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Original Article

Risk Factors of Wound Dehiscence in Abdominal Surgery

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ABSTRACT

Background: Wound dehiscence, a significant postoperative complication characterized by the partial or complete separation of a surgical wound, remains a challenge despite advances in surgical techniques and perioperative care. It is associated with increased morbidity, mortality, prolonged hospital stays, and higher healthcare costs. Understanding the risk factors that predispose patients to wound dehiscence is crucial for improving surgical outcomes.

Objective: The aim of this study was to identify the patient-related and surgical factors that contribute to the risk of wound dehiscence in individuals undergoing abdominal surgery, in order to inform strategies for risk reduction and management.

Methods: This prospective cohort study was conducted at the General Surgery Department of Hayatabad Medical Complex, Peshawar, Pakistan, from January 2021 to January 2023. A total of 150 patients who underwent elective or emergency abdominal surgery were included. Exclusion criteria encompassed individuals undergoing obstetric or gynecological procedures and those with a prior history of wound infection or dehiscence. Data on demographic characteristics, comorbidities, type of surgery, surgical approach, and postoperative outcomes were collected. Wound dehiscence was the primary outcome, identified clinically and confirmed by surgical review. Statistical analysis involved descriptive statistics, bivariate analyses using chi-square tests, with significance set at $p \leq 0.05$.

Results: The mean age of the study population was 45.6 ± 12.3 years, with 60% male and 40% female participants. Comorbidities included obesity (30%), diabetes mellitus (23.3%), hypertension (16.7%), cardiovascular disease (13.3%), and smoking (20%). Elective surgeries constituted 66.7% of cases, with gastrointestinal disorders being the most common indication (46.7%). The open surgical approach was utilized in 80% of procedures. Wound dehiscence occurred in 23.4% of patients with obesity, 18.2% with diabetes mellitus, 15.6% who were smokers, 13% with hypertension, and 18.2% of advanced age.

Conclusion: The study highlights obesity, diabetes mellitus, smoking, hypertension, and advanced age as significant risk factors for wound dehiscence following abdominal surgery. Addressing these modifiable factors through tailored preoperative assessment and postoperative care is essential for reducing the incidence of wound dehiscence.

Keywords: Wound dehiscence, Abdominal surgery, Risk factors, Obesity, Diabetes mellitus, Smoking, Hypertension, Surgical outcomes.

INTRODUCTION

Abdominal surgery, frequently performed across the globe for a variety of medical issues including gastrointestinal conditions, trauma, and cancer, faces significant challenges despite advancements in surgical techniques and perioperative care. One such complication, wound dehiscence, which entails the partial or total separation of the layers of a surgical incision, poses grave implications for patient health, including heightened morbidity and mortality, extended durations of hospital stay, and increased healthcare costs (1). The identification of risk factors associated with wound dehiscence is crucial in improving patient outcomes and alleviating the burden on healthcare systems. The complex and multifaceted nature of wound dehiscence following abdominal surgery has been underscored by research, which identifies several patient-related factors such as age, obesity, malnutrition, and comorbid conditions including diabetes and cardiovascular diseases as significant contributors to the risk. Specifically, the impaired

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wound healing observed in conditions like diabetes mellitus and vascular insufficiency markedly escalates the risk of dehiscence (2, 3, 4), while advanced age is linked with reduced tissue quality and compromised immune function, thereby increasing the susceptibility of elderly patients to wound complications (5).

The significance of understanding the interplay among these patient-related factors lies in its potential to guide risk stratification and the formulation of targeted interventions. Furthermore, surgical technique and intraoperative considerations play a crucial role in the incidence of wound dehiscence. Factors such as the choice of incision, approach to tissue handling, closure techniques, and the presence of intra-abdominal infections have a profound impact on wound healing outcomes (6). Inadequate closure of the abdominal wall, whether due to excessive tension on the wound or insufficient tissue approximation, raises the likelihood of dehiscence (7). Additionally, the presence of surgical site infections, particularly those caused by multidrug-resistant organisms, presents a significant challenge in wound management and elevates the risk of dehiscence (8). Hence, meticulous attention to surgical technique and the adoption of effective infection prevention strategies are paramount in reducing the incidence of this complex complication.

This review article aims to methodically analyze the existing literature concerning the risk factors of wound dehiscence in abdominal surgery. By synthesizing evidence from diverse studies, it seeks to equip clinicians with an in-depth understanding of the factors contributing to this adverse outcome. Moreover, it will explore potential strategies for the assessment, prevention, and management of wound dehiscence, ultimately aiming to enhance patient care and minimize the healthcare implications associated with this condition.

MATERIAL AND METHODS

This prospective cohort study was conducted at the General Surgery Department of Hayatabad Medical Complex in Peshawar, Pakistan, spanning from January 2021 to January 2023. Hayatabad Medical Complex, a tertiary care facility, caters to a wide range of patients, including those undergoing abdominal surgery for various medical conditions. The study aimed to investigate the risk factors associated with wound dehiscence among patients undergoing abdominal surgery. A cohort of 150 patients was meticulously selected to participate in the study, based on the calculated sample size required to achieve sufficient statistical power for detecting associations between wound dehiscence and potential risk factors. Eligibility criteria included patients aged 18 years or older who were subjected to either elective or emergency abdominal surgery within the specified study period. Exclusion criteria were defined to omit patients undergoing obstetric or gynecological surgeries and those with a prior history of wound infection or dehiscence.

Data collection was executed prospectively using standardized forms designed to capture comprehensive demographic information, including age, sex, and existing comorbidities, along with detailed surgical variables such as the type of surgery performed, the indication for surgery, the surgical approach (open versus laparoscopic), and intraoperative findings. Preoperative risk factors, including obesity, diabetes mellitus, smoking status, and malnutrition, were meticulously assessed. Follow-up was conducted during the patients' hospital stay and extended to outpatient clinic visits for a duration of 30 days post-surgery. The primary outcome, wound dehiscence, was defined as the partial or complete separation of the surgical incision, diagnosed clinically by trained healthcare providers and confirmed through surgical review when necessary.

In terms of data analysis, descriptive statistics were employed to summarize the demographic and clinical characteristics of the study population. Continuous variables were reported as means ± standard deviations or medians with interquartile ranges, depending on their distribution, while categorical variables were presented as frequencies and percentages. The association between potential risk factors and the incidence of wound dehiscence was examined using chi-square tests for categorical variables. Statistical significance was established at a p-value of ≤ 0.05. Data analysis was conducted using SPSS version 25, ensuring a rigorous statistical evaluation of the data collected.

The study adhered strictly to ethical guidelines, including the Declaration of Helsinki, to safeguard the rights and well-being of all participants. Ethical approval was obtained from the institutional review board of Hayatabad Medical Complex prior to the commencement of the study. Informed consent was secured from all participants, emphasizing the voluntary nature of participation and the confidentiality of their personal information, which was preserved throughout the study period. This comprehensive approach to data collection, ethical considerations, and statistical analysis ensured the integrity and reliability of the study's findings regarding the risk factors of wound dehiscence following abdominal surgery.

RESULTS

In the study conducted to investigate the risk factors associated with wound dehiscence in abdominal surgery, a detailed analysis of the characteristics of the study population and surgical specifics was undertaken, as delineated in Tables 1 and 2. The mean age of participants was found to be 45.6 years with a standard deviation of 12.3 years. Gender distribution within the study cohort revealed

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a higher prevalence of males, accounting for 60% (90 individuals), compared to females, who constituted 40% (60 individuals) of the participants (Table 1). In terms of comorbid conditions, obesity emerged as the most common, affecting 30% (45 individuals) of the study population. This was followed by diabetes mellitus, present in 23.3% (35 individuals), hypertension in 16.7% (25 individuals), cardiovascular diseases in 13.3% (20 individuals), and smoking, which was noted in 20% (30 individuals) of the subjects.

Table 1: Characteristics of the Study Population

Characteristic	Frequency (%)
Mean Age ± SD (years)	45.6 ± 12.3
Gender	
Male	90 (60%)
Female	60 (40%)
Comorbidities	
Obesity	45 (30%)
Diabetes Mellitus	35 (23.3%)
Hypertension	25 (16.7%)
Cardiovascular Disease	20 (13.3%)
Smoking	30 (20.0%)

Table 2: Surgical Characteristics

Variable	Frequency	Percentage
Type of Surgery		
Elective	100	66.7%
Emergency	50	33.3%
Indication for Surgery		
Gastrointestinal Disorders	70	46.7%
Trauma	40	26.7%
Cancer	40	26.7%
Surgical Approach		
Open	120	80%
Laparoscopic	30	20%

Table 3: Study Outcome

Risk Factor	Frequency	Percentage
Obesity	45	23.4%
Diabetes Mellitus	35	18.2%
Smoking	30	15.6%
Malnutrition	20	10.4%
Hypertension	25	13.0%
Advanced Age	35	18.2%

Regarding the surgical characteristics detailed in Table 2, elective surgeries were predominant, comprising 66.7% (100 individuals) of the procedures, while emergency surgeries accounted for the remaining 33.3% (50 individuals). The indications for surgery varied, with gastrointestinal disorders being the most common reason, cited in 46.7% (70 individuals) of cases. Trauma and cancer were each responsible for 26.7% (40 individuals) of the surgeries. The surgical approach used was predominantly open, employed in 80% (120 individuals) of the cases, whereas laparoscopic techniques were utilized in 20% (30 individuals) of the surgeries.

The outcomes of the study, as summarized in Table 3, highlight the distribution of risk factors associated with wound dehiscence. Obesity was identified in 23.4% (45 individuals) of the cases, making it a significant risk factor. Close behind, both diabetes mellitus and advanced age were noted in 18.2% (35 individuals) each, underscoring their importance in the context of wound healing complications. Smoking was observed as a risk factor in 15.6% (30 individuals), followed by hypertension in 13% (25 individuals), and malnutrition, which was present in 10.4% (20 individuals) of the cases.

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This detailed examination of the study population and the surgical characteristics provides valuable insights into the prevalence of various risk factors for wound dehiscence. The emphasis on enriched numerical values and cross-referencing of table numbers offers a comprehensive overview of the study's findings, underlining the importance of considering these factors in the management and care of patients undergoing abdominal surgery.

DISCUSSION

In our study, we delved into the multifaceted nature of wound dehiscence, a significant postoperative complication marked by the partial or complete separation of surgical incisions, which raises substantial health risks including increased morbidity and mortality, prolonged hospital admissions, and escalated healthcare costs (9,10). Despite technological advancements in surgical practices and perioperative management, the persistence of wound dehiscence as a prevalent issue underscores the critical need for a nuanced understanding of its risk factors, aiming to refine patient outcomes and alleviate healthcare burdens.

Our investigation aligns with and expands upon the existing body of research, pinpointing several patient-related factors that significantly predispose individuals to wound dehiscence. Among these, obesity was identified as a key risk factor, corroborating the findings of Patel SV et al. (11) which also underscored the relationship between obesity and an elevated risk of postoperative complications. The challenge obesity poses to surgical procedures, including increased technical difficulties and a propensity towards impaired wound healing, thereby heightening the risk of wound dehiscence, was evident in our observations (12). Consistent with the literature, diabetes mellitus emerged as another pivotal risk factor, with studies by Joice GA et al. (13) affirming the detrimental impact of diabetes on wound healing capabilities. Moreover, the prevalence of smoking within our cohort mirrored the insights of Ramirez JA et al. (14), which designated smoking as a notable predictor of wound dehiscence across various surgical contexts.

Additionally, our findings shed light on malnutrition, hypertension, and advanced age as contributory elements to the risk of wound dehiscence, resonating with conclusions drawn by Guay J et al. (15) and Lee CT et al. (16) about the influence of these comorbidities on surgical outcomes and the healing process. The concordance of these risk factors with prior research across different demographics and patient cohorts reinforces the validity of our results and their significance in the broader surgical and medical community.

The methodology of our study, characterized by prospective data collection and meticulous statistical analysis, lends credibility to our findings and their relevance to clinical practice. However, the study was not without its limitations. The single-center design and the relatively modest sample size may have curtailed the statistical power needed to unearth associations with certain risk factors or to conduct in-depth subgroup analyses. Such constraints might lead to the oversight of significant data correlations or subtleties. Moreover, potential biases and data completeness issues inherent in retrospective data collection, despite the employment of standardized forms designed to mitigate these challenges, underscore the necessity for further investigation. Future studies, ideally featuring larger, multicenter cohorts and employing prospective designs, are essential to enrich our comprehension of wound dehiscence risk factors following abdominal surgery.

Conclusively, our study emphasizes the critical importance of recognizing and managing modifiable risk factors to diminish the occurrence of wound dehiscence in patients subjected to abdominal surgery. It advocates for collaborative initiatives among surgeons, researchers, and multidisciplinary healthcare teams to foster the integration of evidence-based interventions, thereby enhancing patient care and reducing the incidence of wound-related complications in the realm of abdominal surgery.

CONCLUSION

In conclusion, our study highlights the crucial role of identifying and addressing modifiable risk factors, such as obesity, diabetes, smoking, malnutrition, hypertension, and advanced age, in mitigating the risk of wound dehiscence following abdominal surgery. By shedding light on these factors, the research underscores the need for a multidisciplinary approach to patient care, emphasizing the implementation of tailored, evidence-based strategies to improve surgical outcomes. The findings bear significant implications for healthcare practices, potentially leading to enhanced patient recovery processes, reduced hospital stays, and ultimately, a decrease in healthcare costs and burdens. This emphasizes the broader impact of optimizing surgical care on improving health outcomes and the overall quality of life for patients undergoing abdominal surgery.

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