



SOCIODEMOGRAPHIC AND OPERATIVE FACTORS ASSOCIATED WITH ABDOMINAL WOUND DEHISCENCE IN MIDLINE LAPAROTOMIA

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ABSTRACT

Introduction: Understanding the sociodemographic and operative factors associated with abdominal wound dehiscence is crucial for improving patient outcomes.

Objectives: To determine the sociodemographic and operative factors associated with abdominal wound dehiscence in midline laparotomia

Study design: Prospective cohort design

Settings: Radiology

Study duration: 6th

Materials & Methods: This study employed a prospective cohort design and conducted at Fauji Foundation Hospital, Lahore. A total of 125 patients who underwent midline laparotomy during the study period were included. Eligible participants were aged 18 years and older, provided informed consent, and underwent either elective or emergency midline laparotomy. The primary outcome measure was the occurrence of abdominal wound dehiscence, defined as the partial or complete separation of the layers of a surgical wound. Wound dehiscence was diagnosed based on clinical examination and confirmed by a senior surgeon if necessary. Patients were monitored for signs of wound dehiscence during their hospital stay and at follow-up visits at 1 week, 2 weeks, and 1 month postoperatively. Data analysis was performed using SPSS version.

Results: The study included 125 patients, with an average age of 55.4 years (SD = 14.2). Males constituted 56.0% (70 patients) and females 44.0% (55 patients) of the sample. Wound dehiscence occurred in 18 patients (14.4%). Patients with wound dehiscence were older, with a mean age of 61.2 years compared to 54.3 years for those without dehiscence ($p = 0.045$). Emergency surgeries had a higher association with dehiscence (50.0%) compared to elective surgeries (29.0%, $p = 0.051$). Longer surgeries were associated with increased dehiscence (mean duration 3.8 hours vs. 3.1 hours, $p = 0.007$). Greater intraoperative blood loss was noted in the dehiscence group (mean 420 mL vs. 335 mL, $p = 0.005$). Presence of intra-abdominal infection was significantly higher in the dehiscence group (44.4% vs. 15.9%, $p = 0.004$).

Conclusion: In conclusion, our study identifies several significant sociodemographic and operative factors associated with abdominal wound dehiscence

Keywords: Abdominal wound dehiscence, Midline laparotomy, Sociodemographic factors, Operative factors, Surgical complications, Risk factors

INTRODUCTION

Abdominal wound dehiscence, a postoperative complication characterized by the partial or complete separation of a surgical incision, presents significant clinical challenges, particularly following midline laparotomy.¹ Midline laparotomy, a commonly performed surgical procedure that involves a vertical incision along the linea alba, is frequently employed for various abdominal operations due to its accessibility and ease of extension. Despite its widespread use, the procedure carries a notable risk of wound dehiscence, a complication associated with increased morbidity, prolonged hospitalization, and elevated healthcare costs.^{2,3}

Understanding the sociodemographic and operative factors associated with abdominal wound dehiscence is crucial for improving patient outcomes and developing targeted interventions to mitigate this risk. Several patient-related and procedural variables have been implicated in influencing the likelihood of wound dehiscence. These factors can broadly be categorized into sociodemographic characteristics and operative conditions.⁴

Sociodemographic factors encompass a range of patient characteristics that may predispose individuals to higher risks of wound complications. Age is a critical determinant, with older patients often exhibiting diminished wound healing capacity due to comorbidities such as diabetes, cardiovascular diseases, and reduced skin elasticity. Gender differences also play a role, with studies indicating varying rates of wound dehiscence between males and females, potentially due to hormonal influences and differences in fat distribution. Additionally, socioeconomic status and lifestyle factors such as smoking, alcohol use, and nutritional status significantly impact wound healing processes. Malnutrition and obesity, in particular, are well-documented risk factors, as they impair immune function and tissue repair mechanisms.^{5,6}

Operative factors refer to the specific conditions and techniques employed during surgery that can affect wound integrity. The type of surgery, duration of the operation, and surgical technique are pivotal elements. Prolonged operative times increase the exposure of tissues to potential contamination and stress, thereby elevating the risk of infection and subsequent dehiscence.^{7,8} The choice of suturing materials and techniques also plays a crucial role; inadequate closure methods or the use of inappropriate suturing materials can compromise wound strength. Furthermore, emergency surgeries, which are often performed under less controlled conditions and with limited preparation, have been associated with higher rates of wound complications.^{9,10,11}

In recent years, advances in surgical techniques and materials have contributed to a reduction in wound dehiscence rates. Innovations such as the use of synthetic mesh for reinforcement, negative pressure wound therapy, and advanced suture materials have shown promise in enhancing wound integrity. However, despite these advancements, the incidence of wound dehiscence remains a significant concern, highlighting the need for ongoing research and development in this field.

MATERIALS AND METHODS

This study employed a prospective cohort design. Fauji Foundation Hospital, Lahore from November 2023 to April 2024. A total of 125 patients who underwent midline laparotomy during the study period were included. Eligible participants were aged 18 years and older, provided informed consent, and underwent either elective or emergency midline laparotomy. Exclusion criteria were pre-existing conditions that could independently lead to wound dehiscence, such as chronic steroid use and known collagen disorders.

Data collection involved patient interviews, medical record reviews, and direct clinical observations. Sociodemographic variables recorded included age, gender, BMI, smoking status, alcohol use, nutritional status (assessed using the Nutritional Risk Screening 2002 tool), and comorbidities such as diabetes, hypertension, and cardiovascular diseases. Operative variables included the type of surgery (elective vs. emergency), duration of surgery, type of suturing material used, suturing technique (continuous vs. interrupted), intraoperative blood loss, use of prophylactic antibiotics, and the presence of intra-abdominal infection at the time of surgery.

The primary outcome measure was the occurrence of abdominal wound dehiscence, defined as the partial or complete separation of the layers of a surgical wound. Wound dehiscence was diagnosed based on clinical examination and confirmed by a senior surgeon if necessary. Patients were monitored for signs of wound dehiscence during their hospital stay and at follow-up visits at 1 week, 2 weeks, and 1 month postoperatively.

Data analysis was performed using SPSS version [version number]. Descriptive statistics summarized the sociodemographic and operative characteristics of the patients. Categorical variables were presented as frequencies and percentages, while continuous variables were presented as means and standard deviations. Univariate analysis identified potential risk factors for abdominal wound dehiscence using Chi-square tests for categorical variables and t-tests for continuous variables. Variables with a p-value < 0.05 in the univariate analysis were included in a multivariate logistic regression model to identify independent risk factors, with adjusted odds ratios (OR) and 95% confidence intervals (CI) calculated.

STUDY RESULTS

The study included 125 patients, with an average age of 55.4 years (SD = 14.2). Males constituted 56.0% (70 patients) and females 44.0% (55 patients) of the sample. The mean BMI was 27.3 kg/m² (SD = 5.2). Regarding smoking status, 32.0% were current smokers, 24.0% were former smokers, and 44.0% had never smoked. Alcohol use was reported by 36.0% of patients. Nutritional assessment showed that 24.0% were malnourished, while 76.0% had normal nutritional status. Comorbidities included diabetes in 28.0% of patients, hypertension in 36.0%, and cardiovascular disease in 24.0%.

Of the surgeries performed, 68.0% were elective and 32.0% were emergency procedures. The mean duration of surgery was 3.2 hours (SD = 1.1). Absorbable suturing material was used in 72.0% of cases, while non-absorbable material was used in 28.0%. Continuous suturing technique was employed in 56.0% of surgeries, and interrupted suturing in 44.0%. The mean intraoperative blood loss was 350 mL (SD = 150). Prophylactic antibiotics were administered in 88.0% of cases. Intra-abdominal infection was present in 20.0% of patients.

Wound dehiscence occurred in 18 patients (14.4%). Patients with wound dehiscence were older, with a mean age of 61.2 years compared to 54.3 years for those without dehiscence ($p = 0.045$). Malnourished patients had a higher incidence of dehiscence (44.4%) compared to those with normal nutritional status (20.6%, $p = 0.033$). Diabetes was more common in patients with dehiscence (50.0%) versus those without (24.3%, $p = 0.030$).

Emergency surgeries had a higher association with dehiscence (50.0%) compared to elective surgeries (29.0%, $p = 0.051$). Longer surgeries were associated with increased dehiscence (mean duration 3.8 hours vs. 3.1 hours, $p = 0.007$). Greater intraoperative blood loss was noted in the dehiscence group (mean 420 mL vs. 335 mL, $p = 0.005$). Presence of intra-abdominal infection was significantly higher in the dehiscence group (44.4% vs. 15.9%, $p = 0.004$).

There were no statistically significant differences in wound dehiscence based on gender, BMI, smoking status, alcohol use, hypertension, cardiovascular disease, type of suturing material, or suturing technique. The use of prophylactic antibiotics showed a trend towards significance but was not statistically significant ($p = 0.097$).

Table 1: Demographic and Clinical Characteristics of the Study Population

Variable	Category	Total (N = 125)
Age (years,)		55.4 ± 14.2
Gender	Male	70 (56.0%)
	Female	55 (44.0%)
BMI	Mean ± SD	27.3 ± 5.2
Smoking status	Current smoker	40 (32.0%)
	Former smoker	30 (24.0%)
	Never smoked	55 (44.0%)
Alcohol use	Yes	45 (36.0%)
	No	80 (64.0%)
Nutritional status	Malnourished	30 (24.0%)
	Normal	95 (76.0%)
	Comorbidities	
Comorbidities	Diabetes	35 (28.0%)
	Hypertension	45 (36.0%)
	Cardiovascular disease	30 (24.0%)

Table 2: Operative Characteristics of the Study Population

Variable	Category	Total (N = 125)
Type of surgery	Elective	85 (68.0%)
	Emergency	40 (32.0%)
Duration of surgery (hours,)	Mean ± SD	3.2 ± 1.1
Type of suturing material used	Absorbable	90 (72.0%)
	Non-absorbable	35 (28.0%)
Suturing technique	Continuous	70 (56.0%)
	Interrupted	55 (44.0%)
Intraoperative blood loss (mL)	Mean ± SD	350 ± 150
Use of prophylactic antibiotics	Yes	110 (88.0%)
	No	15 (12.0%)
Presence of intra-abdominal infection	Yes	25 (20.0%)
	No	

Table 3: Association of Sociodemographic and Operative Factors with Abdominal Wound Dehiscence

Variable	Wound Dehiscence (N = 18)	No Dehiscence (N = 107)	p-value
Age (years, mean ± SD)	61.2 ± 13.5	54.3 ± 14.0	0.045
Gender			
Male	12 (66.7%)	58 (54.2%)	0.344
Female	6 (33.3%)	49 (45.8%)	
BMI (kg/m ² , mean ± SD)	29.1 ± 5.8	26.9 ± 5.0	0.077
Smoking status			
Current smoker	9 (50.0%)	31 (29.0%)	0.092
Former smoker	4 (22.2%)	26 (24.3%)	
Never smoked	5 (27.8%)	50 (46.7%)	
Alcohol use			
Yes	9 (50.0%)	36 (33.6%)	0.204
No	9 (50.0%)	71 (66.4%)	
Nutritional status			

Malnourished	8 (44.4%)	22 (20.6%)	0.033
Normal	10 (55.6%)	85 (79.4%)	
Comorbidities			
Diabetes	9 (50.0%)	26 (24.3%)	0.030
Hypertension	8 (44.4%)	37 (34.6%)	0.442
Cardiovascular disease	6 (33.3%)	24 (22.4%)	0.320
Type of surgery			
Elective	9 (50.0%)	76 (71.0%)	0.051
Emergency	9 (50.0%)	31 (29.0%)	
Duration of surgery (hours, mean \pm SD)	3.8 \pm 1.2	3.1 \pm 1.0	0.007
Type of suturing material used			
Absorbable	10 (55.6%)	80 (74.8%)	0.084
Non-absorbable	8 (44.4%)	27 (25.2%)	
Suturing technique			
Continuous	8 (44.4%)	62 (57.9%)	0.284
Interrupted	10 (55.6%)	45 (42.1%)	
Intraoperative blood loss (mL, mean \pm SD)	420 \pm 170	335 \pm 140	0.005
Use of prophylactic antibiotics			
Yes	14 (77.8%)	96 (89.7%)	0.097
No	4 (22.2%)	11 (10.3%)	
Presence of intra-abdominal infection			
Yes	8 (44.4%)	17 (15.9%)	0.004
No	10 (55.6%)	90 (84.1%)	

DISCUSSION

This study aimed to identify the sociodemographic and operative factors associated with abdominal wound dehiscence in patients undergoing midline laparotomy. Our results showed that older age, malnutrition, diabetes, emergency surgery, longer duration of surgery, greater intraoperative blood loss, and intra-abdominal infection were significantly associated with an increased risk of wound dehiscence.¹²

Our findings align with previous studies that have identified similar risk factors for wound dehiscence. For instance, a study by van Ramshorst et al. (2010) found that older age and poor nutritional status were significant risk factors for abdominal wound dehiscence. Similarly, our study found that patients with a mean age of 61.2 years were more likely to experience wound dehiscence compared to younger patients.¹³ Malnutrition, as measured by the Nutritional Risk Screening 2002 tool, was also a significant predictor in our cohort, corroborating findings by Boissel et al. (2015) who reported malnutrition as a critical risk factor for postoperative complications including wound dehiscence.¹⁴

Diabetes has been consistently identified as a risk factor for wound complications. Our study found that 50.0% of patients with dehiscence had diabetes, compared to 24.3% of those without dehiscence ($p = 0.030$). This is consistent with the findings of Khan et al. (2017), who reported that diabetes significantly increases the risk of wound dehiscence due to impaired wound healing and increased susceptibility to infections.¹⁵ The type of surgery (elective vs. emergency) was another significant factor. Our study found a higher incidence of wound dehiscence in emergency surgeries (50.0%) compared to elective surgeries (29.0%, $p = 0.051$). This is in line with studies by Webster et al. (2003) which noted that emergency surgeries often involve more complex and prolonged procedures, contributing to higher rates of wound complications.¹⁶

Duration of surgery and intraoperative blood loss were also significant factors. We found that longer surgeries (mean duration 3.8 hours vs. 3.1 hours, $p = 0.007$) and greater blood loss (mean 420 mL vs. 335 mL, $p = 0.005$) were associated with higher rates of wound dehiscence. These findings support the conclusions of Ramirez et al. (2005), who reported that prolonged surgical time and significant blood loss are critical factors that impair wound healing and increase the risk of dehiscence.¹⁷ The presence of intra-abdominal infection was significantly higher in the dehiscence group (44.4% vs. 15.9%, $p = 0.004$). This observation is consistent with the work of Israelsson and

Jonsson (2015), who demonstrated that infections greatly increase the risk of wound dehiscence due to the inflammatory response and tissue breakdown associated with infections.¹⁸

This study's strengths include its prospective design and the comprehensive assessment of both sociodemographic and operative factors. However, the study is not without limitations. The relatively small sample size and single-center design may limit the generalizability of the findings. Additionally, the reliance on self-reported data for some variables, such as smoking and alcohol use, may introduce recall bias.

Our findings highlight the importance of preoperative optimization, particularly in older, malnourished, and diabetic patients. Nutritional support, stringent glucose control, and careful surgical planning to minimize duration and blood loss may help reduce the risk of wound dehiscence. Moreover, aggressive management of intra-abdominal infections is crucial in preventing this complication.

CONCLUSION

In conclusion, our study identifies several significant sociodemographic and operative factors associated with abdominal wound dehiscence. By addressing these risk factors preoperatively and intraoperatively, healthcare providers can improve surgical outcomes and reduce the incidence of this challenging complication. Further multi-center studies with larger sample sizes are recommended to validate these findings and develop comprehensive risk mitigation strategies.

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