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Comparison of Intensive Care Unit Outcomes between Obese and Non-Obese Postmenopausal Women Undergoing Gastric Surgery

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ABSTRACT

Introduction: This study compares intensive care unit outcomes between obese and non-obese postmenopausal women undergoing gastric surgery, a population vulnerable to distinct metabolic and respiratory risks. Ultimately, we aim to evaluate how obesity status influences postoperative ICU length of stay, complication rates, and resource utilization in these patients.

Material and methods: This descriptive cross-sectional study was conducted at Tabriz University of Medical Sciences during 2023 and included 215 postmenopausal women selected through convenience sampling. Sample size was estimated using the Cochran formula for a single-population proportion. The study assessed demographic, clinical, surgical, and ICU-related variables, including obesity status, comorbidities, operative characteristics, inflammatory markers, postoperative complications, and key intensive care outcomes.

Results: Obese postmenopausal women experienced significantly longer ICU stays (54.82 ± 14.63 vs. 38.15 ± 9.47 hours; p<0.001) and prolonged mechanical ventilation (8.42 vs. 4.15 hours). Higher rates of respiratory distress (29.81% vs. 9.91%; p<0.001) and wound infections (12.50% vs. 3.60%; p=0.014) were observed. Consequently, obesity extended total hospitalization to 8.74 days compared to 6.82 days (p<0.001), reflecting a more complex and resource-intensive postoperative recovery trajectory.

Conclusion: Obesity in postmenopausal women significantly impairs recovery after gastric surgery, leading to extended ICU stays and increased respiratory and infectious complications. These findings suggest that obese patients require more intensive perioperative management and specialized monitoring. Clinicians should prioritize early mobilization and targeted pulmonary interventions to mitigate the heightened resource utilization and clinical risks associated with elevated body mass in this population.

Introduction

Obesity has become one of the most pervasive global health challenges, with rising prevalence across virtually all regions and age groups, and with particularly important implications for women after the menopausal transition, when hormonal and metabolic shifts favor central adiposity, insulin resistance, and sarcopenic trajectories that can compound perioperative risk in major abdominal procedures such as gastric surgery [1].

In postmenopausal women, the decline in estrogen and associated changes in body composition are linked not only to increases in visceral fat but also to adverse cardiometabolic profiles, including hypertension, dyslipidemia, impaired glucose tolerance, and systemic low-grade inflammation, all of which may influence physiologic reserve and

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postoperative recovery patterns that can culminate in intensive care unit (ICU) utilization [2].

Gastric surgery whether performed for malignant disease, complicated peptic disease, bariatric indications, or other upper gastrointestinal conditions remains a high-acuity surgical domain because it can entail substantial fluid shifts, risk of bleeding, pulmonary compromise, and anastomotic complications, making postoperative monitoring in high-dependency settings a common pathway for selected patients [3].

The ICU is not merely a location for rescue therapy but a complex environment where early recognition of deterioration, invasive hemodynamic support, mechanical ventilation, and organ support strategies converge, and where outcomes such as mortality, length of stay, ventilator days, and major complications reflect both preoperative vulnerability and the quality and timing of perioperative interventions [4].

Obesity intersects with perioperative physiology in multifaceted ways, influencing respiratory mechanics through reduced functional residual capacity and increased airway resistance, altering pharmacokinetics of anesthetic agents, complicating airway management, and increasing the likelihood of postoperative hypoventilation, atelectasis, and need for prolonged oxygen therapy or ventilatory support factors that can increase ICU admission rates and resource use [5].

At the same time, the relationship between obesity and critical care outcomes is not uniformly linear, as some cohorts have reported an “obesity paradox” in which overweight or moderately obese patients demonstrate comparable or occasionally better short-term survival in critical illness, a phenomenon variably attributed to selection bias, differences in inflammatory phenotypes, nutritional reserves, or limitations of body mass index (BMI) as a proxy for adiposity and fitness [6].

These uncertainties become more clinically consequential in the postmenopausal population, where frailty, osteopenia, cardiovascular remodeling, and diminished pulmonary reserve may coexist with obesity, thereby creating heterogeneous risk profiles that are not captured by BMI alone and may influence the trajectory from operating room to ICU and eventual convalescence [7].

Moreover, gastric surgery poses specific postoperative threats such as anastomotic leak, intra-abdominal sepsis, hemorrhage, delayed gastric emptying, and thromboembolic events that can precipitate rapid decompensation and ICU escalation, while obesity may further modify these risks through impaired wound healing, altered immune responses, and technical complexity that can prolong operative time and increase physiologic stress [8].

In postmenopausal women, cardiopulmonary comorbidities are often prevalent and may be underrecognized, including diastolic dysfunction, obstructive sleep apnea, and pulmonary hypertension, conditions that are particularly relevant to ICU outcomes because they predispose to perioperative hemodynamic instability, arrhythmias, and prolonged ventilatory dependence after upper abdominal surgery [9].

ICU outcome comparisons between obese and non-obese patients must also account for differences in perioperative decision-making, because thresholds for planned ICU admission may be lower in patients with higher BMI due to anticipated airway concerns, monitoring needs, or institutional practice patterns, potentially confounding the interpretation of ICU length of stay and complication rates as pure reflections of biological risk [10].

Equally important, obesity can shape postoperative care processes within the ICU itself, including challenges in mobilization, imaging, vascular access, pressure injury prevention, and accurate dosing of antimicrobial and anticoagulant therapies, all of which can influence the incidence of complications such as delirium, nosocomial infection, venous thromboembolism, and prolonged functional decline [11].

Non-obese postmenopausal women, however, are not uniformly low risk, as some may present with sarcopenia or sarcopenic obesity not evident in BMI-based classification, and low muscle mass has been associated with worse surgical resilience, higher infection rates, delayed recovery, and prolonged critical care needs, highlighting the limitations of binary obese/non-obese categorization without complementary body-composition or frailty assessment [12].

From a health-systems perspective, ICU utilization after gastric surgery carries substantial cost and opportunity implications, and understanding whether obesity in postmenopausal women is associated with longer ICU stays, higher organ support requirements, or different complication patterns can inform perioperative triage, enhanced recovery pathways, staffing models, and targeted risk mitigation strategies [13].

Methodologically, meaningful comparisons require clear definitions of obesity (e.g., BMI cutoffs or alternative adiposity metrics), consistent ICU outcome endpoints, and careful adjustment for confounders such as age, smoking, comorbidity burden, operative approach (open versus minimally invasive), cancer stage when relevant, transfusion, and intraoperative hemodynamics, because these variables may differ systematically between obese and non-obese groups and independently drive ICU trajectories [14].

Against this clinical and operational backdrop, comparing ICU outcomes between obese and non-obese postmenopausal women undergoing gastric surgery addresses a timely gap at the intersection of sex-specific aging biology, obesity-related perioperative physiology, and critical care resource stewardship, with the potential to refine risk stratification and tailor perioperative and ICU management to improve survival, reduce complications, and accelerate recovery in this growing patient population.

Material and methods

Study Design:

A descriptive cross-sectional study was conducted at Tabriz University of Medical Sciences, Tabriz, Iran, throughout 2023. The study captured perioperative and early postoperative ICU-related outcomes in a defined time window for eligible postmenopausal women undergoing gastric surgery, using a standardized data-collection protocol.

Sampling

The required sample size was estimated using the Cochran sample size formula for a single-population proportion in a descriptive cross-sectional study. With a 95% confidence level (Z=1.96), maximum variability (p=0.50), and acceptable precision (d=0.067), the calculated sample size was n=215. Participants were recruited through convenience (available) sampling, enrolling consecutive eligible patients admitted during 2023 at Tabriz University of Medical Sciences until the target sample size was reached.

Inclusion and Exclusion Criteria

Inclusion criteria were: postmenopausal women (no menstrual bleeding for ≥12 months), candidates for gastric surgery (elective) with planned postoperative monitoring in the ICU or high-dependency setting as per institutional routine, age ≥45 years, and provision of written informed consent. Exclusion criteria were: emergency surgery, pregnancy or perimenopausal status, refusal or inability to consent, reoperation during the same admission, known active systemic infection at baseline, documented chronic inflammatory/autoimmune disease, current use of systemic corticosteroids or immunosuppressive therapy, end-stage organ failure (e.g., decompensated cirrhosis or dialysis-dependent renal failure), incomplete key clinical records, or transfer to another center before completion of postoperative follow-up.

Procedure

For each participant, baseline characteristics were recorded from interviews and medical charts, including age, height, weight, body mass index (BMI), obesity status (categorized using BMI-based criteria), smoking status, comorbidities (e.g., hypertension, diabetes mellitus, ischemic heart disease, chronic lung disease), American Society of Anesthesiologists (ASA) class, and preoperative laboratory values available in routine care. Operative and anesthesia-related variables were documented, including surgical indication, surgical approach (open vs. laparoscopic), procedure type, operative duration, estimated blood loss, intraoperative fluid balance, transfusion requirement, anesthesia technique, and intraoperative hemodynamic events.

Postoperative and ICU-related outcomes were captured through structured bedside and chart-based assessment. The primary measured outcomes included ICU admission (planned vs. unplanned, if applicable), ICU length of stay, need for mechanical ventilation and its duration, oxygen therapy requirements, vasopressor use, hemodynamic parameters (heart rate and mean arterial pressure), urine output, and major early complications such as respiratory events (atelectasis, pneumonia, re-intubation), cardiovascular events (arrhythmia, myocardial ischemia), bleeding, thromboembolism, sepsis, and anastomotic or surgical-site complications. Additional recorded outcomes included total hospital length of stay, readmission to ICU (if any), and in-hospital mortality.

Data Analysis

Given that the study variables were normally distributed, continuous data were summarized as mean ± standard deviation and compared between obese and non-obese groups using the independent-samples t test. Categorical variables were presented as frequency (percentage) and compared using the chi-square test (or Fisher's exact test when expected cell counts were small). To quantify the association between obesity status and ICU outcomes while accounting for clinically relevant covariates (e.g., age, ASA class, major comorbidities, operative duration, and surgical approach), multivariable linear regression (for continuous outcomes such as ICU length of stay) and logistic regression (for binary outcomes such as mechanical ventilation requirement or presence of complications) were applied as appropriate. A two-sided p value <0.05 was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Ethics Committee of Tabriz University of Medical Sciences (Ethics Code: IR.TBZMED.REC.1403.571). Written informed consent was obtained from all participants before enrollment, confidentiality was ensured through de-identified data handling, and patients were informed of their right to withdraw at any stage without any effect on their clinical care.

Results

The baseline demographic and clinical characteristics of the 215 postmenopausal women stratified by obesity status are summarized in Table 1. No statistically significant between-group differences were observed for age (61.42 ± 5.83 vs. 62.17 ± 6.12 years; p=0.354) or years since menopause (11.28 ± 4.16 vs. 12.04 ± 4.79; p=0.218). In contrast, the obese group had higher prevalences of hypertension (55.77% vs. 37.84%; p = 0.009), type 2 diabetes mellitus (37.50% vs. 20.72%; p=0.007), and obstructive sleep apnea (27.88% vs. 5.41%; p<0.001), and a greater proportion of ASA class III (60.58% vs. 31.53%; p<0.001). Preoperative hemoglobin and serum albumin were comparable between groups (both p>0.05), whereas baseline C-reactive protein was significantly higher among obese participants (4.83 ± 1.72 vs. 3.14 ± 1.06 mg/L; p<0.001), consistent with greater preoperative systemic inflammation (Table 1).

Table 1. Baseline Demographic and Clinical Characteristics of Postmenopausal Women Undergoing Gastric Surgery

Variable	Obese Group (n = 104)	Non-Obese Group (n = 111)	p-value
Age (years, mean ± SD)	61.42 ± 5.83	62.17 ± 6.12	0.354
Years Since Menopause (mean ± SD)	11.28 ± 4.16	12.04 ± 4.79	0.218
Weight (kg, mean ± SD)	88.63 ± 9.42	64.19 ± 7.28	<0.001
BMI (kg/m², mean ± SD)	34.27 ± 3.19	24.11 ± 2.05	<0.001
Comorbidities [n (%)]	-	-	-
Hypertension	58 (55.77%)	42 (37.84%)	0.009
Type 2 Diabetes Mellitus	39 (37.50%)	23 (20.72%)	0.007
Ischemic Heart Disease	18 (17.31%)	12 (10.81%)	0.174
Obstructive Sleep Apnea	29 (27.88%)	6 (5.41%)	<0.001
Chronic Obstructive Pulmonary Disease	11 (10.58%)	8 (7.21%)	0.385
ASA Physical Status [n (%)]	-	-	-
Class II	41 (39.42%)	76 (68.47%)	<0.001
Class III	63 (60.58%)	35 (31.53%)	<0.001
Preoperative Laboratory Metrics	-	-	-
Hemoglobin (g/dL, mean ± SD)	12.64 ± 1.18	12.89 ± 1.32	0.149
Serum Albumin (g/dL, mean ± SD)	3.82 ± 0.44	3.91 ± 0.49	0.158
Baseline CRP (mg/L, mean ± SD)	4.83 ± 1.72	3.14 ± 1.06	<0.001

The intraoperative and surgical variables of the study cohort are detailed in Table 2. Obese patients experienced a significantly higher rate of conversion to or planning for open gastric procedures compared to non-obese patients (41.35% vs. 27.93%; p=0.038), though the distribution of specific surgical procedure types, such as gastrectomies and bariatric reconstructions, did not differ significantly between the groups (all p>0.05). Due to the technical challenges associated with increased abdominal adiposity, the mean operative duration was significantly longer in the obese cohort than in the non-obese cohort (168.42 ± 32.17 vs. 139.58 ± 26.84 minutes; p<0.001). This prolonged surgical exposure in obese patients corresponded with a statistically higher mean estimated blood loss (264.83 ± 68.51 vs. 192.14 ± 49.32 mL; p<0.001) and a significantly greater requirement for intraoperative blood transfusions (18.27% vs. 8.11%; p=0.029). Furthermore, intraoperative fluid administration was significantly elevated in the obese group compared to the non-obese group (2845.19 ± 512.63 vs. 2314.72 ± 418.95 mL; p<0.001), indicating more aggressive fluid resuscitation during surgery (Table 2).

Table 2. Intraoperative and Surgical Characteristics of Postmenopausal Women Undergoing Gastric Surgery

Variable	Obese Group (n = 104)	Non-Obese Group (n = 111)	p-value
Surgical Approach [n (%)]	-	-	-
Open Gastric Surgery	43 (41.35%)	31 (27.93%)	0.038
Laparoscopic Gastric Surgery	61 (58.65%)	80 (72.07%)	0.038
Type of Gastric Procedure [n (%)]	-	-	-
Gastrectomy (Total/Subtotal)	39 (37.50%)	45 (40.54%)	0.648
Bariatric Gastric Procedures	48 (46.15%)	42 (37.84%)	0.219

Other Gastric Resections	17 (16.35%)	24 (21.62%)	0.327
Operative Duration (minutes, mean ± SD)	168.42 ± 32.17	139.58 ± 26.84	<0.001
Estimated Blood Loss (mL, mean ± SD)	264.83 ± 68.51	192.14 ± 49.32	<0.001
Intraoperative Fluid Administration (mL, mean ± SD)	2845.19 ± 512.63	2314.72 ± 418.95	<0.001
Intraoperative Transfusion Required [n (%)]	19 (18.27%)	9 (8.11%)	0.029

The postoperative intensive care unit (ICU) outcomes and clinical complications are detailed in Table 3. Patients in the obese group experienced a significantly longer mean ICU residence time compared to the non-obese cohort (54.82 ± 14.63 vs. 38.15 ± 9.47 hours; p<0.001), which was accompanied by an extended total hospital duration (8.74 ± 2.19 vs. 6.82 ± 1.54 days; p<0.001). The duration of postoperative mechanical ventilation was also significantly prolonged in obese patients (8.42 ± 3.19 vs. 4.15 ± 1.83 hours; p<0.001), reflecting a higher proportion of planned ICU admissions for airway and respiratory monitoring in this group (85.58% vs. 72.97%; p=0.024). Regarding postoperative morbidity within the ICU, the obese cohort exhibited a significantly higher incidence of atelectasis or acute respiratory distress (29.81% vs. 9.91%; p<0.001) and surgical site or wound infections (12.50% vs. 3.60%; p=0.014). In contrast, rate differences for severe adverse events including pneumonia (8.65% vs. 2.70%), re-intubation (5.77% vs. 0.90%), anastomotic leakage (4.81% vs. 3.60%), sepsis (3.85% vs. 0.90%), and in-hospital mortality (1.92% vs. 0.90%) did not reach statistical significance between the two patient groups (Table 3).

Table 3. Postoperative ICU Outcomes and Complications in Postmenopausal Women Undergoing Gastric Surgery

Variable	Obese Group (n = 104)	Non-Obese Group (n = 111)	p-value
ICU Length of Stay (hours, mean ± SD)	54.82 ± 14.63	38.15 ± 9.47	<0.001
Total Hospital Stay (days, mean ± SD)	8.74 ± 2.19	6.82 ± 1.54	<0.001
Mechanical Ventilation Duration (hours, mean ± SD)	8.42 ± 3.19	4.15 ± 1.83	<0.001
Planned ICU Admission [n (%)]	89 (85.58%)	81 (72.97%)	0.024
Unplanned ICU Readmission [n (%)]	7 (6.73%)	2 (1.80%)	0.076
Postoperative ICU Complications [n (%)]	-	-	-
Atelectasis or Respiratory Distress	31 (29.81%)	11 (9.91%)	<0.001
Pneumonia	9 (8.65%)	3 (2.70%)	0.062
Re-intubation Required	6 (5.77%)	1 (0.90%)	0.057
Anastomotic Leakage	5 (4.81%)	4 (3.60%)	0.659
Wound Infection / Surgical Site Infection	13 (12.50%)	4 (3.60%)	0.014
Hemorrhage or Bleeding Events	8 (7.69%)	6 (5.41%)	0.499
Sepsis or Septic Shock	4 (3.85%)	1 (0.90%)	0.197
In-Hospital Mortality [n (%)]	2 (1.92%)	1 (0.90%)	0.609

The most critical findings regarding intensive care utilization are illustrated in Figure 1, highlighting a significant disparity in postoperative recovery trajectories based on obesity status. Patients in the obese cohort required a substantially longer mean ICU stay compared to their non-obese counterparts (54.82 ± 14.63 vs. 38.15 ± 9.47 hours; p<0.001). This increased duration of critical care was closely associated with a significantly higher incidence of respiratory distress and atelectasis (29.81% vs. 9.91%; p<0.001) and a prolonged requirement for mechanical ventilation (8.42 ± 3.19 vs. 4.15 ± 1.83 hours; p<0.001). Furthermore, the obese group demonstrated a three-fold increase in surgical site infections (12.50% vs. 3.60%; p=0.014), altogether contributing to a marked extension in total hospital residence time as depicted in the clinical data and the comparative analysis in Figure 1.

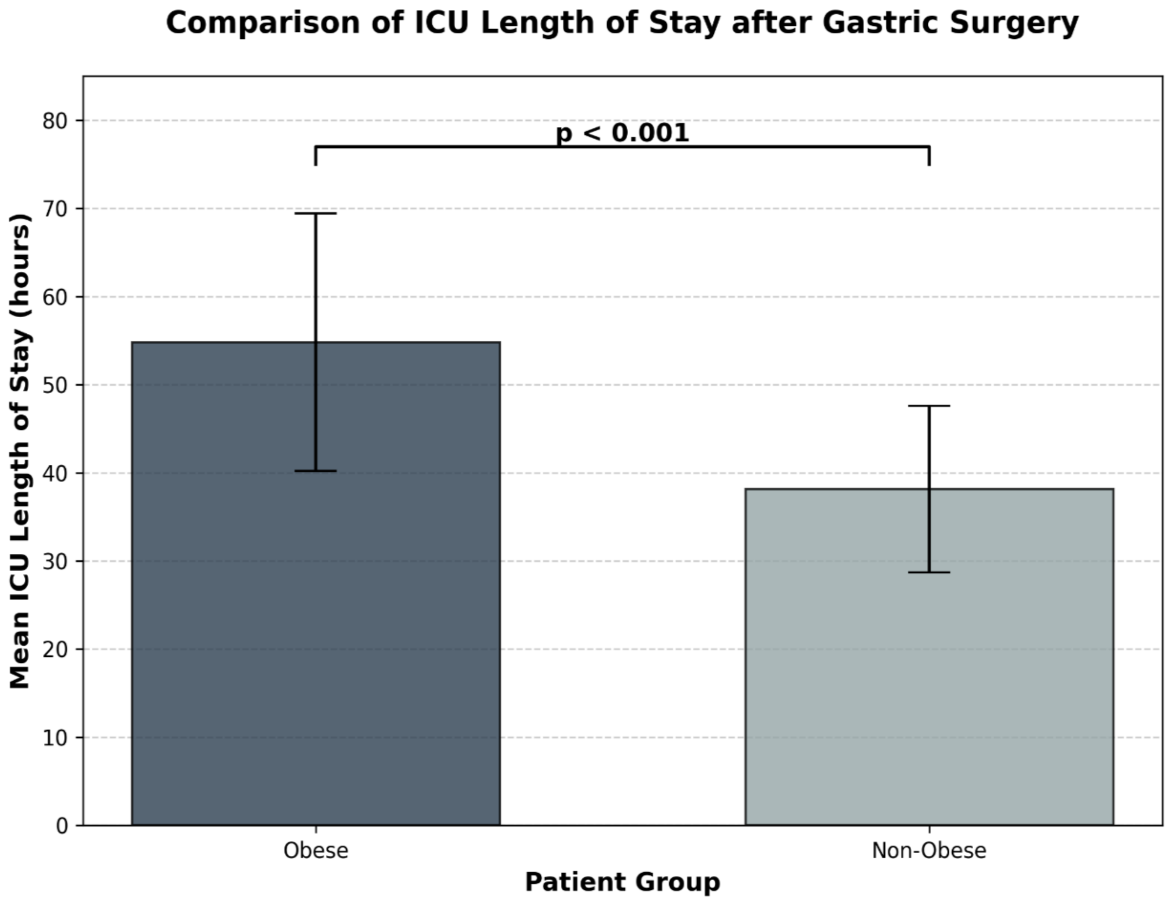

Figure 1. Comparison of ICU Length of Stay Between Obese and Non-Obese Postmenopausal Women Undergoing Gastric Surgery

Discussion

The present study was designed to compare intensive care unit outcomes between obese and non-obese postmenopausal women undergoing gastric surgery, with particular emphasis on the relationship between obesity, perioperative inflammatory burden, and early postoperative critical care requirements. By focusing on this clinically vulnerable population, the study sought to clarify whether obesity status is associated with a more complex postoperative course characterized by greater inflammatory activation, increased respiratory compromise, and longer utilization of ICU resources after gastric procedures [15].

Overall, the findings showed a consistent pattern of less favorable perioperative and postoperative outcomes in obese postmenopausal women. Compared with non-obese patients, the obese group underwent open procedures more frequently, had longer operative times, greater blood loss, higher intraoperative fluid and transfusion requirements, and subsequently experienced longer ICU stay, prolonged mechanical ventilation, more respiratory complications, more wound infections, and longer total hospitalization. Although some severe outcomes such as pneumonia, re-intubation, sepsis, anastomotic leakage, and in-hospital mortality were numerically higher in obese patients, these differences did not reach statistical significance, possibly because of the relatively limited number of such events [16].

One plausible explanation for these findings is the well-established proinflammatory state associated with obesity, which appears to be particularly relevant after menopause. Adipose tissue is not merely a passive energy reservoir; it is an active endocrine and immunologic organ that produces interleukin-6, tumor necrosis factor-alpha, leptin, and other mediators that contribute to chronic low-grade systemic inflammation. In postmenopausal women, estrogen decline further shifts fat distribution toward visceral accumulation, intensifying inflammatory signaling and metabolic dysregulation. This biological background may help explain why obese patients enter surgery with a less favorable physiologic profile and are more likely to develop exaggerated postoperative inflammatory responses requiring closer ICU surveillance [17].

The higher frequency of open surgery and the significantly longer operative duration observed in the obese group likely also contributed to the adverse ICU profile. Excess adiposity increases technical difficulty during gastric procedures by limiting exposure, complicating dissection, impairing tissue handling, and prolonging anesthesia time. Longer operations are commonly associated with greater surgical stress, more tissue trauma, larger fluid shifts, and increased blood loss, all of which may amplify inflammatory activation and delay early recovery. In this context, the greater need for transfusion and fluid administration in obese patients may reflect not only technical complexity but also a more demanding intraoperative physiological course [18].

Respiratory morbidity emerged as one of the most important differences between the groups, and this is clinically unsurprising. Obesity adversely affects pulmonary mechanics by reducing functional residual capacity, decreasing chest wall compliance, and increasing airway closure, particularly in the supine and postoperative states. In postmenopausal women, these effects may be compounded by age-related reductions in respiratory reserve and a higher prevalence of comorbid conditions such as obstructive sleep apnea. After upper abdominal surgery, pain-independent splinting, diaphragmatic dysfunction, and limited mobility further increase the risk of atelectasis and respiratory distress, thereby prolonging ventilatory support and ICU stay in obese patients [19].

The longer ICU and hospital stays observed in the obese cohort can therefore be interpreted as downstream consequences of both baseline vulnerability and postoperative complexity. Obese patients in this study had higher rates of hypertension, diabetes, sleep apnea, and higher ASA class, indicating a heavier comorbidity burden before surgery. These factors reduce physiologic reserve and may impair the ability to tolerate hemodynamic stress, metabolic fluctuations, and pulmonary compromise after major gastric surgery. As a result, clinicians may appropriately adopt a lower threshold for ICU monitoring and more cautious postoperative management in this population, which can itself extend ICU utilization even in the absence of catastrophic complications [20].

The increased rate of surgical site infection in obese patients is also biologically and surgically plausible. Obesity has been associated with impaired tissue perfusion, reduced oxygen delivery to adipose-rich surgical fields, altered collagen synthesis, and delayed wound healing. In addition, longer procedures and greater tissue handling may increase contamination risk and local inflammatory injury. For gastric surgery, where nutritional status, immune competence, and tissue integrity are central to recovery, these mechanisms may combine to create a more favorable environment for postoperative wound complications in obese postmenopausal women [21].

Although some major adverse outcomes did not differ significantly between groups, the direction of effect consistently favored the non-obese cohort. The absence of statistical significance for pneumonia, re-intubation, sepsis, anastomotic leakage, and mortality should therefore be interpreted cautiously rather than as proof of equivalence. These endpoints were relatively infrequent, and the study may not have been powered to detect modest but clinically meaningful differences in rare complications. Nonetheless, the observed trends remain important because they align with the broader pattern of increased perioperative burden among obese patients and support the need for closer risk stratification in this setting [22].

The findings of this study also have practical implications for perioperative care pathways. Obese postmenopausal women undergoing gastric surgery may benefit from enhanced preoperative optimization, including stricter control of diabetes and hypertension, respiratory evaluation for sleep-disordered breathing, nutritional assessment, and strategies to reduce inflammatory burden before surgery. Intraoperatively, minimizing operative duration where feasible, careful fluid management, lung-protective ventilation, and meticulous tissue handling may reduce downstream complications. Postoperatively, aggressive pulmonary care, early mobilization, infection prevention, and individualized ICU triage may help shorten recovery time and improve outcomes in this high-risk group [23].

Several limitations should be acknowledged when interpreting these results. The cross-sectional design limits causal inference, and the single-center setting may reduce generalizability to other institutions with different case mixes, ICU admission policies, or surgical expertise. In addition, obesity was categorized primarily by body mass index, which cannot distinguish visceral adiposity from differences in muscle mass or detect sarcopenic obesity. Residual confounding related to nutritional status, cancer stage, anesthetic variability, or perioperative inflammatory markers may also have influenced the results. Even so, the consistency of the observed differences across multiple surgical and ICU outcomes strengthens the overall interpretation [24].

In conclusion, this study suggests that obesity in postmenopausal women undergoing gastric surgery is associated with a more demanding intraoperative course and a more complicated postoperative ICU trajectory, characterized by longer critical care stay, prolonged ventilatory support, and higher rates of respiratory and wound-related complications. These findings likely reflect the combined effects of baseline inflammatory dysregulation, metabolic comorbidity, altered respiratory physiology, and greater technical complexity during surgery. Future prospective studies incorporating direct inflammatory biomarkers and more refined body-composition assessment may further clarify the mechanisms linking obesity to adverse ICU outcomes in this population [25].

Conclusion

In conclusion, this study demonstrates that obesity status in postmenopausal women is a critical determinant of intensive care outcomes following gastric surgery. The significant increases in ICU length of stay, mechanical ventilation duration, and postoperative complications particularly respiratory distress and surgical site infections highlight the physiological and technical challenges posed by excess adiposity. These outcomes underscore the necessity for tailored perioperative protocols and enhanced recovery pathways specifically designed for obese postmenopausal patients. Optimizing preoperative comorbidities and implementing aggressive postoperative respiratory care may reduce the observed disparity in clinical recovery and hospital resource utilization. Ultimately, obesity should be integrated into risk stratification models to better anticipate and manage the complex intensive care needs of this surgical demographic.

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Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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