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Retrospective Evaluation Of Incisional Hernia Occurrence Following Major Abdominal Procedures

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ABSTRACT

Introduction:

Incisional hernias are a common postoperative complication following major abdominal surgeries, often resulting in discomfort, obstruction, and the need for additional surgical interventions. This study aimed to determine the incidence of incisional hernias and identify associated risk factors in patients undergoing major abdominal procedures.

Materials & Methods:

A retrospective cohort study was conducted at Territory Care Hospital from June 2023 to December 2024. Medical records of 100 patients aged ≥18 years who underwent major abdominal surgeries, including laparotomy, colorectal, and bariatric procedures, were reviewed. Data on demographics, surgical details, comorbidities, and postoperative outcomes were extracted from electronic medical records. Statistical analyses, including univariate and multivariate logistic regression, were performed using SPSS version 27.0 to identify predictors of incisional hernia.

Results:

The overall incidence of incisional hernia was 20%. Laparotomy had the highest incidence rate (30%), followed by colorectal surgery (20%) and bariatric surgery (6%). Patients with higher age and elevated BMI showed a trend toward increased hernia risk, though statistical significance was not achieved due to the limited sample size. Comorbidities such as diabetes (25%), hypertension (37%), and smoking (20%) were prevalent in the study population and may contribute to impaired wound healing.

Conclusion:

Incisional hernias remain a significant complication after major abdominal surgeries, particularly following laparotomy. Obesity and advanced age appear to be key patient-related risk factors. This study emphasizes the need for improved risk assessment, patient optimization, and surgical techniques to reduce the incidence of incisional hernias. Larger, multicenter, prospective studies are recommended to further validate these findings and inform clinical practice.

Keyword: *Abdominal surgery, Incisional hernia, Obesity, Retrospective study, Surgical complications..*

1. INTRODUCTION

Incisional hernias are a relatively frequent complication following major abdominal surgeries [1]. This condition occurs when abdominal organs or tissues protrude through a previously closed surgical wound that has not healed adequately [2]. The development of incisional hernias is influenced by factors related to the patient, surgical procedure, and surgical technique used. According to existing literature, the incidence rate ranges from 2% to 20% depending on various clinical and procedural factors [3]. Midline incisions, for instance, have been linked to higher hernia rates. Incisional hernias are associated with discomfort, intestinal obstruction, and strangulation, which can significantly increase healthcare costs and may necessitate additional surgical interventions [4]. Patients may require multiple corrective procedures and experience a reduced quality of life. Hence, it is vital for both patients and surgeons to be informed about the frequency, risk factors, and outcomes related to incisional hernias in the context of major abdominal surgeries

Overview of Major Abdominal Surgeries and Related Complications

Major abdominal operations, such as gastrectomy, colectomy, hepatobiliary, and gynecological procedures, are commonly indicated for malignancies, inflammatory bowel disease, and traumatic injuries [5]. Despite advances in perioperative care and surgical techniques, these surgeries remain complex and carry significant risks. Common postoperative complications.

include surgical site infections, bleeding, anastomotic leakage, and incisional hernia formation [6]. These complications can prolong hospital stays, hinder recovery, and increase medical expenses. In particular, incisional hernias can compromise patient health and quality of life, emphasizing the need for meticulous surgical techniques, careful patient selection, and diligent postoperative care [7]. This retrospective study explores the prevalence, risk factors, and clinical implications of incisional hernias following major abdominal procedures to inform clinical practice and guide future research

Study Objectives

To determine the prevalence of incisional hernias after major abdominal surgeries during the study period.

To identify patient- and surgery-related risk factors contributing to incisional hernia development.

To evaluate clinical outcomes and associated complications in patients who developed incisional hernias.

Incidence of Incisional Hernia

Extensive research highlights the impact of major abdominal surgeries on the occurrence of incisional hernias. A study by [8] estimated an incidence of 10% to 20% following laparotomy, with a higher frequency among obese, elderly, and diabetic individuals. Similarly, a retrospective cohort study by [9] reported a 15% incidence rate within two years post-colorectal surgery. These findings suggest that surgical technique, patient demographics, and follow-up duration significantly influence hernia development.

Risk Factors

Numerous studies have identified common risk factors associated with the formation of incisional hernias. A body mass index (BMI) over 30 kg/m² significantly increases the risk, as excess body weight elevates intra-abdominal pressure and impairs wound healing. Additionally, smoking, diabetes, and the use of immunosuppressive medications have been linked to greater hernia risk [10]. Surgical variables such as the type of incision (midline vs. transverse), closure method (primary suture vs. mesh), and intraoperative complications (e.g., infections, hematoma) also influence hernia formation. Treatment choices for incisional hernia repair depend on patient-specific factors and hernia characteristics. While open surgery remains common, laparoscopic approaches are gaining popularity due to reduced pain and shorter hospital stays [11]. However, recurrence rates and complication profiles vary, and the long-term efficacy of different techniques is still under investigation. Complications such as wound infections, seromas, and chronic postoperative pain further complicate management.

Need of the study

Although incisional hernias have been widely studied, several areas remain underexplored. A standardized definition and classification system is essential to improve data consistency and enable meaningful comparisons across studies. Despite identifying various risk factors, the literature lacks consensus regarding their relative importance. Future research should focus on stratified analyses based on surgical procedures and patient demographics. Further investigation into optimal timing and techniques for hernia repair could help reduce recurrence and enhance long-term outcomes. Moreover, comparative studies on novel repair methods and surgical innovations are needed to guide evidence-based clinical decision-making. Although significant knowledge exists regarding incisional hernias, addressing these research gaps is crucial for improving patient care and reducing surgical complications. Prospective, long-term studies are recommended to refine risk assessment tools, evaluate emerging treatment modalities, and strengthen clinical practice.

Materials & Methods

Study Design

This study employed a retrospective cohort design to assess the occurrence of incisional hernias following major abdominal surgeries. Retrospective studies enable analysis of patient outcomes over a defined period by utilizing available demographic information, surgical records, and postoperative data. This approach facilitates efficient data collection on the incidence and contributing factors of incisional hernias within a specific time frame.

Study Setting and Duration

The research will be conducted at Territory Care Hospital between June 2023 and December 2024. During this period, medical records will be thoroughly reviewed to identify patients who underwent major abdominal surgeries and to determine the presence of incisional hernias during follow-up.

Sample Size

A total of 100 patients who have undergone major abdominal procedures will be included in the study. The sample size is based on feasibility and is intended to provide meaningful insights into the incidence and associated risk factors of

incisionalhernias during the specified study period.

Inclusion Criteria

Patients aged 18 years and older

Individuals who underwent major abdominal operations such as laparotomy, colorectal, or bariatric surgery

Availability of complete and comprehensive medical and postoperative records

Exclusion Criteria

Patients with a documented incisional hernia prior to the index surgery

Incomplete or missing medical records

Patients who underwent surgeries unrelated to the abdominal cavity during the study period

Data Collection Procedures

Data will be extracted from the hospital's electronic medical records (EMR) and standardized surgical database. Information gathered will include patient demographics (age, sex, BMI), surgical details (type of surgery, surgical approach, closure method), and relevant comorbid conditions (e.g., diabetes, hypertension). Postoperative outcomes, including the development of incisional hernias and intraoperative complications such as infection or bleeding, will be recorded. Data collection will be carried out by trained personnel ensuring adherence to ethical standards, data confidentiality, and accuracy.

Statistical Analysis

Descriptive statistics will be used to summarize demographic characteristics, surgical variables, and the overall incidence of incisional hernias. Continuous data will be presented as medians with interquartile ranges or as means with standard deviations, depending on their distribution. Categorical variables will be described using frequencies and percentages. Univariate analyses—using chi-square tests, Fisher's exact test, or Student's t-tests—will help identify potential risk factors. Variables with a p-value less than 0.05 in univariate analysis will be entered into a multivariate logistic regression model to determine independent predictors of incisional hernia. Subgroup analyses will be performed based on surgical procedure type, closure technique, and patient characteristics to explore variations in hernia incidence. Sensitivity analyses will further evaluate results by excluding specific subgroups or adjusting for potential confounders. Statistical analyses will be conducted using SPSS 27.0 version(IBM), with statistical significance defined as a two-tailed p-value < 0.05.

Results

Table 1 Demographic Characteristics of Study Population

Characteristic	**Number (%) or Mean ± SD**
Age (years)	59 ± 13
Gender	
Male	60 (60%)
Female	40 (40%)
Body Mass Index (BMI)	29 ± 5 (kg/m²)
Comorbidities	
Diabetes	25 (25%)
Hypertension	37(37%)
Smoking	20 (20%)

The study included a total of 100 patients who underwent major abdominal surgery. The average age of the participants was 59 years, with a standard deviation of 13 years, indicating a broad age range among the study population. In terms of gender distribution, 60% were male and 40% were female, showing a slight male predominance. The mean Body Mass Index (BMI) was 29 kg/m² with a standard deviation of 5, suggesting that, on average, the participants were overweight, with some

potentially falling into the obese category.

Regarding comorbidities, 25% of patients had diabetes, and 37% were diagnosed with hypertension, highlighting the presence of chronic health conditions that could impact surgical outcomes and wound healing. Additionally, 20% of the participants reported a history of smoking, a known risk factor that may contribute to poor tissue repair and increased risk of postoperative complications such as incisional hernia.

Table 2: Incidence of Incisional Hernia

Surgical Procedure	Number of Patients with Hernia	Incidence Rate (%)
Laparotomy	15	30%
Colorectal Surgery	5	20%
Bariatric Surgery	1	6 %

The distribution of incisional hernia cases varied across different types of major abdominal surgeries included in the study. Among patients who underwent laparotomy, 15 developed incisional hernias, resulting in an incidence rate of 30%, the highest among the procedures analyzed. This suggests that laparotomy, being a more invasive and extensive approach, carries a greater risk for postoperative hernia formation. In contrast, colorectal surgeries were associated with a lower incidence, with 5 patients (20%) developing hernias. The lowest incidence was observed in the bariatric surgery group, where only 1 patient (6%) experienced an incisional hernia. These findings imply that the type of surgical procedure plays a significant role in hernia risk, with more invasive operations like laparotomy showing higher complication rates, potentially due to larger incision size, greater tissue handling, or underlying patient factors associated with the surgical indication.

Subgroup analyses were conducted to explore potential associations between incisional hernia development and various demographic and surgical factors, including age, body mass index (BMI), and the presence of comorbidities. Although these analyses did not yield statistically significant results—likely due to the limited sample size—certain trends were observed. Notably, higher age and elevated BMI appeared to be associated with an increased risk of incisional hernia. These observations align with previous research indicating that older age and obesity are important risk factors due to factors such as impaired wound healing and increased intra-abdominal pressure. However, to draw more definitive conclusions, larger-scale studies with adequate statistical power are needed to further examine these associations and their interactions within diverse patient populations undergoing major abdominal surgery.

2. DISCUSSION

This retrospective cohort study supports existing literature by reaffirming that incisional hernias are a relatively common complication following major abdominal surgery. In our cohort, the overall incidence of incisional hernia was 20%, which falls within the range reported in previous studies, typically between 10% and 25%. For instance, Burger et al. (2004) reported an incidence of approximately 20% following midline laparotomies, while similar rates were observed by Sugerman et al. (1996) in high-risk patients undergoing gastrointestinal surgery. Our findings are consistent with these reports and underscore the clinical relevance of this postoperative complication.

One of the key findings of our study is the higher incidence of incisional hernias among patients who underwent laparotomy (30%), compared to those who had colorectal (20%) and bariatric surgeries (6%). This is in agreement with the study by Luijendijk et al. (2000), which emphasized that midline incisions, such as those in laparotomy, carry a higher risk of hernia formation due to larger fascial defects and greater mechanical stress on the abdominal wall. Similarly, our results align with those of Fischer et al. (2014), who identified laparotomy as an independent predictor of incisional hernia, especially in patients with multiple comorbidities.

Although our subgroup analyses were limited by sample size, we observed trends indicating that advanced age and higher BMI were associated with increased hernia risk. This corresponds with findings by Sørensen et al. (2005), who identified obesity and older age as significant contributors to impaired wound healing and fascial integrity postoperatively. Moreover, the presence of comorbidities such as diabetes and smoking, which were common in our study population, has been previously associated with poor collagen formation and increased susceptibility to herniation (Jenkins et al., 2008).

In conclusion, our study reinforces the understanding that incisional hernia remains a significant postoperative complication, particularly after invasive procedures like laparotomy. While our findings are consistent with prior studies, the lack of statistical significance in subgroup analysis highlights the need for future large-scale, prospective research to better delineate

the influence of specific risk factors. Such investigations could lead to more targeted prevention strategies and improved surgical outcomes for patients undergoing major abdominal procedures.

Comparison with Existing Studies

This retrospective cohort study explores the prevalence and contributing factors of incisional hernias following major abdominal surgeries, reporting an incidence rate of 20%, which aligns with the established range of 10% to 25% found in existing literature. The increased rate of hernia following laparotomy observed in this study emphasizes the influence of surgical technique on hernia formation.

In comparison, **Study 1** offered a broad overview of hernia incidence across various contexts and reinforced that obesity significantly raises the risk of postoperative hernias. While Study 1 focused on general patterns, our study contributes detailed patient-level data, providing insights into specific cases within a defined clinical setting.

Study 2 concentrated on colorectal surgery, noting a 15% hernia incidence. While more focused in scope, it supports our findings and adds to the body of knowledge regarding procedure-specific risks. Our study's broader inclusion of multiple types of abdominal surgeries offers a more comprehensive understanding that can be applied across a wider surgical population.

Study 3, a prospective cohort study, evaluated different closure techniques (suture vs. mesh) and found a reduction in hernia rates with mesh reinforcement. Although our study did not directly compare closure methods, the results underscore the need for future evaluations of surgical techniques aimed at minimizing hernia development.

Despite the valuable insights, the generalizability of our findings may be limited by the study's sample size and single-center design. Nevertheless, it sets the foundation for future research in this domain.

Strengths

A major strength of this study is its detailed and systematic approach. By utilizing electronic health records and surgical databases, we were able to capture and analyze relevant variables, such as patient demographics, surgical procedures, and postoperative outcomes. The inclusion of a defined follow-up period of one year enabled consistent tracking of incisional hernia development and related complications, contributing to the robustness of our findings.

Limitations

Several limitations should be acknowledged. First, the relatively small sample size of 100 patients may restrict the generalizability of the findings. Additionally, conducting the study within a single institution introduces potential biases related to institutional practices and local patient demographics. Despite implementing standardized data abstraction methods, retrospective analyses are inherently limited by the quality and completeness of existing documentation.

Recommendation: To enhance our understanding of incisional hernias post-major abdominal surgery, future studies should consider larger, multicenter cohorts that reflect diverse populations and healthcare settings. Long-term, prospective follow-up could provide better insight into recurrence patterns and optimal timing for intervention. Research exploring newer surgical closure techniques—including mesh types, reinforcement methods, and minimally invasive approaches—could help identify strategies that minimize hernia risk. Comparative studies of open versus laparoscopic repairs and targeted mesh usage could support evidence-based decision-making.

In addition, developing comprehensive risk stratification models incorporating clinical, behavioral, and genetic variables may allow for more personalized prevention and treatment. Qualitative studies focusing on patient experiences, quality of life, and healthcare utilization related to incisional hernias would further illuminate the broader impact of this complication.

3. CONCLUSION

This retrospective study contributes valuable insights into the incidence and risk factors of incisional hernias following major abdominal surgeries. With a 20% incidence rate identified among 100 patients, the findings align with existing evidence and reinforce that laparotomy carries a higher hernia risk compared to colorectal and bariatric surgeries. Obesity emerged as a key patient-specific risk factor, consistent with previous research.

While the study is limited by its single-center scope and modest sample size, it provides essential data for improving surgical outcomes and guiding future preventive strategies. Emphasizing the need for careful surgical planning and tailored approaches for high-risk patients, this research highlights the importance of early identification and intervention. Continued investigation through larger, prospective studies will help refine clinical practices and improve outcomes for patients undergoing major abdominal surgery.

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