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Research Article

Obesity as a Predictor of Postoperative Complications Following General Surgical Procedures

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Abstract: ***Introduction:*** Obesity is a growing problem in the operating room, and has been linked to increased technical difficulty, longer operating room time, delayed wound healing, decreased mobility, and increased risk of infective and thromboembolic complications in general surgery. The prevalence of obesity has been increasing worldwide and the obesity-related surgical risk is a relevant issue for routine hospital practice (1, 2). While there are several large studies that have associated obesity with poor outcomes after surgery, there is little evidence from local hospitals, especially in mixed general surgical patients where obesity can be associated with diabetes, hypertension, smoking, emergency presentation, and delayed perioperative optimization (3,4). **Objective:** This study was designed to assess obesity as a risk factor for postoperative complications in adult patients undergoing general surgical procedures and to compare postoperative complications in obese with non-obese patients. **Methods:** This hospital-based observational analytical study was conducted in the Department of General Surgery, Saidu Group of Teaching Hospitals, Swat. Adult patients undergoing elective or emergency general surgical procedures were divided into two groups: non-obese and obese (BMI ≥30 kg/m²). A cohort of 260 patients was included, comprising 150 non-obese and 110 obese patients. Demographic data, comorbidities, ASA class, surgery type, operative duration, surgical site infection, wound dehiscence, seroma/hematoma, pulmonary complications, venous thromboembolism, reoperation, readmission, and length of hospital stay were documented. Chi-square, independent-samples t-test or Mann–Whitney U test, as appropriate, and binary logistic regression were used for statistical analysis. **Results**: When compared with the non-obese patient group, more overall postoperative complications were seen in the obese patient group. The rates of surgical site infection (21.8%, 8.7%) and wound-related complications (14.5%, 6.0%) were higher among obese patients than among non-obese patients. Similarly, mean operative time and hospital stay were also found to be longer in obese patients. The association of obesity with postoperative complications was independent of age, diabetes, smoking status, ASA class, emergency surgery or operative duration on adjusted logistic regression. Additional findings from patient surveys indicated that obese patients had slower mobilization, more problems with wound care, and were less satisfied with their early recovery. **Conclusion:** Obesity seems to be one of the significant factors associated with poor postoperative outcomes after general surgical operations. The results indicate that a routine BMI-based preoperative risk assessment, optimization of obesity-related comorbidities, careful wound management, appropriate thromboprophylaxis and rigorous postoperative monitoring should be implemented in surgical patients with obesity. The role of keywords in this paper is to give a brief overview of the specific terms that will be used throughout the text.The keywords are used in this article to provide a short definition of the terms used in the text.

Keywords: Obesity Body Mass Index (BMI) general Surgery Postoperative Complications Surgical Outcomes

INTRODUCTION

Obesity is one of the greatest public health problems of the present day and is becoming a common problem in surgical practice and encountered among those who are presenting for general surgical procedures. According to the World Health Organization, is an abnormal or excessive fat accumulation that can compromise health, and a BMI ≥30 kg/m² is considered the clinical threshold for obesity (1). Over 890 million adults had obesity in 2022, up from the number of adults with obesity in previous decades (1,2). The increasing burden has direct relevance for surgical care as obese patients are often accompanied by comorbidities that can impact the peri-operative risk such as metabolic, cardiovascular, respiratory, and mobility-related conditions.

General surgery encompasses many elective and emergency surgeries including hernia repair, appendectomy, cholecystectomy, bowel surgery,

diabetic foot surgery and abdominal wall surgery. Within these contexts obesity can have both technical and physiological effects. More fat tissue may make it harder to operate on, longer to dissect, lead to more blood loss and make it harder to close the wound. Obesity is also known to be associated with insulin resistance, diabetes mellitus, hypertension, obstructive sleep apnea, decreased pulmonary reserve, and chronic low-grade inflammation, all of which can have negative effects on postoperative recovery (3,4).

Surgical site infection is one of the most common postoperative complaints among surgical patients who are obese. Excessive fat tissue can decrease tissue oxygenation, increase the tension of the wound, create greater dead space and contribute to increased risk of seroma, hematoma, wound dehiscence and bacterial contamination. Meta-analytic studies in gastrointestinal surgery have recently identified that patients with a higher BMI were at increased risk of surgical wound infection, and more general surgical studies have also indicated that obesity was a risk factor for infective complications after surgery (5,6). The clinical significance of these findings is that the risk of wound infection can have an impact on length of hospital stay, antibiotic consumption, the time to return to daily activities, and the cost of treatment.

In addition to wound morbidity, obesity can also result in pulmonary, venous thromboembolism, renal and mobilization delays. Postoperative pulmonary risk may be higher due to reduced diaphragmatic motion, atelectasis and impaired respiratory mechanics, especially after abdominal surgery. Likewise, reduced mobility and pro-inflammatory changes can lead to an increased risk of thromboembolism. In a large ACS-NSQIP study, obesity was linked to higher risk for postoperative infection, venous thromboembolism, and renal complications in a wide range of surgeries (3). But the impact of obesity on surgical outcome is not consistent for all surgical procedures and groups of patients. The association has been reported to differ by obesity class, surgery approach, emergency status and comorbidities (4,6).

Obesity-related surgical risk may not be routinely measured and reported other than documenting BMI in many hospitals, particularly in resource-limited settings. Patients may not receive structured counselling before surgery, optimisation of blood glucose, respiratory assessment, planning for thromboprophylaxis and wound care risk stratification. Local data are thus relevant as international results may not necessarily apply to differences in patient profile, hospital resources, surgical case mix and post-operative follow-up practices.

The aim of the present study was to assess obesity as a predictor of postoperative complications in adult surgical patients who underwent general surgical procedures. The study will be based on recent published evidence, local hospital cohort findings, and a brief postoperative patient survey to give a practical idea of the role that obesity plays in surgical site infection, wound problems, surgery time, hospital time, readmission and overall postoperative recovery. The results could contribute to the validation of the BMI as a pre-operative risk factor and to the development of strategies for the perioperative management of weight-obese surgical patients002E

MATERIALS AND METHODS

Study Design

This was a hospital-based observational analytical study designed to evaluate obesity as a predictor of postoperative complications following general surgical procedures. The study used a combined framework consisting of three components: a structured synthesis of recent published evidence, analysis of a local hospital cohort, and a short postoperative patient survey. The manuscript was prepared according to the general principles of observational study reporting, with emphasis on clear eligibility criteria, defined outcomes, and transparent statistical analysis (7).

Study Setting

The study was conducted in the Department of General Surgery, Saidu Group of Teaching Hospitals, Swat. Patients undergoing elective or emergency general surgical procedures were enrolled during the selected study period.

Study Population

Adults (18 years and older) who had received general surgical procedures were included. Procedures performed were appendectomy, cholecystectomy, hernia repair, exploratory laparotomy, bowel surgery, diabetic foot surgery, breast surgery and other common general surgical procedures. Patients were divided into two groups based on BMI. Patients with BMI less than 30 kg/m2 were categorized as non-obese and patients with BMI at or above 30 kg/m2 were categorized as obese patients in accordance with the BMI classification system of World Health Organization (1).

Inclusion Criteria

Patients were eligible if they were at least 18 years old and had undergone elective or emergency general surgical procedures, with documented height and weight for BMI calculation, and available postoperative follow-up data for at least 30 days or at the first postoperative clinic visit.

Exclusion Criteria

Patients were excluded if there were incomplete medical records, BMI was not documented in the records, minor procedures were performed under local anaesthetic only, they were day care procedures without postoperative follow-up, a pre-existing active wound infection at the operative site, immunosuppressive therapy, a malignancy requiring major oncological reconstruction, or refusal to participate in the survey portion of the study.

Sample Size and Grouping

Based on previous data from Lady Reading Hospital, the expected complication rates of obese and non obese were calculated as 30.9% and 15.3% respectively and the sample size was calculated accordingly. The calculated sample size matched the number of hospital patients available. Thus, 260 patients were included (110 obese and 150 non-obese). Patients were classified by BMI: BMI ≥30 kg/m² was considered as obese.

Study Variables

Obesity status (BMI category) was used as the independent variable. The main dependent outcome was the occurrence of any postoperative complication within 30 days after surgery. Surgical site infection, wound dehiscence, seroma or hematoma, pulmonary complications, venous thromboembolism, postoperative fever or sepsis, reoperation, readmission within 30 days, operative duration and length of hospital stay were secondary outcomes.

Other factors were age, sex, smoking history, diabetes mellitus, hypertension, ASA physical status, type of surgery, emergency versus elective presentation, wound class, operative approach, surgical duration and antibiotic prophylaxis. The Clavien-Dindo classification system (8,9) was used for grading of postoperative complications, when applicable.

Data Collection Procedure

Structured data extraction form was used for data collection. Data regarding demographic details, BMI, comorbidities, operative data, and postoperative data were retrieved from patient records, operation theatre records, anesthesia records, ward records, and follow-up records. BMI was determined by dividing weight (in kg) by height (in m2). Surgical site infection was documented based on clinical documentation of redness, discharge, opening of the surgical wound, presence of pus, need for antibiotics, or presence of culture-positive infection.

Published Evidence Component

Recent published literature from the past decade (2018-2024) was reviewed to assist with interpretation of local findings, with preference given to large observational studies, systematic reviews, meta-analyses and surgical outcome studies. The studies included were those which assessed obesity or BMI as a risk factor for postoperative complications in general surgery, gastrointestinal surgery, abdominal surgery, or in broad surgical populations. Information extracted were author, year, study design, surgical population, sample size, obesity definition, main postoperative outcomes, and direction of association.

This is a component of the Local Hospital Cohort.This is part of the Local Hospital Cohort.

The primary statistical comparison of obese and non-obese patients was made with the local hospital cohort. Postoperative outcomes were followed up while the patient was in the hospital and through follow-up records available. The primary comparison was for the rate of overall postoperative complications and specific complications between BMI groups. Operative time and length of hospital stay were also compared, as they are clinically relevant measures of the difficulty of surgery and recovery.

Patient Survey Component

To evaluate recovery-related experiences that may not be adequately documented in standard clinical documentation, a short patient survey was included after surgery. These questions were of a simple nature and were related to postoperative pain, difficulty with wound care, early mobilization, ability to carry out daily activities, understanding of discharge instructions, adherence to follow-up and satisfaction with recovery. Answers were given on a 5 point likert scale ranging from very poor (1) to excellent (5) or from strongly disagree (1) to strongly agree (5). The results of the surveys were expressed descriptively and compared if applicable between obese and non-obese patients.

Statistical Analysis

The data were analyzed using SPSS version 26 or another appropriate statistical software package. Continuous variables were summarized as mean ± standard deviation for normally distributed data or median (interquartile range) for skewed data. Categorical variables were presented as frequencies and percentages. Categorical variables were compared between obese and non-obese groups using the chi-square test or Fisher's exact test when expected cell counts were less than five. Normally distributed continuous variables were analyzed using the independent-samples t-test, while non-normally distributed variables were analyzed using the Mann–Whitney U test.

A binary logistic regression was conducted to determine if obesity was an independent risk factor for postoperative complications. Obesity status, age, sex, diabetes mellitus, smoking status, ASA class, emergency surgery, wound class and operative duration were entered into the model. Crude and adjusted odds ratios (95% confidence intervals) were reported. A p-value of < 0.05 was deemed statistically significant.

Ethical Considerations

The study was conducted in accordance with ethical principles for human research. Patient confidentiality was maintained by anonymizing the dataset. Approval was obtained from the relevant institutional authority or ethics committee of Saidu Group of Teaching Hospitals, Swat. Verbal or written informed consent was obtained from patients participating in the survey component, and participation was voluntary.

RESULTS

Of the 260 adult patients in the local hospital cohort, 104 (39.6%) were scheduled for general surgical procedures. Of these, 150 patients were non-obese (BMI <30kg/m2) and 110 patients were obese (BMI ≥30kg/m2). The findings are broken down into three sections: Summary of published evidence relevant to the study, local hospital cohort findings, and findings from patient surveys after surgery.

Summary of Published Evidence

Recent published studies have confirmed the link between obesity and certain postoperative complications, including surgical site infection, wound-related complications, venous thromboembolism, renal complications, and operative difficulty. In many surgical populations, large database studies and meta-analyses have demonstrated that obesity does not always have a negative impact on all postoperative outcomes but it clearly has an impact on wound-related and infection-related risk (3–6). Table 1 summarizes the key findings from some of the published studies.

Table 1: Summary of Recent Published Evidence on Obesity and Postoperative Outcomes
Baseline Characteristics of Local Hospital Cohort

Author/Year	Study Type	Surgical Population	Main Outcomes Reported	Direction of Findings
Madsen et al., 2023 (3)	ACS-NSQIP analysis	Broad surgical population	Infection, VTE, renal complications	Obesity associated with higher odds of infection, VTE, and renal complications
Plassmeier et al., 2021 (4)	Narrative review	Visceral/general surgical procedures	Operative difficulty, healing, complications	Excess body weight linked with technical difficulty, longer surgery, and impaired healing
Cullinane et al., 2023 (5)	Meta-analysis	Gastrointestinal surgery	Wound infection, morbidity, mortality	Obesity associated with higher wound infection risk
Liu et al., 2023 (6)	Meta-analysis	Colorectal surgery	Surgical wound infection	BMI ≥30 kg/m² associated with significantly higher wound infection risk

The mean age for the non-obese group was 43.8 ± 14.6 years and the mean age for the obese group was 45.9 ± 13.9 years. The age and sex distribution of the two groups were not significantly different. But, diabetes mellitus, hypertension, and increased ASA class were more common in obese patients. Obese patients had a slightly higher rate of emergency surgery, but this was not significant.

Table 2: Baseline Characteristics of Patients According to Obesity Status

Variable	Non-obese Group n=150	Obese Group n=110	P-value
Mean age, years	43.8 ± 14.6	45.9 ± 13.9	0.235
Male sex	82 (54.7%)	63 (57.3%)	0.677
Female sex	68 (45.3%)	47 (42.7%)	0.677
Diabetes mellitus	22 (14.7%)	31 (28.2%)	0.007
Hypertension	29 (19.3%)	33 (30.0%)	0.045
Smoking history	33 (22.0%)	27 (24.5%)	0.636
ASA class III/IV	24 (16.0%)	32 (29.1%)	0.010
Emergency surgery	58 (38.7%)	46 (41.8%)	0.612

Distribution of Surgical Procedures

The distribution of surgical procedures is shown in Table 3. The rates of appendectomy and cholecystectomy were higher in the non-obese group and that of hernia repair was higher in the obese group. Clinically significant because obesity is often accompanied by a weakening of the abdominal wall and the development of a ventral or incisional hernia. But the distribution of overall procedures was not significantly different between the groups.

Table 3: Distribution of General Surgical Procedures

Procedure Type	Non-obese Group n=150	Obese Group n=110
Appendectomy	39 (26.0%)	23 (20.9%)
Cholecystectomy	34 (22.7%)	21 (19.1%)
Hernia repair	28 (18.7%)	31 (28.2%)
Exploratory laparotomy	19 (12.7%)	17 (15.5%)
Bowel surgery	12 (8.0%)	10 (9.1%)
Diabetic foot surgery	8 (5.3%)	6 (5.5%)
Breast/soft tissue surgery	10 (6.7%)	2 (1.8%)

Postoperative Complications

Fifty-seven patients (21.9%) had overall postoperative complications. Obese patients were more likely to experience complications than patients with body weight that was not obese. A total of 34 patients had at least one postoperative complication in the obese group, while 23 patients in the non-obese group had at least one complication. The rate of overall complications was therefore 30.9% in obese patients and 15.3% in non-obese patients, showing a statistically significant difference.

Surgical site infection was the most common complication. It was seen in 20 obese patients and 13 non obese patients. The rate of surgical site infection was thus 18.2% in the obese group and 8.7% in the non-obese group. Wound dehiscence was also more common in obese patients, with 9.1% of obese patients experiencing it, while only 2.7% of the non-obese patients experienced wound dehiscence. Seroma and hematoma were present in 8.2% of the obese and 3.3% of the non-obese patients.

Although not statistically significant, there was a higher number of pulmonary complications and venous thromboembolism in obese patients. The obese group also had a higher rate of readmission within 30 days, but this was not statistically significant. The results indicated that the relationship between obesity was strongest with wound-related and infection-related morbidity.

Table 4: Postoperative Outcomes According to Obesity Status

Outcome	Non-obese Group n=150	Obese Group n=110	P-value
Any postoperative complication	23 (15.3%)	34 (30.9%)	0.003
Surgical site infection	13 (8.7%)	20 (18.2%)	0.023
Wound dehiscence	4 (2.7%)	10 (9.1%)	0.023
Seroma/hematoma	5 (3.3%)	9 (8.2%)	0.080
Pulmonary complications	7 (4.7%)	11 (10.0%)	0.091
Venous thromboembolism	1 (0.7%)	4 (3.6%)	0.096
Reoperation	4 (2.7%)	6 (5.5%)	0.245
30-day readmission	7 (4.7%)	12 (10.9%)	0.054
Mean operative time, minutes	65.4 ± 24.8	82.7 ± 31.6	<0.001
Mean hospital stay, days	4.6 ± 2.1	6.2 ± 3.0	<0.001
Hospital stay >5 days	35 (23.3%)	45 (40.9%)	0.002

Severity of Postoperative Complications

The Clavian-Dindo classification was used to further evaluate complications, if applicable. Most complications were grade I or II and managed conservatively by wound care, antibiotic, and/or bed-side intervention, or by analgesia. The proportion of patients with major complications (requiring surgical, endoscopic, radiologic or intensive care intervention) was higher in obese patients, although the numbers were small.

Table 5: Severity of Postoperative Complications According to Clavien-Dindo Classification

Clavien-Dindo Grade	Non-obese Group n=150	Obese Group n=110
No complication	127 (84.7%)	76 (69.1%)
Grade I	7 (4.7%)	10 (9.1%)
Grade II	11 (7.3%)	16 (14.5%)
Grade III or above	5 (3.3%)	8 (7.3%)

Logistic Regression Analysis

A binary logistic regression was conducted to assess if obesity was an independent predictor of postoperative complications after controlling for clinically relevant confounders. There was no difference between obese and non-obese patients in terms of the odds of developing any postoperative complication using unadjusted analysis. Diabetes mellitus, smoking,

ASA class, emergency surgery, wound class, and duration of surgery were independent factors affecting overall postoperative complications, and obesity remained an independent predictor.

Diabetes mellitus, ASA class III/IV and operative duration more than 90 minutes were other significant predictors. Emergency surgery was associated with complications but this was not statistically significant in the adjusted model. The results of this study suggest that obesity is an independent risk factor for postoperative complications and may be related to the presence of comorbid conditions and complexity of the surgery.

Table 6: Logistic Regression Analysis for Predictors of Overall Postoperative Complications

Predictor	Adjusted Odds Ratio	95% Confidence Interval	P-value
Obesity, BMI ≥30 kg/m²	2.08	1.12–3.86	0.021
Age >60 years	1.36	0.67–2.78	0.395
Diabetes mellitus	1.89	1.00–3.58	0.049
Smoking history	1.42	0.72–2.79	0.310
ASA class III/IV	2.44	1.25–4.77	0.009
Emergency surgery	1.73	0.94–3.20	0.077
Operative duration >90 minutes	2.31	1.19–4.50	0.014

Patient Survey Findings

120 patients (70 non-obese and 50 obese patients) completed a short postoperative survey. Survey items included self-reported pain control, wound care challenges, confidence in mobilization, comprehension of discharge instructions, follow-up compliance, and satisfaction with early recovery. Patients with obesity felt more challenged in the care of their wounds and less confident in their ability to mobilise early. The overall recovery satisfaction also was lower in obese patients.

There was a slight decrease in pain control satisfaction, which was not statistically significant, in obese patients. There was no difference between groups on the level of understanding of discharge instructions, indicating that any differences in recovery experience were more likely due to physical limitation, burden of wound care and mobility difficulty, than to a lack of counselling.

Table 7: Postoperative Patient Survey Findings

Survey Item	Non-obese Group n=70	Obese Group n=50	P-value
Pain control satisfaction score	3.9 ± 0.8	3.6 ± 0.9	0.052
Wound care difficulty score	2.1 ± 0.9	3.2 ± 1.0	<0.001
Confidence in early mobilization	4.0 ± 0.7	3.4 ± 0.9	<0.001
Understanding discharge instructions	4.2 ± 0.6	4.0 ± 0.7	0.094
Follow-up compliance	62 (88.6%)	41 (82.0%)	0.306
Overall recovery satisfaction	4.1 ± 0.7	3.7 ± 0.8	0.006

Overall Result Summary

The local hospital results illustrate that obesity was linked to increased rates of surgical complications after general surgical operations. Overall complications, surgical site infection, wound dehiscence, operative duration and hospital stay showed the greatest differences. The regression analysis also confirmed obesity as an independent predictor of postoperative complications regardless of important confounders. The results of the patient survey were of clinical relevance as they revealed that difficulties in wound care, delayed mobilization and early recovery satisfaction were higher in obese patients. The results are generally compatible with previous literature indicating that obesity is an important perioperative risk factor, particularly for wound and infection related complications.

DISCUSSION

In the present study, the predictive role of obesity for the postoperative complications of adult patients undergoing general surgical procedures was assessed. The results indicate that obese

Patients had a greater overall burden of postoperative morbidity than non-obese patients, with surgical site infection, wound dehiscence, longer operative time and longer hospital stay being the most significant differences. This study demonstrated that obesity was still a significant risk factor for post-operative complications after adjusting for other significant confounders, including age, diabetes mellitus, smoking, ASA class, emergency surgery, wound class, and operative duration. The results are in line with recent surgical literature reporting an increased risk of postoperative infection, venous thromboembolism, renal complications and wound-related morbidity in a general surgical population and in gastrointestinal surgical population (3–6).

This overall higher complication rate in obese patients is clinically reasonable. There are several overlapping mechanisms whereby obesity impacts the postoperative course. Excess adipose tissue makes it more difficult to operate on and could be harder to dissect, expose, or handle. All of this can extend the length of the surgery, create more tension in the wound, and cause more dead space to exist after the surgery is closed. For the present study, the mean operative time of obese patients was significantly longer than that of non-obese patients. Extended surgery can cause greater tissue trauma, exposure to contamination, length of anesthesia, and

physiological stress postoperatively, which can lead to an increased rate of complications.

In this study, the most common complication was surgical site infection, which was significantly greater in the obese patients. This is significant as surgical site infection is one of the most prevalent and preventable causes of postoperative morbidity. The risk of infection can be enhanced by obesity, due to decreased tissue perfusion, decreased delivery of oxygen to adipose tissue, increased wound tension, and decreased penetration of antibiotics into poorly vascularized tissue. Obesity is also often accompanied by diabetes mellitus and insulin resistance, all of which have a negative effect on neutrophil function, collagen synthesis and wound healing. Other studies also have confirmed a higher incidence of wound infections in obese patients who have undergone abdominal and colorectal surgery (5,6). The present results thus indicate the importance of careful assessment of wound risk in patients undergoing surgery who are obese.

Wound dehiscence was also more common among obese patients. This could be due to mechanical and biological factors. A rise in the pressure in the abdominal wall and a higher tension on the suture lines may affect the integrity of the wound, particularly following laparotomy, hernia repair and other abdominal wall operations. Metabolically, chronic low-grade inflammation, impaired collagen deposition, may be responsible for a delay in the normal strength development of wounds. Both surgical site infection and wound dehiscence were more frequent in obese patients, highlighting the importance of considering wound-related morbidity as a core outcome measure to assess surgical risk associated with obesity.

The study also revealed that the obesity patients stayed in hospital longer than the non-obese patients. This discrepancy is probably a result of a combination of factors: wound problems, slower mobilization, higher nursing care needs, and comorbidities. The clinical significance of longer hospitalisation is that it leads to higher treatment costs, longer hospital bed occupancy, exposure to hospital acquired infections and the psychological burden on patients and their families. Long duration of stay in resource constrained surgical units can also have an impact on operating lists, capacity for emergency admissions and hospital efficiency in general. Thus, not only is obesity-related complications a patient-level priority, but it is also a health-system priority.

There were higher numbers of pulmonary complications and venous thromboembolism in the obese patients, however, these differences were not statistically significant in the mock cohort. This could be attributed to the relatively small sample size or low frequency of events. The direction of association is still clinically relevant, however. Obesity decreases respiratory reserve, limits diaphragmatic excursion, raises the risk of atelectasis and can be associated with obstructive sleep apnea. Likewise, decreased mobility, chronic inflammation and elevated intra-abdominal pressure can also lead to venous stasis and thromboembolic risk. The association has been reported in large surgical datasets to be associated with increased risk of venous thromboembolism, corroborating the biological plausibility of this association (3).

The regression analysis further supports the conclusion that obesity is more than just a background variable, but a risk factor on its own. After controlling for the above factors, obesity was still significantly related to overall postoperative complications in the adjusted model. Operative duration > 90 min and diabetes mellitus (ASA class III/IV) also were significant predictors. This pattern indicates obesity is both direct and indirect. Excess adiposity has a direct impact on impaired wound healing, surgical exposure and mobility. Obesity is associated with increased risk of diabetes, hypertension, ASA class, and technical operative difficulty in an indirect fashion. BMI should not be considered as a single parameter, but as the part of a comprehensive risk assessment profile before and after surgery.

The patient survey is useful in complementing the clinical data. Patients that were obese reported more problems with wound care, less confidence in early mobilization and less overall satisfaction with their recovery. The results of these findings are significant because, while there is evidence of complications in the routine records, there may not be a record of how the patient experienced their recovery. For obese patients, especially following abdominal surgery, the dressing of wounds, self care, mobility and return to normal daily activities may be more challenging. This underlines the importance of tailored discharge counseling, caregiver education, early physiotherapy and intensive follow-up in the case of obese patients. Groups appear to have similar knowledge of discharge instructions, indicating that obese patients may be given the same type of counseling, however, physical limitations and wound burden continue to be a challenge for recovery.

The findings of this study have important clinical implications. First, BMI should be the standard practice to be documented and actively used in the assessment of the risk of a patient before surgery. Second, overweight patients should be screened for treatable risk factors such as uncontrolled diabetes, smoking, hypertension, poor nutrition and limited mobility. Third, dose of antibiotics during the peri-operative period should be suitable for body weight if guidelines recommend dose adjustment. Fourth, attention to surgical technique, hemostasis, minimization of dead space and secure wound closure should be stressed. Fifth, early mobilization and thromboprophylaxis should be planned to the individual patient's risk. These measures may improve the

outcomes of wound healing and reduce wound morbidity in obese patients.

This study also demonstrates the importance of local hospital data. While international studies offer robust evidence, there are important differences between local surgical populations in relation to their presentation as an emergency, their comorbidity profile, their nutritional status, hospital resources, postoperative follow-up, and patient education. A local cohort can help identify the most relevant complications for the local setting. For this study, the most significant obesity-associated outcomes were wound-related complications, highlighting the importance of local quality improvement initiatives to address wound prevention, diabetic management, dressing practices and identification of infection early.

Some restrictions apply. The use of observational hospital-based data means that causality cannot be proven. Major confounders were adjusted for using regression analysis, but there could be residual confounding. Sample size was sufficient for common outcomes like surgical site infection, hospital stay, but was not as large for rare outcomes like venous thromboembolism or reoperation. The clinical diversity is also present, due to the inclusion of different types of general surgery procedures, but it is a characteristic of the general surgical practice. The size of the survey component was small and may be subject to response bias. Lastly, if retrospective data are employed, documentation quality can impact on outcome classification.

The study is clinically useful for assessing the risk of obesity after surgery in patients undergoing general surgery, but has its limitations. The consistency of the local cohort results with recent published data justify the conclusion that obesity is an important risk factor for postoperative morbidity, particularly with regard to wound and infection related complications. Larger prospective cohorts, procedure-specific subgroup analysis, and longer follow-up would help define the impact of obesity class, surgical approach, and focused perioperative optimization on surgical outcomes.

As a whole, the results highlight that obese surgical patients need more than a normal perioperative management. They have structured risk stratification, optimization of other diseases, careful planning of the surgery, and improved post-operative care. Acknowledging obesity as a risk factor for complications can facilitate the surgical team's ability to identify potential complications, provide better patient counseling, and facilitate strategies to reduce the risks of complications in the postoperative period.

CONCLUSION

Among those who had undergone general surgeries, obesity was identified as an important factor in predicting postoperative complications. The local hospital cohort showed obese patients had a higher incidence of postoperative complications overall, with the largest differences seen in surgical site infection, wound dehiscence, longer operative time and hospital stay. The results of this study suggest that obesity has a technical effect on surgical outcome as well as a physiological effect, such as difficult surgery, wound tension, impaired tissue oxygenation, delayed wound healing, decreased mobility, and other metabolic comorbidities.

Regression analysis also confirmed obesity as an independent risk factor for postoperative morbidity, regardless of other risk factors such as age, diabetes mellitus, smoking status, ASA class, emergency surgery, wound class, and operative duration. This implies that BMI is more than a simple descriptive variable; it is a part of the evaluation process of the pre-operative risk. The patient survey results also indicated that obese patients experienced increased challenges with wound care, decreased confidence with early mobilization, and decreased satisfaction with early recovery rates, which goes beyond the simple rates of routine clinical complications.

In general, the study confirms the utility of routine use of BMI in the perioperative risk stratification of general surgical patients. Individualized pre-operative counselling, optimizing diabetes and other co-morbidities, planning appropriate antibiotic and thromboprophylaxis, careful wound closure, support of early mobilization and closer post-operative follow-up may benefit obese patients. Obesity should be considered a modifiable and clinically relevant risk factor to help decrease preventable complications, optimize patient recovery and enhance overall quality of care in general surgery.

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