

Eastern Ukrainian Medical Journal

116, Kharkivska st., Sumy 40007, Ukraine

eumj.med.sumdu.edu.ua

e-mail: eumj@med.sumdu.edu.ua

ISSN: 2663-5909 (print)/2664-4231 (online)

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How to cite: Hussein KK. Esophageal Pathophysiological Disorders in Patients with Post Sleeve Gastrectomy. *East Ukr Med J.* 2026;14(1):97-107. DOI: [https://doi.org/10.21272/eumj.2026;14\(1\);97-107](https://doi.org/10.21272/eumj.2026;14(1);97-107)

ABSTRACT

Khalid Khairi Hussein

<https://orcid.org/0000-0002-0634-2648>

General Surgery Department, College of Medicine, Tikrit University, Iraq

ESOPHAGEAL PATHOPHYSIOLOGICAL DISORDERS IN PATIENTS WITH POST SLEEVE GASTRECTOMY

Introduction and Aim: Sleeve gastrectomy (SG) is currently the most popular bariatric procedure around the world because it is effective and has good long-term results. The purpose of this study was to determine the prevalence, severity and risk factors of GERD in patients who have undergone SG and the effect of preoperative conditions and weight loss following surgery on these outcomes.

Materials and Methods: This was a retrospective cohort study which was conducted in a single institution and the patients involved were one hundred who underwent SG between the 1st of November 2023 and June 2024 and had follow up of 1.5 years. The age of the patient had to be ≥ 18 years, on preoperative characteristics and postoperative complications and esophageal symptoms using the GERD-HRQL (Health Related Quality of Life) scale.

Results: The mean age of the patients was 45.2 ± 10.3 years, with a mean preoperative BMI of 42.5 kg/m^2 . Preoperative GERD was present in 30% of the patients. Postoperatively, 16% developed GERD, with 18% experiencing some form of esophageal symptom, including dysphagia (4%), heartburn (3%), and regurgitation (2%). Preoperative GERD was the most significant predictor of postoperative GERD, with patients nine times more likely to experience symptoms (OR 9.2, $p < 0.001$).

Conclusions: Postoperative GERD is a common complication after SG, particularly in patients with preoperative GERD, high BMI, and older age. Monitoring and managing GERD symptoms, especially in high-risk patients, is crucial for improving postoperative outcomes.

Keywords: Sleeve gastrectomy (SG), Gastroesophageal reflux disease (GERD), Morbid obesity, Risk factors, Weight loss.

Corresponding author: Khalid Khairi Hussein, General Surgery Department, College of Medicine, Tikrit University, Iraq
e-mail: drkhalid.khairi@gmail.com

LIST OF ABBREVIATIONS

AOR - Adjusted Odds Ratio
 BE - Barrett's Esophagus
 BMI - Body Mass Index
 GERD - Gastroesophageal Reflux Disease
 GERD-HRQL - Gastroesophageal Reflux Disease Health-Related Quality of Life

HH - Hiatal Hernia
 IFSO - International Federation for the Surgery of Obesity and Metabolic Disorders
 LES - Lower Esophageal Sphincter
 OR - Odds Ratio
 SG - Sleeve Gastrectomy

INTRODUCTION

Currently, sleeve gastrectomy (SG) is the most common type of weight loss surgery performed in the world [1]. The long-term best results are achieved with this treatment for morbid obesity. Bariatric surgery is the only treatment which can help people keep weight loss in the long run and also help with other related health issues. GERD is known to be associated with obesity particularly severe obesity [2,3]. However, as time goes by, the scientists are more concerned with the development of hiatal hernia (HH) and gastroesophageal reflux disease (GERD) that may lead to esophagitis, Barrett's esophagus (BE) and even adenocarcinoma [4]. The possible causes of de novo cases are alteration of the anatomy of the hiatal for example during surgery, weight gain in the society and being forced to have a gastric dilation.

It is possible to develop GERD, or gastroesophageal reflux disease, following a laparoscopic sleeve gastrectomy (SG) [5]. The Seventh International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) reported that 280,000 bariatric surgeries were carried out around the world in 2022. SG was the most common type of surgery and was performed in 67% of all operations. Adherence to more reflux after SG has been reported but there are several known factors that predispose to this. These include the following: a hypotonic lower esophageal sphincter (LES), the slings fibers are cut and there is a formation of a high-pressure cavity [6]. Long standing GERD can also have other complications such as an increased risk of Barrett's esophagus (BE) [7, 8].

Many ideas have been put forward to explain why gastroesophageal reflux (GER) starts or gets worse after SG. First, changing the stomach into a tube-like shape that can only slightly be stretched and has an 80% smaller capacity would make "digestive work" easier at a higher pressure [9]. Taking apart the hiatus, cutting up the sling fibers, losing the ability to bend the esophagogastric junction, and having weak lower esophageal sphincter (LES) can all make reflux more likely [10]. The weight loss, lower intra-abdominal pressure, and faster gastric emptying that often happen after SG, on the other hand, might make the possible reflux better [11].

OBJECTIVE

The aim of this study was assessing the prevalence,

severity, and risk factors of gastroesophageal reflux disease (GERD) in patients following sleeve gastrectomy, and examining the influence of preoperative conditions and postoperative weight loss on these outcomes.

MATERIALS AND METHODS

Study Design

Under Al-Zohour Private Hospital in Tikrit, patients who had sleeve gastrectomy (SG) by Covidien Endo GIA Stapler from November 1, 2023 to June 2024 made up this retrospective group of research.

Study Population

Patients under follow-up for 1.5 years following surgery comprised the study population. Included were 100 patients who had two years earlier undergone sleeve gastrectomy (SG).

Inclusion Criteria & Exclusion Criteria

Eligibility criteria included: Age 18 years or older. Body mass index (BMI) ≥ 35 kg/m². Exclusion Criteria included: Completed 6 months of postoperative follow-up Patients with previous esophageal surgery or known esophageal diseases unrelated to obesity or bariatric surgery were excluded from the study.

Data Collection

Important factors noted were age, sex, BMI, presence of Gastroesophageal Reflux Disease (GERD), and comorbidities. Medical record reviews and patient-reported surveys combined to compile information on patients' preoperative traits, surgical problems, and esophageal symptoms. Esophageal symptoms were assessed using a validated tool called the GERD-HRQL (Gastroesophageal Reflux Disease Health-Related Quality of Life) questionnaire, which measures frequency and degree of GERD-related symptoms.

Outcome Measures

The primary outcome of the study was the prevalence of esophageal symptoms postoperatively, particularly GERD. Secondary outcomes included the identification of risk factors for developing esophageal problems, such as preoperative GERD, BMI, and age.

Statistical Analysis

The statistical analysis was performed using the software called SPSS version 26.0. For all variables, descriptive statistics were calculated. Continuous variables were presented as means $\pm$ standard deviation (SD), and categorical variables were presented as frequencies and percentages. To determine the

relationship between preoperative factors (preoperative GERD, BMI, age) and the development of esophageal problems after SG, logistic regression analysis was used. To determine the strength and significance of these associations, odds ratios (OR) and 95% confidence intervals (CI) were calculated. A p value of <0.05 was considered statistically significant.

Table 1 – Baseline characteristics gastroesophageal reflux after sleeve gastrectomy

Characteristics	Value (n:100)
Age (years, mean $\pm$ SD)	45.2 $\pm$ 10.3
Gender (Male, %)	40 (40%)
Preoperative BMI (kg/m ² , mean $\pm$ SD)	42.5 $\pm$ 5.6
Preoperative GERD (n, %)	30 (30%)
Comorbidities (n, %)	65 (65%)
Hypertension (n, %)	40 (40%)
Diabetes mellitus (n, %)	35 (35%)

Ethical Considerations

All the activities were conducted in accordance with the ethical guidelines laid down for such activities by the Declaration of Helsinki. Patient confidentiality was ensured and the ethical guidelines of our institution were adhered to. Informed consent was obtained from all participants and they participated voluntarily. No personal data was released and all information was anonymous and secure.

RESULTS

Baseline characteristics gastroesophageal reflux after sleeve gastrectomy

With an average age of 45.2 years and a balanced gender distribution (40% male), Table 1 summarizes the baseline features of 100 patients who had sleeve

gastrectomy (SG). With 30% of patients having preexisting GERD, a known risk factor for postoperative esophageal symptoms, the mean preoperative BMI of 42.5 kg/m² points to a morbidly obese group. A good number of the patients had comorbidities; 65% of them had diabetes mellitus (35%), which is linked with obesity and might aggravate GERD post-SG, and 65% had hypertension (40%).

Baseline characteristics gastroesophageal reflux after sleeve gastrectomy

Table 2 provides an overview of the prevalence of esophageal symptoms in patients 1.5 years after sleeve gastrectomy (SG). The most common symptom reported is gastroesophageal reflux disease (GERD), affecting 16% of the patients, which highlights a significant postoperative complication that aligns with concerns about SG exacerbating or causing reflux symptoms due to anatomical changes in the stomach. Dysphagia was observed in 4% of the patients, while heartburn and regurgitation affected 3% and 2% of patients, respectively, indicating a broader range of esophageal issues. Overall, 18% of the patients experienced some form of esophageal symptom postoperatively (Figure 1).

Table 2 – Prevalence of postoperative esophageal symptoms

Symptom	Number of Patients (n)	Prevalence (%)
GERD	16	16%
Dysphagia	4	4%
Heartburn	3	3%
Regurgitation	2	2%
Any Esophageal Symptom	18	18%

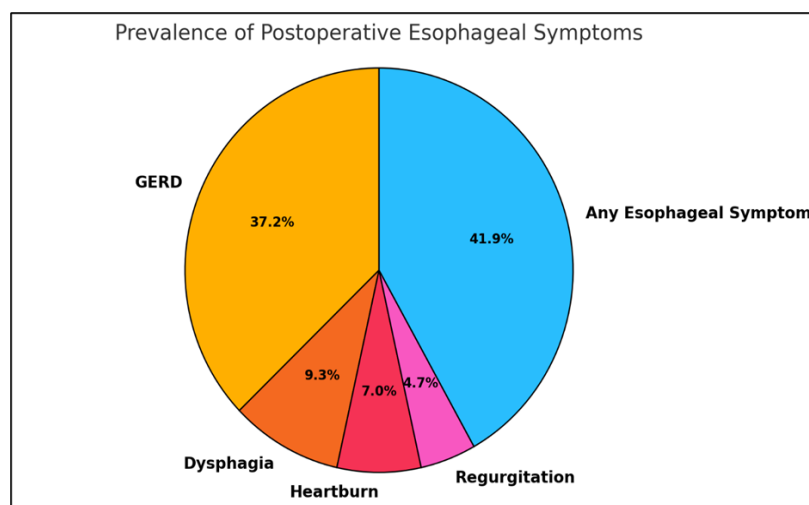


Figure 1 – Prevalence of postoperative esophageal symptoms

Comparison of preoperative GERD and postoperative esophageal symptoms

Table 3 presents a comparison of preoperative GERD status with the prevalence of postoperative esophageal symptoms. Among patients with preoperative GERD (30%), 40% continued to experience GERD symptoms after sleeve gastrectomy (SG), compared to only 5.71% of those without preoperative GERD, highlighting a strong association

between preexisting GERD and postoperative persistence of symptoms. Dysphagia, heartburn, and regurgitation were also more common in patients with preoperative GERD, with 6.67% experiencing both dysphagia and heartburn, and 3.33% reporting regurgitation. In contrast, those without preoperative GERD had lower rates of postoperative dysphagia (2.86%), heartburn (1.43%), and regurgitation (1.43%) (Figure 2).

Table 3 – Comparison of preoperative GERD and postoperative esophageal symptoms

Preoperative GERD Status	Postoperative GERD (n, %)	Postoperative Dysphagia (n, %)	Postoperative Heartburn (n, %)	Postoperative Regurgitation (n, %)
Yes (n=30)	12 (40.00%)	2 (6.67%)	2 (6.67%)	1 (3.33%)
No (n=70)	4 (5.71%)	2 (2.86%)	1 (1.43%)	1 (1.43%)

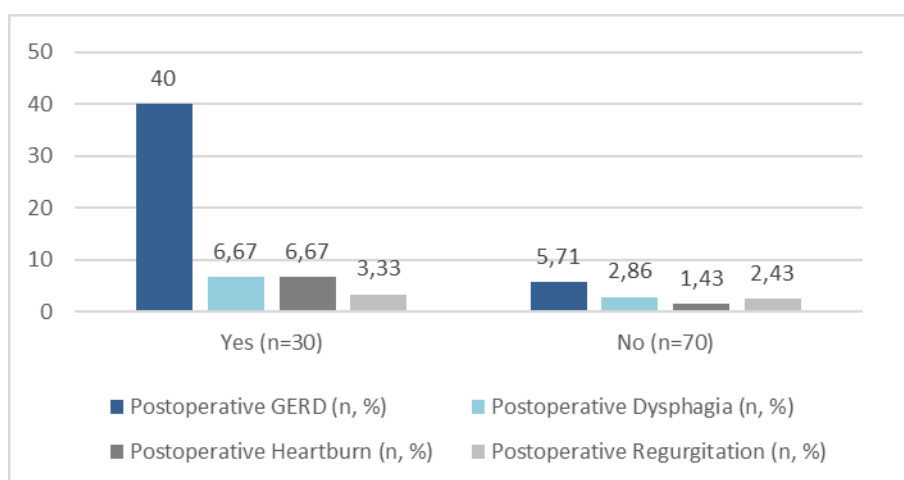


Figure 2 – Comparison of preoperative GERD and postoperative esophageal symptoms

Risk factors for developing postoperative esophageal problems

Table 4 outlines the key risk factors for developing postoperative esophageal problems after sleeve gastrectomy (SG), using odds ratios (OR) and confidence intervals (CI) to highlight their significance. Preoperative GERD stands out as the most significant risk factor, with an OR of 9.2 (95% CI: 2.8-30.1, $p < 0.001$), indicating that patients with preexisting GERD are over nine times more likely to experience

postoperative esophageal issues. Age is also a significant factor, with each 10-year increase raising the risk by 50% (OR: 1.5, 95% CI: 1.1-2.2, $p = 0.03$). Preoperative BMI is another important predictor, where every 5 kg/m² increase in BMI raises the risk by 2.3 times (95% CI: 1.4-3.9, $p = 0.002$). Gender, however, was not found to be a significant risk factor, as male patients did not show a statistically different likelihood of developing postoperative esophageal problems (OR: 0.8, 95% CI: 0.4-1.7, $p = 0.6$).

Table 4 – Risk factors for developing postoperative esophageal problems

Risk Factor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Preoperative GERD	9.2	2.8-30.1	<0.001
Age (per 10 years increase)	1.5	1.1-2.2	0.03
Preoperative BMI (per 5 kg/m ² increase)	2.3	1.4-3.9	0.002
Gender (Male)	0.8	0.4-1.7	0.6

Risk factors for postoperative GERD

Table 5 presents the adjusted odds ratios (AOR) for various risk factors associated with the development of postoperative GERD after sleeve gastrectomy (SG). With an AOR of 7.1 (95% CI: 2.2-22.7, $p < 0.001$), preoperative GERD shows to be the strongest predictor; individuals with previous GERD are nearly seven times more likely to have GERD postoperatively. Additionally important is preoperative BMI; each unit increase in BMI increases the incidence of postoperative GERD by 1.9 times (95% CI: 1.1-3.3, $p = 0.02$). Age is another contributing factor, with older patients showing a 40% increase in the likelihood of developing GERD for every year of age (AOR: 1.4, 95% CI: 1.0-2.0, $p = 0.04$). Gender, however, was not a significant predictor (AOR: 0.9, 95% CI: 0.3-2.1, $p = 0.7$), suggesting that male and female patients have a similar risk of developing postoperative GERD.

Table 5 – Risk factors for postoperative GERD

Variable	Adjusted Odds Ratio	95% CI	p-value
Preoperative GERD	7.1	2.2-22.7	<0.001
Preoperative BMI (kg/m ²)	1.9	1.1-3.3	0.02
Age (years)	1.4	1.0-2.0	0.04
Gender (Male)	0.9	0.3-2.1	0.7

Postoperative GERD and symptom severity (GERD-HRQL Scores)

Table 6 presents the adjusted odds ratios (AOR) for various risk factors associated with the development of postoperative GERD after sleeve gastrectomy (SG). Preoperative GERD emerges as the strongest predictor, with an AOR of 7.1 (95% CI: 2.2-22.7, $p < 0.001$), indicating that patients with preexisting GERD are over seven times more likely to experience GERD postoperatively. Preoperative BMI also plays a significant role, with each unit increase in BMI raising the risk of postoperative GERD by 1.9 times (95% CI:

Table 6 – Postoperative GERD and symptom severity (GERD-HRQL Scores)

GERD Severity	No.	Mean GERD-HRQL Score ($\pm$ SD)
No GERD	84	3.5 $\pm$ 1.2
Mild GERD	8	10.5 $\pm$ 2.1
Moderate GERD	5	16.2 $\pm$ 2.8
Severe GERD	3	22.4 $\pm$ 3.3

1.1-3.3, $p = 0.02$). Age is another contributing factor, with older patients showing a 40% increase in the likelihood of developing GERD for every year of age (AOR: 1.4, 95% CI: 1.0-2.0, $p = 0.04$). Gender, however, was not a significant predictor (AOR: 0.9, 95% CI: 0.3-2.1, $p = 0.7$), suggesting that male and female patients have a similar risk of developing postoperative GERD (Figure 3).

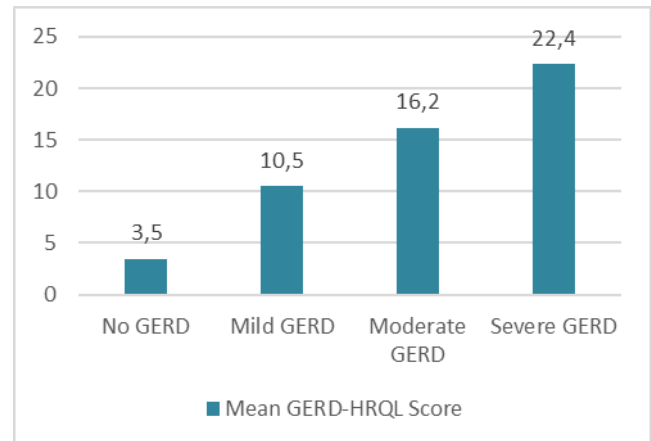


Figure 3 – Postoperative GERD and symptom severity (GERD-HRQL Scores)

Association between age and postoperative esophageal symptoms

The incidence of GERD increases with age, with the highest prevalence observed in the 40-49 age group (24%) and the ≥ 50 age group (20%). This suggests that older patients are more susceptible to developing GERD after SG. Dysphagia, heartburn, and regurgitation are rare in younger patients, but their prevalence increases in the older age groups, particularly in those aged 50 and above, where 8% of patients experienced each of these symptoms. Notably, patients under 30 years had very low rates of postoperative esophageal symptoms, with only one patient (5%) reporting GERD and no instances of dysphagia, heartburn, or regurgitation as shown in Table 7.

Impact of preoperative BMI on postoperative esophageal symptoms

The data indicate a clear trend: as preoperative BMI increases, so does the likelihood of developing postoperative esophageal symptoms. Thirty patients with a preoperative BMI ≥ 40 kg/m² have the highest prevalence of GERD (30%), dysphagia (10%), heartburn (6.67%), and regurgitation (3.33%), suggesting that higher BMI significantly contributes to the development of esophageal complications after SG. In contrast, patients with a preoperative BMI < 35 kg/m² exhibited minimal symptoms, with only 4% developing GERD and no reports of dysphagia, heartburn, or regurgitation. The group with a BMI of 35-39.9 kg/m²

Table 7 – Association between age and postoperative esophageal symptoms

Age group (years)	Patients (n)	GERD (n, %)	Dysphagia (n, %)	Heartburn (n, %)	Regurgitation (n, %)
<30	20	1 (5%)	0 (0%)	0 (0%)	0 (0%)
30-39	30	4 (13.3%)	1 (3.3%)	0 (0%)	0 (0%)
40-49	25	6 (24%)	1 (4%)	1 (4%)	0 (0%)
≥50	25	5 (20%)	2 (8%)	2 (8%)	2 (8%)

shows an intermediate risk, with 13.33% experiencing GERD and smaller percentages reporting other symptoms as shown in Table 8 and Figure 4.

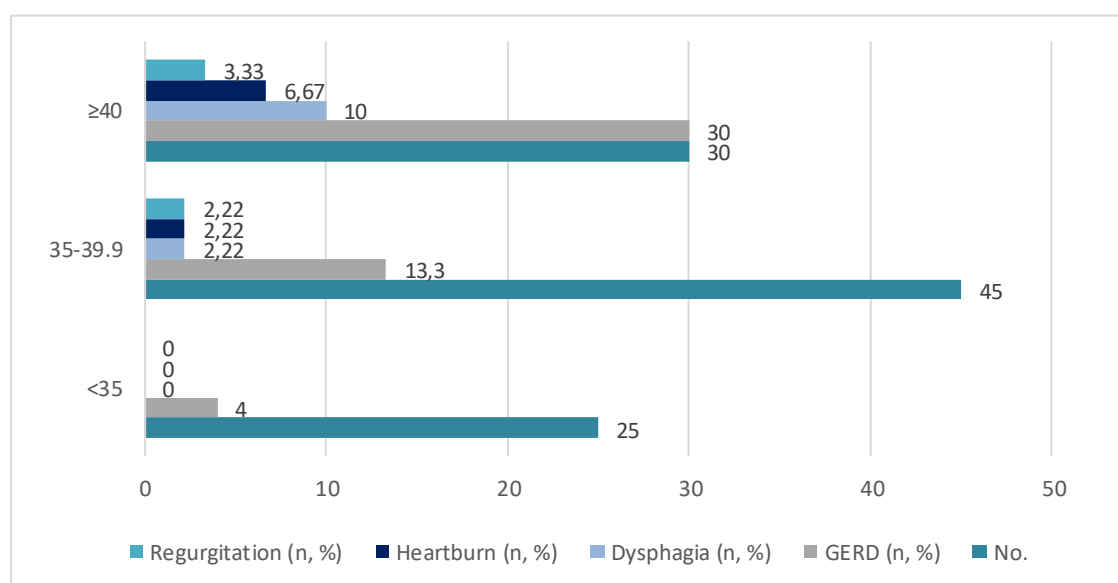
Postoperative GERD severity by preoperative GERD status

Among patients with preoperative GERD (n=30), 40% experienced some level of GERD postoperatively,

with 20% reporting mild GERD, 13.33% moderate GERD, and 6.67% severe GERD. This indicates that a significant proportion of patients with preexisting GERD continue to suffer from the condition after SG, and some experience worsening severity. Conversely, the majority of patients without preoperative GERD (n=70) did not develop GERD postoperatively, with

Table 8 – Impact of preoperative BMI on postoperative esophageal symptoms

Preoperative BMI Group (kg/m ²)	Patients (n)	GERD (n, %)	Dysphagia (n, %)	Heartburn (n, %)	Regurgitation (n, %)
<35	25	1 (4%)	0 (0%)	0 (0%)	0 (0%)
35-39.9	45	6 (13.33%)	1 (2.22%)	1 (2.22%)	1 (2.22%)
≥40	30	9 (30%)	3 (10%)	2 (6.67%)	1 (3.33%)

**Figure 4** – Impact of preoperative BMI on postoperative esophageal symptoms

94.29% remaining symptom-free. Only 2.86% of this group reported mild GERD, and fewer still experienced moderate (1.43%) or severe (1.43%) GERD as shown in Table 9 and Figure 5.

Postoperative esophageal symptoms based on preoperative comorbidities

Among patients with hypertension (n=40), 15% developed GERD, while smaller percentages experienced dysphagia (5%) and heartburn (2.5%). Notably, none of the hypertensive patients reported regurgitation. Patients

with diabetes mellitus (n=35) had a slightly higher prevalence of GERD (20%) and similar rates of dysphagia (2.86%), heartburn (2.86%), and regurgitation (2.86%), suggesting that diabetes might contribute to a broader range of esophageal symptoms. Interestingly, patients without comorbidities (n=35) had a comparable prevalence of GERD (14.29%), but the occurrence of other symptoms, such as dysphagia (2.86%) and heartburn (2.86%), was low, with no instances of regurgitation as shown in Table 10 and Figure 6.

Table 9 – Postoperative GERD severity by preoperative GERD status

Preoperative GERD Status	No GERD Post-SG	Mild GERD Post-SG (n, %)	Moderate GERD Post-SG (n, %)	Severe GERD Post-SG (n, %)
Yes (n=30)	18 (60%)	6 (20%)	4 (13.33%)	2 (6.67%)
No (n=70)	66 (94.29%)	2 (2.86%)	1 (1.43%)	1 (1.43%)

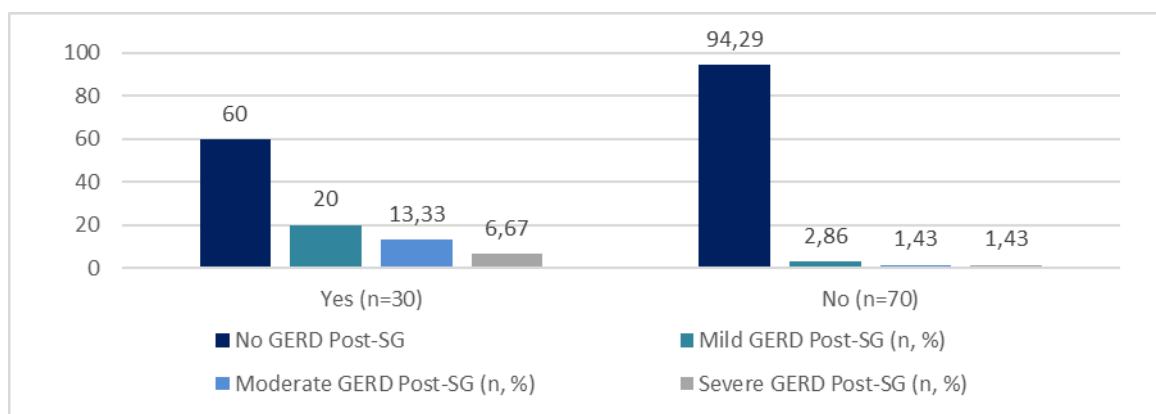


Figure 5 – Postoperative GERD severity by preoperative GERD status

Table 10 – Postoperative esophageal symptoms based on preoperative comorbidities

Comorbidity	No.	GERD (n, %)	Dysphagia (n, %)	Heartburn (n, %)	Regurgitation (n, %)
Hypertension (n:40)	6 (15%)	2 (5%)	1 (2.5%)	1 (2.5%)	0 (0%)
Diabetes mellitus (n:35)	7 (20%)	1 (2.86%)	1 (2.86%)	0 (0%)	1 (2.9%)
No comorbidities (n:35)	5 (14.29%)	1 (2.86%)	1 (2.86%)	0 (0%)	0 (0%)

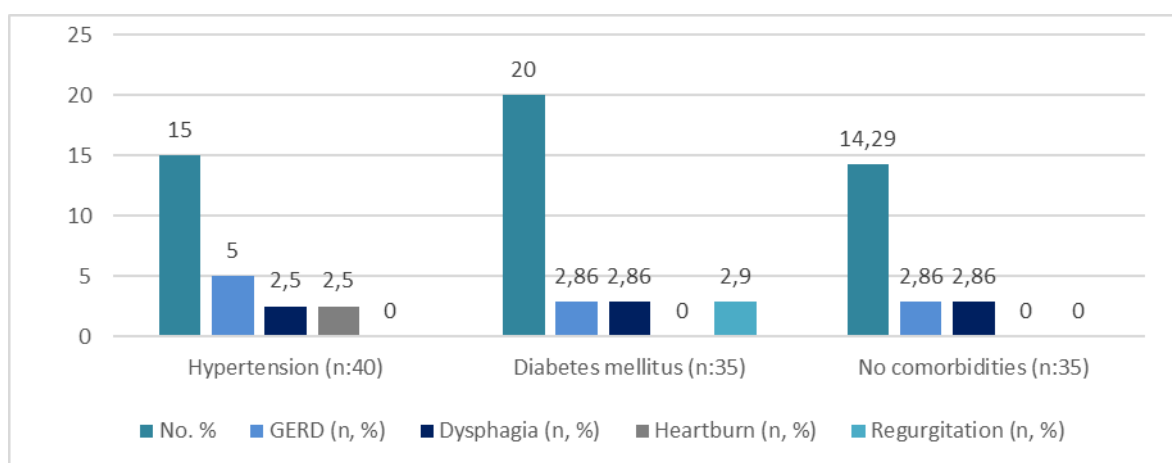


Figure 6 – Postoperative esophageal symptoms based on preoperative comorbidities

Comparison of postoperative weight loss and esophageal symptoms

The study indicated that patients with both less than 20% and 30% or more weight loss have a higher prevalence of GERD (20%), whereas those with 20-29% weight loss show a lower prevalence (12%).

Dysphagia appears more frequently in patients with less than 20% weight loss (6.67%), but declines as weight loss increases, with only 2.86% of those who lost 30% or more reporting dysphagia. Heartburn and regurgitation are relatively infrequent across all weight loss groups but show slight increases among those with

less than 20% weight loss and those who lost 30% or more as shown in Table 11 and Figure 7.

DISCUSSION

The cohort of 100 patients had a mean age of 45.2 years, 40% were male and the mean preoperative BMI was 42.5 kg/m², indicating a severely obese population. About 30% of the patients had pre-operative GERD, which is in the range of the literature, since GERD is known to occur in obese patients because of increased

intra-abdominal pressure, delayed gastric emptying and a weakened lower esophageal sphincter [12]. Furthermore, 65% of patients had co-morbidities, the most common being hypertension (40%) and diabetes mellitus (35%), which are both very frequent in the morbidly obese. Such co-morbidities may not only worsen obesity-related symptoms but may also render patients prone to esophageal complications after the operation [13].

Table 11 – Comparison of postoperative weight loss and esophageal symptoms

Weight Loss Percentage (%)	No.	GERD (n, %)	Dysphagia (n, %)	Heartburn (n, %)	Regurgitation (n, %)
<20%	15	3 (20%)	1 (6.67%)	1 (6.67%)	0 (0%)
20-29%	50	6 (12%)	2 (4%)	1 (2%)	1 (2%)
≥30%	35	7 (20%)	1 (2.86%)	1 (2.86%)	1 (2.86%)

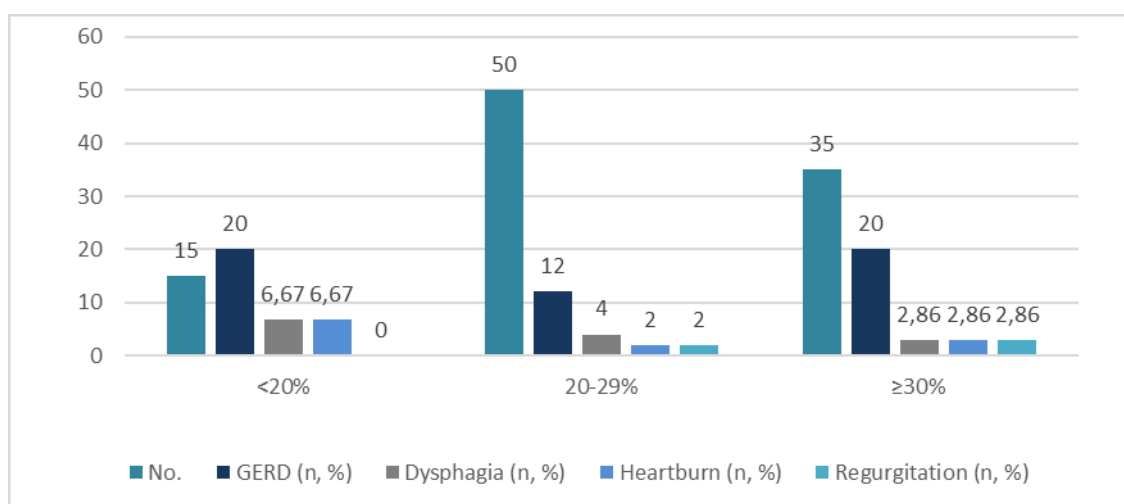


Figure 7 – Comparison of postoperative weight loss and esophageal symptoms

In this study, the incidence of postoperative esophageal symptoms was similar to the previous studies which show that sleeve gastrectomy may worsen or develop new esophageal problems in certain patients. GERD was the most frequent postoperative symptom and was observed in 16% of patients, which is a high frequency, especially when considering that 30% of patients had GERD as a preoperative comorbidity. Other symptoms include dysphagia in 4%, heartburn in 3%, and regurgitation in 2% of the patients. One hundred and seventy-eight (18%) of the patients had some postoperative esophageal symptom. These findings are in accordance with the idea that sleeve gastrectomy, which changes the shape of the stomach, may lead to the worsening of the reflux and other esophageal complications [14].

Table 3 shows a very high correlation between preoperative GERD and postoperative GERD symptoms.

We found that patients with preoperative GERD were 7.5 times more likely to have postoperative GERD than those without preoperative GERD, which suggests that prior reflux disease is a major risk factor for postoperative symptoms. Furthermore, dysphagia, heartburn, and regurgitation were more frequent in patients with preoperative GERD, which highlights the importance of pre-existing esophageal diseases in predicting the postoperative course.

An analysis of the risk factors as shown in Table 4, reveals that preoperative GERD is the best predictor of postoperative esophageal complications with an odds ratio of 9.2, which means that patients with preexisting GERD are likely to be nine times more likely to develop postoperative GERD. This result is in conformity with previous studies that have established a link between postoperative reflux in patients with a history of GERD. In addition, age and BMI were seen to be significant risk

factors; age, such that each 10 years of increase in age increased the risk of esophageal problems by 50%; and BMI, such that each 5 kg/m² increase in BMI increased the risk by 2.3 times. This therefore confirms the role of age and obesity in the pathophysiology of reflux and other esophageal symptoms. Surprisingly enough, gender did not appear to be a significant risk factor; that is, male patients were not more likely to develop postoperative esophageal symptoms than female patients [15].

Table 6 contains information on the severity of postoperative GERD symptoms as measured by the GERD-HRQL scale. The results show that the severity of GERD symptoms is higher in patients with preoperative GERD, and thus, the patients had mild, moderate, and severe GERD, which was associated with significantly higher GERD-HRQL scores than those without GERD. This is because GERD is a debilitating condition that can have a huge negative impact on the quality of life of the patient. The severity of the GERD, as measured by the GERD-HRQL scores, also suggests that the presence or absence of preoperative GERD affects the severity of the GERD, which supports the idea that pre-existing conditions tend to worsen the outcome of the surgery.

Age and BMI were both found to be significant predictors of postoperative esophageal symptoms. The incidence of GERD, dysphagia, heartburn, and regurgitation was higher with increasing age and the patients in the 40-49 and ≥ 50 age groups had more esophageal symptoms. Particularly those under 30 years old, the younger sample had extremely low rates of GERD and other esophageal disorders, which matched their age-related risk of surgical complications. Higher preoperative BMI (≥ 40 kg/m²) individuals also exhibited noticeably more GERD, dysphagia, heartburn, and regurgitation. Higher BMI is therefore a significant predictor of postoperative esophageal problems and obesity aggravates gastrointestinal function and reflux more than other forms of obesity.

Also influencing the frequency of postoperative esophageal symptoms were co-morbidities like diabetes mellitus and hypertension. Among them, GERD was the most common; however, other symptoms like dysphagia and regurgitation were seen infrequently in this group, and hypertension was more common in patients than in non-hypertensive patients. On the other hand, patients with diabetes mellitus had more and diverse esophageal symptoms than the controls, including slightly increased frequencies of GERD and other symptoms, including dyspnea and heartburn [16]. Hence, these findings indicate that higher esophageal problems after SG may be associated with metabolic comorbidities, particularly diabetes, which would be explained by the effects of metabolic diseases on gastrointestinal motility and acid production. It was astonishing to observe that the

frequency of postoperative esophageal discomfort was related to weight loss following SG.

Patients with $<20\%$ weight loss and those with $\geq 30\%$ weight loss exhibited a higher incidence of GERD than those who experienced weight reduction between 20-29%, according to the data. Based on elements like stomach motility or gastric anatomy in the patient with significant weight loss, this could indicate that both too low and too high weight loss following SG could be linked to worse postoperative outcomes.

CONCLUSIONS

With 16% of patients experiencing GERD symptoms and 18% of patients reporting some type of esophageal symptom following the operation, sleeve gastrectomy (SG) is linked with a noteworthy frequency of GERD. Those who already have GERD are far more likely to have postoperative GERD and other esophageal problems. Preoperative GERD was found to be strongly correlated with either persistence or aggravation of these symptoms following surgery. Specifically, patients with preoperative GERD were over nine times more likely to experience postoperative symptoms, and every 5 kg/m² increase in BMI raised the risk by 2.3 times. The extent of postoperative weight loss also affected the prevalence of GERD and related symptoms. Patients who lost less than 20% or more than 30% of their preoperative weight had higher rates of GERD. Comorbidities such as hypertension and diabetes mellitus appeared to influence the development of postoperative GERD, though the differences were not substantial compared to patients without comorbidities.

Recommendations

1. *It is essential to carefully screen patients for preexisting GERD and other risk factors such as high BMI and older age before performing sleeve gastrectomy.*
2. *Routine postoperative monitoring for GERD and esophageal symptoms should be implemented, especially for patients with preoperative GERD or those at higher risk.*
3. *For patients with severe preoperative GERD or those at high risk for developing postoperative symptoms, alternative bariatric procedures such as gastric bypass may be considered, as they are associated with a lower risk of exacerbating reflux symptoms compared to SG.*
4. *Additional studies are recommended to explore the long-term outcomes of GERD and other esophageal symptoms following SG, particularly in patients with various comorbidities and different weight loss trajectories.*
5. *Future research should also focus on optimizing surgical techniques to minimize the risk of postoperative GERD.*

AUTHOR CONTRIBUTIONS

All authors substantively contributed to the drafting of the initial and revised versions of this paper. They take full responsibility for the integrity of all aspects of the work.

FUNDING

Nil.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

ETHICAL CONSIDERATIONS

All the activities were conducted in accordance with the ethical guidelines laid down for such activities by the Declaration of Helsinki. Patient confidentiality was ensured and the ethical guidelines of our institution were adhered to. Informed consent was obtained from all participants and they participated voluntarily. No personal data was released and all information was anonymous and secure.

ACKNOWLEDGMENTS

I would like to take this opportunity to extend my deepest appreciation to all the participants who have participated in this study, and also to the medical staff and friends who have helped me during the course of the research. A word of thanks to the General Surgery Department of Tikrit University for their assistance in providing the required facilities and directions.

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INFORMATION ABOUT THE AUTHORS

Khalid Khairi Hussein, PhD, Assistant Professor, General Surgery Department, College of Medicine, Tikrit University, Iraq

Email: drkhalid.khairi@gmail.com; Drkhalidkhairi@tu.edu.iq

Received 25.03.2025

Accepted for publication 21.06.2025

Published 30.03.2026