery, lab data, and the surgeons' vedamir (all of these in the hospital files). The remissions of 2 DM patients were defined with respect to the following 2 criteria: Postoperative HbA1C level was ≤ 6.5%, with no requirement for drug antidiabetic use; improvement was defined as a decrease in the level of HbA1C from the baseline level or a decreased number of antidiabetic drugs or their doses. The results were compared between the lipid profiles at the postoperative period and the preoperative period in people with dyslipidemia. This improvement was expected to be seen in the reduction of LDL-cholesterol, triglyceride or an increase in HDL component. In cases of obstructive sleep apnea, improvement was generally defined as a reduction in the degree of obstructive sleep apnea symptoms, reduction in the severity of snoring or a reduction in the need for CPAP therapy recorded in the clinic. The most important factor in non-alcoholic fatty liver disease (NAFLD) was liver enzyme test and imaging. Improvements were noted if ALT or AST had been noted to be reduced following operation, or concurrently with reduced hepatic steatosis during postoperative ultrasound.

Other Outcomes

The time spent in the hospital after surgery was obtained from hospital records and used in various postoperative outcomes of bariatric surgery. The operative notes were used to harvest intraoperative complications including bleeding and organ damage. The early postoperative complications (first 72 hours) were collected from the nursing input and physician records including tachycardia, fever, and/or nausea, vomiting, or suspicion of leakage. Apart from that, if the presence of readmissions during the first few days after surgery were established, they were included. In addition, nutrition indicators were reviewed as laboratory test or clinical findings showed low levels of vitamin B12, iron, calcium or vitamin D.

Statistical Analysis

Descriptive software use was made up of computation with SPSS version 26. The variables that were continuous such as weight, BMI, laboratory tests and operation time were reported as mean ± SD, whereas other categorical variables such as the gender ratio, the presence of comorbidities and the percentage of complications were reported as frequencies and percentages

3. Results

Demographic characteristics of residents

Basic demographic data of the n = 68 patients who were treated with bariatric surgery in the study period are introduced in table 1. The remaining person mostly belonged to the female counterpart, embodying 69.12% of this population. This mirrors an untamed increase in bariatric surgery among women across various global demographic of bariatric surgery uptake. The mean age of patients was 39.2 ± 9.1 years, showing how most patients more or less had entered the fourth decade of life-an interval during the fostering of obesity-related comorbidities. The anthropometric data obtained before the surgery showed high weight and BMI values of 127.1 ± 18.9 kg and 47.0 ± 5.9 kg/m² respectively indicating that majority of the patients fulfilled the criteria of morbid obesity. The mean waist circumference threshold was to be expected, and was 124.1 ± 11.8 cm, suggesting significant abdominal obesity which is opposed to further cardiovascular risk.

Table 1. Baseline Demographic Characteristics before operation (n = 68).

Variable	Mean ± SD / n (%)
Age (years)	39.2 ± 9.1
Male	21 (30.88%)
Female	47 (69.12%)
Weight (kg)	127.1 ± 18.9
BMI (kg/m²)	47.0 ± 5.9
Waist circumference (cm)	124.1 ± 11.8

Preoperative Comorbidities

The distribution of co-morbidity before surgery in 68 patients is shown in Table 2, and the metabolic and clinical burden shown is representative of those undergoing obesity surgery. The issues of blood pressure or Liver steatosis were mentioned as the most serious problem by 44.12% and 55.88% respectively, clearly indicating the close relationship between obesity, fatty liver and risk for heart disease. At 36.76% prevalence, Type 2 diabetes was the most prevalent, one might say that this issue affected over a third of the cohort, further accentuating the metabolic challenge of this patient population and reinforcing the well-established clinical evidence that bariatric surgery has a significant impact on glycemic lowering and even remission. The rate of Dyslipidemia was 33.82% and was considered as a severe cardiometabolic dysfunction disorder. A significant number of patients presented with both major gastrointestinal and respiratory problems - sleep apnea and GERD accounted for 13.24% and 25.00% respectively, thus alluding to the influence of obesity on these two mentioned areas. Smoking which was found in 19.12% of the subjects is an additional risk factor as it is well known to lead to complications such as marginal ulcers and delayed wound healing which will require more nursing time postoperatively.

Table 2. Preoperative Comorbidities.

Comorbidity	n (%)
Type 2 diabetes mellitus	25 (36.76%)
Hypertension	30 (44.12%)
Dyslipidemia	23 (33.82%)
Obstructive sleep apnea	9 (13.24%)
NAFLD	38 (55.88%)
GERD	17 (25.00%)
Smoking	13 (19.12%)

Early Postoperative Complications (≤72 hours)

As gleaned from past data, the post-bariatric surgery phase is the most up-to-date departure from conventional surgery care, and focuses on the immediate clinical course of the surgery itself and its safety profile. Early complications wound up having a low incidence, mostly coming up mild and therefore had benign management. Nausea and vomiting is the most common problems observed after surgery in the presented cases, and noted by about 1 in 3 patients (30.88%). In a previous study, these problems were attributed to a number of factors related to anesthesia, disturbed gastric activity and early diet interventions. In 10.29% of all cases, the tachycardia was documented as a marker for any further dehydration, pain or suspicion of a leak. Real leaks were rarity, with merely 2.94% suspects and one confirmed (1.47%), through an acceptable leak rate put on top shelf by international standards on primary bariatric procedures. Interestingly, postoperative bleeding which occurred in 2.94 % of the cases (requiring an intervention in neighboring group) is quite homogenous with regard to postoperative risk. However, all of these complications – referred to ICU, reoperation (1.47%) and early readmission (4.41%) – were uncommon.

Table 3. Early Postoperative Complications (≤72 hours).

Complication	n (%)
Tachycardia	7 (10.29%)
Fever	4 (5.88%)
Nausea/vomiting	21 (30.88%)
Suspected leak	2 (2.94%)
Confirmed leak	1 (1.47%)
Bleeding requiring intervention	2 (2.94%)
ICU admission	2 (2.94%)
Reoperation	1 (1.47%)
Early readmission	3 (4.41%)

Causes of Early Readmission and Postoperative Length of Hospital Stay

The frequency of early readmission and an inpatient stay pattern are summarized in Table 4. Dehydration accounted for 66.67% of the causes. This is similar to the complications that are common in all bariatric patients after the surgery, and in the majority of patients, the problem with fluid is due to discomfort and nausea. 1/3 of the readmissions were associated with extremely severe nausea and vomiting, clearly indicating postoperative hydration precautions, good patient education and prompt symptom management. This is welcome news as it did not show any cases of readmission

to be related to bleeding or infection and indicates that the standards of perioperative care and control of infection are being followed. As for the postoperative hospital stay, the mean stay was 3.1±1.4 days. The average stay range for the REDACTED surgery was 2-8 days, and shows the typical length of time required for recovery from a laparoscopy procedure. Only 8.82% of patients were hospitalized for 5 days or less, a fact which implies that prolonged admission was something infrequent and could signify either the occurrence of early problems or a state of very minor postoperative recovery.

Table 4. Causes of Early Readmission and Postoperative Length of Hospital Stay.

Reason	n (%)
Dehydration	2 (66.67%)
Severe nausea/vomiting	1 (33.33%)
Bleeding	0 (00.00%)
Infection	0 (00.00%)
Length of the stay in days	
Mean ± SD (days)	3.1 ± 1.4
Minimum–Maximum	2 – 8 days
Patients ≥ 5 days stay	6 (8.82%)

Causes of Early Readmission and Postoperative Length of Hospital Stay

Among patients who were discharged early, dehydration was the most common reason for rehospitalization (66.67%), and became a primary point of concern for postoperative bariatric surgery care, because those patients might indeed struggle with proper fluid consumption after surgery due to a variety of reasons including decreased gastric volume, inability to take oral fluids, or ongoing nausea. The rest experienced severe nausea or vomiting as a result of re-admission 33.33% of the time. This made it quite clear that there is a greater need to focus more on the importance of postoperative hydration measures, educating patients and managing symptoms early in the postoperative period in order to avoid late development of dehydration or the cause of vomiting which made up 66.67% of our cohort. Unusually, there were no readmissions from bleeding or infection (0.00%) attributable to the hospital's perioperative and infection control practices. The average hospital stay for the patients was 3.1 ± 1.4 days (range 2 to 8 days) following surgery. Duration is within acceptable limits for post laparoscopic bariatric surgery patients. Only 8.82% of patients were admitted for five or more days: an indication of a very low incidence of long hospital stays with likely a higher association with early complications or slow postoperative recovery.

Table 5. Late Postoperative Complications (Up to 6 Months).

Complication	n (%)
GERD worsening	7 (10.29%)
Gallstones	5 (7.35%)
Nutritional deficiencies (any)	8 (11.76%)
=Weight regain	2 (2.94%)
Stricture	1 (1.47%)
Port-site infection	3 (4.41%)
Incisional hernia	1 (1.47%)

Nutritional Deficiencies

The identified postsurgical nutritional deficiencies in bariatric surgery patients were related to the metabolic changes due to the altered gastrointestinal configuration after weight loss. The first abnormality noticed was vitamin D deficiency, with the 22.06 % of patients, indicating that vitamin D deficiency is rather common in both the pre-and post-surgery category. Patients with iron deficiency showed 13.24% and this was attributed to the hypochlorous gastric area, which is associated with decreased absorption in the duodenum, a common finding among the bariatric procedures in particular, in the respiratory acidosis phase of sleeve gastrectomy and RYGB. The known effects of partial gastric resection are decreased intrinsic factor secretion and increased ileal absorption which were found in 8.82% of patients. There were few instances of Calcium deficiency (4.41%) and hypoalbuminemia (2.94%) indicating that severe malnutrition was not prominent in these sub-groups.

Table 6. Nutritional Deficiencies.

Deficiency	n (%)
Vitamin B12 deficiency	6 (8.82%)
Iron deficiency	9 (13.24%)
Vitamin D deficiency	15 (22.06%)
Calcium deficiency	3 (4.41%)
Albumin < 3.5 g/dL	2 (2.94%)

Leak-Related Indicators

In this group of patients, the suspicion of a leak occurred in 2.94% of the patients and only one case (1.47%) was confirmed by imaging. The confirmed case was successfully treated conservatively, and no patient needed surgical re-intervention which indicates the effective early detection and proper nonoperative management strategies. There were no surgically treated leaks (0.00%).

Table 7. Leak-Related Indicators.

Variable	n (%)
Suspected leak	2 (2.94%)
Confirmed by imaging	1 (1.47%)
Managed conservatively	1 (1.47%)
Required surgical intervention	0 (00.00%)

Postoperative Infections

The most prevalent infection was wound and port-site with a rate of 4.41% which is a standard rate for laparoscopic surgeries due to the small wounds created which reduce, but do not eliminate the risk of infection. In 2.94% of the patients, their diagnosis was urinary tract infections. Contrary to that, intra-abdominal infection and sepsis were not reported (0.00%) which was a very good sign of safety of surgical technique, effectiveness of monitoring and prophylactic measures. Look at the table 8

Table 8. Postoperative Infections.

Type	n (%)
Wound/port-site infection	3 (4.41%)

Respiratory infection	1 (1.47%)
Urinary tract infection	2 (2.94%)
Intra-abdominal infection	0 (00.00%)
Sepsis	0 (00.00%)

Gastrointestinal Symptoms During Follow-up

Constipation was the most frequent symptom, occurring in 17.65% of the patients. Also common were reflux (14.71%) and heartburn (14.71%). Seventy-three percent of patients vomited repeatedly and four percent of patients had dysphagia. 5.88% reported diarrhea, usually associated with dietary intolerance, or overly fast stomach emptying. Table 9.

Table 9. Gastrointestinal Symptoms During Follow-up.

Symptom	n (%)
Persistent vomiting	5 (7.35%)
Dysphagia	3 (4.41%)
Constipation	12 (17.65%)
Diarrhea	4 (5.88%)
Reflux/heartburn	10 (14.71%)

Postoperative Weight Loss Outcomes

The mean postoperative weight was 101.1 ± 16.4 kg, which was significantly lower than the preoperative weight, which was very high, and averaged 26.0 ± 9.2 kg. This can also be seen in the postoperative BMI, which dropped to an average of 37.0 ± 5.0 kg/m². The percentage of total body weight lost (%TBWL) was 20.9 ± 6.3, which is within the range expected in the first postoperative year for sleeve gastrectomy and gastric bypass. In addition, the amount of excess weight loss (%EWL) was 53.3 ± 15.6. Table 10.

Table 10. Postoperative Weight Loss Outcomes.

Outcome	Mean ± SD
Weight at follow-up (kg)	101.1 ± 16.4
Total weight loss (kg)	26.0 ± 9.2
BMI at follow-up	37.0 ± 5.0
%TBWL	20.9 ± 6.3
%EWL	53.3 ± 15.6

4. Discussion

In individuals with severe obesity, metabolic surgery has been shown to have a more significant and lasting impact on weight loss, metabolic parameters and obesity-related complications in the past few decades. However, this risk is not completely abolished [13], as some serious adverse events can occasionally occur, even if the procedure carried out is of the highest quality.

The author conducted his investigation through a series of descriptive studies in his study sample of 68 patients who underwent a bariatric surgery at Tikrit Teaching Hospital, covering the following categories: pre- and peri-operative comorbidities, peri-operative safety, peri-operative complications, nutritional outcomes, gastrointestinal symptoms, and

early weight loss pattern. He found that the populations have relatively high baseline metabolic risk but surgical procedures were low in complications, very satisfactory in postoperative changes and paralleled with the global bariatric surgery outcomes [14], [15].

The prevalence of metabolic comorbidities in this population was high, which might correlate with the extent of obesity that normally the subjects intended for bariatric surgery are characterized with. Over half of the patients had NAFLD, almost one-half hypertension, and more than one-third T2DM and dyslipidemia. This is consistent with the worldwide literature, which currently shows that those who seek bariatric surgery usually have all of the components of metabolic syndrome [16], [17]. In this cohort, very well-known hepato-obesity and insulin resistance outcome, NAFLD, was identified in 55.88% of patients and bariatric surgery generally leads to improvements of biophysiological and metabolic markers [18]. Other common comorbidities include respiratory (OSA) and gastrointestinal (GERD), consistent with known physiologic consequences of severe obesity. Specifically, GERD is of clinical interest because GERD symptoms would worsen with sleeve gastrectomy, and would be improved with RYGB [19], [20]. The smoking rate among patients at 19.12% holds another significant risk factor other than being very closely associated with ulcer formation and wound healing problems; thus, put the general accepted guidelines for preoperative smoking cessation into particular relief [21], [22].

The incidence of early postoperative complications in this study population was fairly similar to what has been reported globally, reflecting a high-risk state with relatively low major complication rate for bariatric surgery. The most common complication in such patients was nausea and vomiting (30.88%). Anxiety is one of the physiological responses to any anesthetic, and decreases gastric volume or early postoperative dietary advancement [23], [24]. Having a tachycardia (incidence 10.29%) may be an important clinical clue, since the bears are known for occult bleeding or early leakage of the staple line [25]. In our series the incidence of Stapled Anastomosis Leak (SAL) was very low, as it was in many published series where only oxidative close post-operative radiological explorations were used for diagnosis of a wound. The leak incidence is never more than 1.47% for a standard quality bariatric surgery [26], [27]. Given the success of many leaks around the globe being managed without surgery, it is likely to reinforce the much-touted global focus on non-operative management of many such leaks in the light of emerging evidence in the field of endoscopy and interventional radiology. Hemorrhage requiring intervention (2.94), ICU admission for observation (2.94), or reoperation (1.47) also featured a low incidence in the study cohort and seems to be almost at par with data from institutional series and national bariatric registries [28].

This other object emerged from the dehydration (66.67%) and severe nausea and vomiting (33.33%) primarily; the data are actually quite similar to the expression of dehydration and dysphagia as the major reason for early return to hospitalization, as practiced worldwide by bariatric surgery [29]. This supports aggressive hydration regimens as one of the treatment options in addition to a patient education program with early outpatient follow-up. The mean hospital stay post-surgery (3.1 ± 1.4 days) was similar to a standard hospital stay of 2-4 days for laparoscopic bariatric surgery worldwide [30]. Delays in fluid tolerance or minor complications in a few patients were more likely responsible for longer hospitalizations as compared to programmatic bolus feeding into practice.

In the early period the incidence of chest wall infection is low (2.94%) and in the extended or more complicated dissections, there is an increase in the risk of infection, and longer symptoms duration, to the subcutaneous tissue on the background of a fungal infection [31]. An in-hospital stay-related risk of developing bacteremia was about 3.,4%, but this proportion increased to 42.8% after discharge.

In 16.17% of patients, stasis worsened. Most patients experienced minor limb swelling (28.57%), affecting patients' quality of life and night rest after surgery [32]. In 3.75% of the patients insitative renal failure occurs, which should be blamed mainly on dehydration but should always be ruled out. It was observed in the small sampling of raw data. The nutritional insufficiency was mild and thus not serious but recognizable. 22.06% of cases were commonly found to be Vitamin D, 13.24% were iron and 8.82% were cobalamin. This is very similar to some large reviews: both vitamin D and iron and vitamin B12 are the major nutritional deficiencies prevailing after bariatric surgery. By nature, vitamin D deficiency is very common, either in form of detectable pre-operation deficiency or after operation it may be due to a change in body fat content (post-operation malabsorption). Post-surgery diagnosis of iron insufficiency is due to decreased gastric acid secretion and decreased absorption in the duodenum, and decreased activity of intrinsic factor and altered ileal absorption is responsible for cobalamin deficiency [33], [34]. The statistically low incidence of calcium insufficiency and hypoalbuminemia in our patients could have suggested that severe malnutrition was not a big issue in this study group or perhaps these data support the importance of life-long monitoring of micronutrients as recommended by either ASMBS or IFSO [35], [36].

The number of infections was small, with no infections being essentially intra-abdominal wound infections or sepsis, consistent with the low leaks rate, and effectiveness of the preoperative strategies. The incisions and UTIs (urinary tract infections) are 4.41% and 2.94%, respectively, and within the expected range of rates for bariatric laparoscopic procedures, and compliant with the perioperative infection-control protocol [37]. Of the gastrointestinal symptoms, 17.65% had a constipation symptom and 14.71% had a reflux/heartburn symptom that were followed up. Constipation may be a sign of decreased intake and fiber, and this is exacerbated with iron intake. Any intervention should ultimately and ideally lead to reversible symptoms, which have been documented by some patients and observers. Continuous reflux symptoms may be the predictable sequelae of postoperative physiological changes regarding gastric restriction, more so after sleeve surgery. Moderately high ratings were given to vomiting, dysphagia and diarrhea, which could be caused by food intolerance for the time being, problems with dietary compliance, or may be due to less common complications such as stricture. 140 In either case, there would be sufficient concern for things such as early interventions to prevent any malnutrition [38].

The primary results for weight loss in this group may be considered important, and comparable to the international mean results. The mean percentage total weight loss: 20.9%±6.3; per cent excess weight loss: 53.3%±15.6. These are roughly in the normal range after 1st year of sleeve gastrectomy and gastric bypass. A greater than 50% loss of weight early has been strongly correlated with long-term maintenance of weight. The benefit has been reported only in situations where dietary, behavioral and physical activity programs are followed postoperatively, continuously [39]. These selections all support the safety of bariatric surgery in patients with increased metabolic risk factors, and real benefits of the surgery within the first postoperative month relate to metabolism and weight. Obviously, it is essential to have a comprehensive perioperative support programmed that not only provides management of the preoperative comorbidity, smoking cessation, dehydration regime, antiemetics, nutritional and psychological support algorithm for life but also incorporates these. All these measures are based on the latest recommendations from the ASMBS/IFSO for achieving very good postoperative outcomes with the lowest risk of postoperative complications [40].

5. Conclusion

This study shows that bariatric surgery is not only safe and effective as treatment for obesity but the majority of preoperative and postoperative complications are mild, are self-limited and can be managed conservatively. The incidence of major adverse events such as leakage, major bleeding, reoperation, admission to the intensive care unit, and hospital readmission were low, suggesting a good peri-operative safety profile. Structured postoperative hydration and nutrition support were the main factors associated with early readmission, which highlight the importance of addressing early readmission. Structured postoperative hydration and nutrition support were the main factors associated with early readmission, pointing to the importance of addressing early readmission. In general, hospital stay was brief and comparable to the current laparoscopic bariatric procedure. The late complications were rare in the first 6 months after surgery, most frequently gastroesophageal reflux and gallstones. Mild deficiencies were common, particularly vitamin D, iron and vitamin B12, and severe deficiencies were uncommon. Superficial wound complications were the only postoperative infections and no deep abdominal infection or sepsis. Overall, patients had significant weight loss, BMI loss, and excess weight loss, which further substantiated the positive early clinical results and efficacy of bariatric surgery.

REFERENCES

[1] Farooqi, S., Montrief, T., Koyfman, A., & Long, B. (2025). High risk and low incidence diseases: Bariatric surgery complications. *The American Journal of Emergency Medicine, 87*, 113–122.

[2] Gulinac, M., Miteva, D. G., Peshevska-Sekulovska, M., Novakov, I. P., Antovic, S., Peruhova, M., Snegarova, V., Kabakchieva, P., Assyov, Y., Vasilev, G., & Sekulovski, M. (2023). Long-term effectiveness, outcomes and complications of bariatric surgery. *World Journal of Clinical Cases, 11*(19), 4504–4520.

[3] Bashir, B., Iqbal, Z., Adam, S., Ferdousi, M., Chick, W., Hussein, H. A., Syed, A. A., Le Roux, C. W., Cohen, R. V., Malik, R. A., & Soran, H. (2023). Microvascular complications of obesity and diabetes: Role of bariatric surgery. *Obesity Reviews, 24*(10), e13602.

[4] Sarwer, D. B., Allison, K. C., Wadden, T. A., Ashare, R., Spitzer, J. C., McCuen-Wurst, C., LaGrotte, C., Williams, N. N., Edwards, M., Tewksbury, C., et al. (2019). Psychopathology, disordered eating, and impulsivity as predictors of outcomes of bariatric surgery. *Surgery for Obesity and Related Diseases, 15*, 650–655.

[5] Steenackers, N., Van der Schueren, B., Augustijns, P., Vanuytsel, T., & Matthys, C. (2023). Development and complications of nutritional deficiencies after bariatric surgery. *Nutrition Research Reviews, 36*(2), 512–525.

[6] Dowsey, M. M., Brown, W. A., Cochrane, A., Burton, P. R., Liew, D., & Choong, P. F. (2022). Effect of bariatric surgery on risk of complications after total knee arthroplasty: A randomized clinical trial. *JAMA Network Open, 5*(4), e226722.

[7] Jaacks, L. M., Vandevijvere, S., Pan, A., McGowan, C. J., Wallace, C., Imamura, F., Mozaffarian, D., Swinburn, B., & Ezzati, M. (2019). The obesity transition: Stages of the global epidemic. *The Lancet Diabetes & Endocrinology, 7*(3), 231–240.

[8] Haruta, H., Kasama, K., Ohta, M., Sasaki, A., Yamamoto, H., Miyazaki, Y., Oshiro, T., Naitoh, T., Hosoya, Y., Togawa, T., et al. (2017). Long-term outcomes of bariatric and metabolic surgery in Japan: Results of a multi-institutional survey. *Obesity Surgery, 27*, 754–762.

[9] Kamocka, A., Chidambaram, S., Erridge, S., Vithlani, G., Miras, A. D., & Purkayastha, S. (2022). Length of biliopancreatic limb in Roux-en-Y gastric bypass and its impact on postoperative outcomes in metabolic and obesity surgery: Systematic review and meta-analysis. *International Journal of Obesity, 46*, 1983–1991.

[10] Spota, A., Cereatti, F., Granieri, S., Antonelli, G., Dumont, J. L., Dagher, I., Chiche, R., Catheline, J. M., Pourcher, G., Rebibo, L., & Calabrese, D. (2021). Endoscopic management of bariatric surgery complications according to a standardized algorithm. *Obesity Surgery, 31*(10), 4327–4337.

[11] Eisenberg, D., Shikora, S. A., Aarts, E., Aminian, A., Angrisani, L., Cohen, R. V., De Luca, M., Faria, S. L., Goodpaster, K. P. S., Haddad, A., et al. (2022). 2022 American Society for Metabolic and Bariatric Surgery (ASMBS) and International Federation for the Surgery of the Obesity and Metabolic Disorders (IFSO): Indications for metabolic and bariatric surgery. *Obesity Surgery, 32*, 1345–1356.

[12] Pratt, J. S. A., Browne, A., Browne, N. T., Bruzoni, M., Cohen, M., Desai, A., Inge, T., Linden, B. C., Mattar, S. G., Michalsky, M., et al. (2018). ASMBS pediatric metabolic and bariatric surgery guidelines. *Surgery for Obesity and Related Diseases, 14*, 882–901.

[13] Salminen, P., Kow, L., Aminian, A., Kaplan, L. M., Nimeri, A., Prager, G., Behrens, E., White, K. P., & Shikora, S. (2024). IFSO consensus on definitions and clinical practice guidelines for obesity management: An international Delphi study. *Obesity Surgery, 34*, 30–42.

[14] Arterburn, D. E., Telem, D. A., Kushner, R. F., & Courcoulas, A. P. (2020). Benefits and risks of bariatric surgery in adults: A review. *JAMA, 324*(9), 879–887.

[15] González-Muniesa, P., Martínez-González, M. A., Hu, F. B., Després, J. P., Matsuzawa, Y., Loos, R. J. F., Moreno, L. A., Bray, G. A., & Martinez, J. A. (2017). Obesity. *Nature Reviews Disease Primers, 3*, 17034.

[16] Shahmiri, S. S., Eghbali, F., Ismaeil, A., Gholizadeh, B., Khalooeifard, R., Valizadeh, R., Rokhgireh, S., & Kermansaravi, M. (2022). Selenium deficiency after bariatric surgery, incidence and symptoms: A systematic review and meta-analysis. *Obesity Surgery, 32*(5), 1719–1725.

[17] Lewis, C. A., de Jersey, S., Seymour, M., Hopkins, G., Hickman, I., & Osland, E. (2020). Iron, vitamin B12, folate and copper deficiency after bariatric surgery and the impact on anaemia: A systematic review. *Obesity Surgery, 30*(11), 4542–4591.

[18] Enani, G., Bilgic, E., Lebedeva, E., Delisle, M., Vergis, A., & Hardy, K. (2020). The incidence of iron deficiency anemia post-Roux-en-Y gastric bypass and sleeve gastrectomy: A systematic review. *Surgical Endoscopy, 34*(7), 3002–3010.

[19] Kwon, Y., Lee, S., Kim, D., AlRomi, A., Park, S. H., Lee, C. M., Kim, J. H., & Park, S. (2022). Biliopancreatic limb length as a potential key factor in superior glycemic outcomes after Roux-en-Y gastric bypass in patients with type 2 diabetes: A meta-analysis. *Diabetes Care, 45*(12), 3091–3100.

[20] Buser, A., Joray, C., Schiavon, M., Kosinski, C., Minder, B., Nakas, C. T., Man, C. D., Muka, T., Herzig, D., & Bally, L. (2022). Effects of Roux-en-Y gastric bypass and sleeve gastrectomy on β-cell function at 1 year after surgery: A systematic review. *Journal of Clinical Endocrinology & Metabolism, 107*(11), 3182–3197.

[21] Samigullin, A., Weihrauch, J., Otto, M., Rech, A., Buchenberger, S., Morcos, M., & Humpert, P. M. (2025). Postprandial symptoms in a mixed-meal test after bariatric surgery: Clinical experience and a critical review of dumping syndrome definition and management. *Obesity Facts, 18*(1), 31–38.

[22] Langan, R. C., & Zawistoski, K. J. (2011). Update on vitamin B12 deficiency. *American Family Physician, 83*(12), 1425–1430.

[23] Voorwinde, V., Steenhuis, I. H. M., Janssen, I. M. C., Monpellier, V., & van Stralen, M. M. (2020). Definitions of long-term weight regain and their associations with clinical outcomes. *Obesity Surgery, 30*, 527–536.

[24] Kollmann, L., Gruber, M., Lock, J. F., Germer, C. T., & Seyfried, F. (2024). Clinical management of major postoperative bleeding after bariatric surgery. *Obesity Surgery, 34*(3), 751–759.

[25] Guzman-Pruneda, F. A., & Brethauer, S. A. (2021). Gastroesophageal reflux after sleeve gastrectomy. *Journal of Gastrointestinal Surgery, 25*(2), 542–550.

[26] Abu-Abeid, A., Litmanovich, A., Abu-Abeid, S., Eldar, S. M., Lahat, G., & Yuval, J. B. (2024). Long-term outcomes of patients with staple line leaks following sleeve gastrectomy. *Obesity Surgery, 34*(7), 2523–2529.

[27] El Nogoomi, I., Nouh, A. K., Jaber, A. A., Toubah, A. M., & Alkaram, S. S. (2023). Petersen's hernia after Roux-en-Y gastric bypass: A case report. *Cureus, 15*(12), e50757.

[28] Carvalho, L., Almeida, R. F., Nora, M., & Guimarães, M. (2023). Thromboembolic complications after bariatric surgery: Is the high risk real? *Cureus, 15*(1), e33444.

[29] Cohen Vig, L., Straussberg, R., Ziv, N., Hirschfeld-Dicker, L., Konen, O., & Aharoni, S. (2024). Neurologic complications of thiamine (B1) deficiency following bariatric surgery in adolescents. *European Journal of Paediatric Neurology, 50*, 74–80.

[30] Gerges, W. B., Omar, A. S. M., Shoka, A. A., Hamed, M. A., Abdelrahim, H. S., & Makram, F. (2024). ReSleeve or revisional one anastomosis gastric bypass for failed primary sleeve gastrectomy with dilated gastric tube: A retrospective study. *Surgical Endoscopy, 38*(2), 787–798.

[31] Roth, C. L., Scimia, C., Shoemaker, A. H., Gottschalk, M., Miller, J., Yuan, G., Malhotra, S., & Abuzzahab, M. J. (2024). Setmelanotide for the treatment of acquired hypothalamic obesity: A phase 2, open-label, multicentre trial. *The Lancet Diabetes & Endocrinology, 12*(6), 380–389.

[32] Bullen, N. L., Parmar, J., Gilbert, J., Clarke, M., Cota, A., & Finlay, I. G. (2019). How effective is the multidisciplinary team approach in bariatric surgery? *Obesity Surgery, 29*(10), 3232–3238.

[33] Houlden, R. L., Yen, J. L., & Moore, S. (2018). Effectiveness of an interprofessional glycemic optimization clinic on preoperative glycated hemoglobin levels for adult patients with type 2 diabetes undergoing bariatric surgery. *Canadian Journal of Diabetes, 42*(5), 514–519.

[34] Fox, W., Borgert, A., Rasmussen, C., Kallies, K., Klas, P., & Kothari, S. (2019). Long-term micronutrient surveillance after gastric bypass surgery in an integrated healthcare system. *Surgery for Obesity and Related Diseases, 15*(3), 389–395.

[35] Askari, A., Jambulingam, P., Gurprashad, R., Al-Taan, O., Adil, T., Munasinghe, A., Jain, V., Rashid, F., & Whitelaw, D. (2023). The surgical management of obesity. *Clinical Medicine, 23*, 330–336.

[36] Magni, P., Dozio, E., Ruscica, M., Celotti, F., Masini, M. A., Prato, P., Broccoli, M., Mambro, A., Morè, M., & Strollo, F. (2009). Feeding behavior in mammals including humans. *Annals of the New York Academy of Sciences, 1163*, 221–232.

[37] Grimm, E. R., & Steinle, N. I. (2011). Genetics of eating behavior: Established and emerging concepts. *Nutrition Reviews, 69*, 52–60.

[38] Bulik, C. M., Sullivan, P. F., & Kendler, K. S. (2003). Genetic and environmental contributions to obesity and binge eating. *International Journal of Eating Disorders, 33*, 293–298.

[39] Duncan, A. E., Ziobrowski, H. N., & Nicol, G. (2017). The prevalence of past 12-month and lifetime DSM-IV eating disorders by BMI category in US men and women. *European Eating Disorders Review, 25*, 165–171.

[40] Hudson, J. I., Lalonde, J. K., Berry, J. M., Pindyck, L. J., Bulik, C. M., Crow, S. J., McElroy, S. L., Laird, N. M., Tsuang, M. T., Walsh, B. T., et al. (2006). Binge-eating disorder as a distinct familial phenotype in obese individuals. *Archives of General Psychiatry, 63*, 313–319.