

Risk Factors of Abdominal Wound Dehiscence in Emergency Laparotomy

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Abstract

Introduction: Dehiscence is a partial or total separation of previously approximated wound edges, due to a failure of proper wound healing. Wound dehiscence primarily occurs after a surgery relating to an open wound. It is sometimes called wound breakdown, wound disruption, or wound separation. It can be influenced by various preoperative and postoperative factors. The present study was carried out to observe the significance of various risk factors in wound dehiscence

Aim of the study: The aim of the study was to observe the association of various risk factors among patients with wound dehiscence.

Methods: This prospective clinical study was conducted at the Department of Surgery, MAG Osmani Medical College, Sylhet, Bangladesh. The study duration was 8 months, from July 2008 to February 2009. A total of 460 participants were selected from those undergoing emergency laparotomy in the study place for this study. A consecutive selection method was followed for the selection of the participants. The participants were divided into two groups depending on whether wound dehiscence was developed or not.

Result: All the baseline characteristics (age, body mass index, and smoking habit) of patients except sex were significantly associated with wound dehiscence. The history of receiving steroid and cytotoxic drug were higher in patients with wound dehiscence than that in patients without wound dehiscence. However, the history of receiving the immunosuppressive drug was almost identical between the groups. The patients who did not take hygienic measures or take bath before an operation or change clothing had a higher incidence of wound dehiscence. The risk factors tuberculosis, diabetes mellitus, jaundice, bronchial asthma, anemia, edema, and dehydration were found significantly higher in wound dehiscent patients compared to those without wound dehiscence

Conclusion: The present study suggests that patient-related risk factors should be assessed before surgery and should be rectified immediately. High-risk patients should be operated on by an experienced surgeon. The study also suggests that baseline characteristics like age and BMI have a significant impact on the development of wound dehiscence. Patient hygiene prior to surgery plays a big role in the occurrence of wound dehiscence. Patients with comorbidities like tuberculosis, diabetes, asthma, jaundice, and anemia have a higher chance of developing wound dehiscence. It was further observed that an increase in the number of risk factors had a major impact on the development of wound dehiscence.

Keywords: Surgery, Wound, Dehiscence, Discharge

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I. INTRODUCTION

Wound dehiscence is an acute wound failure and has an incidence of 1-3%.^[1] It is defined by partial or total disruption of any or all layers of the operative wound. Rupture of all layers of the abdominal wall and extraction of abdominal viscera is called evisceration. Wound dehiscence is a multifactorial problem, contributed by local and systemic as well as preoperative, preoperative, and postoperative factors. Other factors, such as medication and local wound problems are also implicated. Abdominal wound dehiscence is one of the burning postoperative complications in the hospital. It is an unexpected dreadful postoperative complication.^[2] Although it is a very distressing complication, it is fortunately very rare. Every surgeon has an intention to retain the

original architecture of the wound site after surgery, even then wound dehiscence is a problem in his work. At its least, the patients require a second operation and hospital stay is prolonged in a high proportion of case wound infection precedes and determine the results.^[3]Wound dehiscence commonly presents about one week after surgery, and may be preceded by a serosanguinous discharge. Optimizing a patient's postoperative recovery and rehabilitation depends in large part on prompt and sustained wound healing. Surgical wound dehiscence (SWD) has been shown to increase morbidity and death rates as well as the implicit and explicit costs to patients and healthcare providers.^{[4]-[7]} Wound dehiscence occurs significantly more frequently after emergency operations and in patients with complicated neoplastic, diseases, complicated inflammatory diseases, and also to a lesser degree in patients with bleeding or non-complicated inflammatory disorders. Many attempts have been made to understand the primary causative factors of wound dehiscence after surgery. According to the findings of such studies, factors varying from an operative procedure like the type of surgery and suture, post-operative infection, etc. to predisposing factors such as anemia, malignancy, obesity, etc. can have a significant impact on the presence of wound dehiscence. Wound dehiscence occurring after transverse incisions in the epigastrium is always due to technical faults.^[8]Abdominal wound dehiscence is more frequent after the emergency surgical procedure than intervention. Patients with wound dehiscence usually have clinical presentations such as cardiopulmonary symptoms, prolonged ileus, serosanguinous discharge from the wound after 2-3 days, failure to develop inflammatory healing ridge over the first 10 postoperative days, sudden disruption of the wound on the removal of skin suture with exposure of knuckle of intestine through the wound, weakness and bulging straining in the convalescent period, etc.^[9] Identifying and managing the manageable risk factors can greatly decrease the incidence of wound dehiscence, further decreasing the mortality rates. The present study was conducted to observe the significant risk factors of abdominal wound dehiscence among the emergency laparotomy patients of the study hospital.

II. OBJECTIVE

General Objective

- To identify the common risk factors of abdominal wound dehiscence following emergency laparotomy

Specific Objectives

- To compare the association between the number of risk factors and wound dehiscence

III. METHODS

This prospective clinical study was conducted at the Department of Surgery, MAG Osmani Medical College, Sylhet, Bangladesh. The study duration was 8 months, from July 2008 to February 2009. A total of 460 participants were selected from those undergoing emergency laparotomy in the study place for the purpose of this study. A consecutive selection method was followed for the selection of the participants. The participants were divided into two groups depending on whether wound dehiscence was developed or not. Informed consent was obtained from either the patients or their legal guardians prior to admission to the study. Ethical approval was obtained from the ethical review committee of the study hospital. Data were collected through a standard data collection form by interview, observation, and clinical examination. The collected data were processed and analyzed using SPSS software. The test statistics used to analyze the data were the Chi-square test and student's t-Test. For all analytical tests, the level of significance was set at 0.05, and $p < 0.05$ was considered significant. The summarized data were presented in the form of tables and charts.

IV. RESULTS

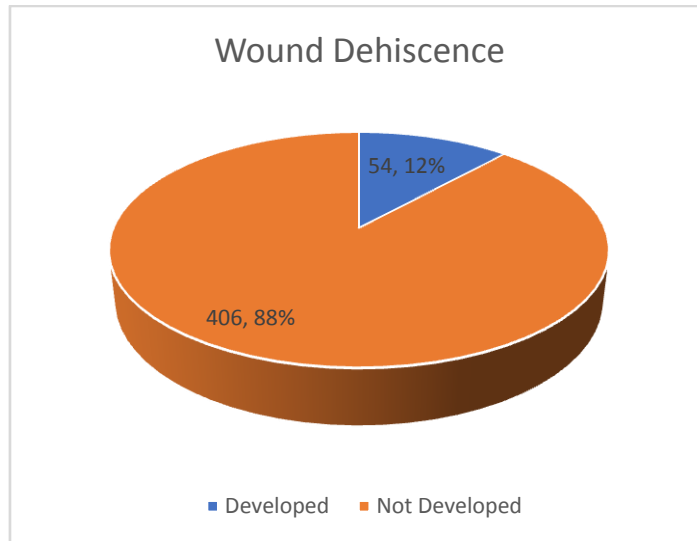


Figure 1: Distribution of the participants by wound dehiscence status (n=460)

Among the total 460 participants, about 12% had developed wound dehiscence, while 88% had not developed any wound dehiscence.

Table 1: Gender Distribution of the study participants among both groups (n=460)

Gender	Wound dehiscence (n, (%))			
	Developed (n=54)		Not developed (n=406)	
Male	42	77.78%	316	77.83%
Female	12	22.22%	90	22.17%

Among the wound dehiscence developed group, 77.78% were male and 22.22% were female. This distribution was similar among the participant of the other group as well.

Table 2: Age distribution of the participants among both groups (n=460)

Age (Years)	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
≤30	3 (5.6)	64 (15.8)	<0.001
31-40	11 (20.4)	99 (24.4)	
41-50	10 (18.5)	138 (34.0)	
51-60	1 (1.9)	89 (21.9)	
>60	29 (53.7)	16 (3.9)	
Mean ± SD	51.2±14.2	40.8±10.6	

*chi-square (X2) test was employed to analyze the data; Figures in the parenthesis denote the corresponding percentage.

More than half of the patients who developed wound dehiscence were elderly (60 or > 60 years old) compared to only 3.9% of those who did not develop the same. The mean age was significantly higher in patients with postoperative wound dehiscence than in those who did not develop wound dehiscence.

Table 3: Preoperative drug history of the participants among both groups (n=460)

Preoperative Drug History	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
Steroid	20 (37.0)	96 (23.6)	0.033

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Cytotoxic Drug	9 (16.7)	23 (5.7)	0.007
Immunosuppressive Drug	1 (1.9)	8 (2.0)	0.953
No History	24 (44.4)	279 (68.7)	N.A

*chi-square (X2) test was employed to analyze the data; Figures in the parenthesis denote the corresponding percentage.

The history of receiving steroid and cytotoxic drugs before the operation was considerably higher in patients having wound dehiscence than in patients who did not have wound dehiscence (37% vs. 23.6%, $p=0.033$ and 16.7% vs 5.7%, $p=0.007$ respectively). However, the history of receiving the immunosuppressive drug was almost identically distributed between groups (1.9% vs 2%, $p=0.953$).

Table 4: Preoperative hygienic measures among both groups

Variable	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
Bath Taken	7 13.0%	199 49.4	<0.001
Clothing Changed	7 13.0	193 47.9	<0.001

The majority (87%) of the patients with wound dehiscence did not take bath and/or change clothing before the operation compared to a little over 50% of patients who did not encounter wound dehiscence ($p<0.001$).

Table 5: Risk factor distribution among the participants of both groups (n=460)

Risk Factors	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
Smoking Habit	36 (66.7)	135 (33.3)	<0.001
Tuberculosis	9 (16.7)	30 (7.4)	0.041
Hypertension	13 (24.1)	122 (30.0)	0.365
Jaundice	6 (11.1)	17 (4.2)	0.028
Diabetes Mellitus	31 (57.4)	79 (19.5)	<0.001
Ischemic Heart Disease	5 (9.3)	21 (5.2)	0.222
Bronchial Asthma	42 (77.8)	86 (21.2)	<0.001
Exposure to radiation	2 (3.7)	4 (1.0)	0.31
Anemia	41 (75.9)	43 (10.6)	<0.001
Edema	8 (14.8)	4 (1.0)	<0.001
Dehydration	44 (81.5)	169 (41.6)	<0.001
Malignancy	4 (7.4)	12 (3.0)	0.2
Underweight	5 (9.3)	6 (1.5)	0.002
Obese	15 (27.8)	59 (14.5)	0.013

*chi-square (X2) test was employed to analyze the data; Figures in the parenthesis denote the corresponding percentage.

Among the various risk factors present among the participants of both groups, smoking habits, tuberculosis, jaundice, diabetes, bronchial asthma, anemia, edema, dehydration, obesity and underweight were significantly higher among the wound dehiscence developed group compared to the non-developed group.

Table 6: Mean hemodynamic parameters among the participants of both groups (n=460)

Hemodynamic Parameters	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
Pulse	89.5±14.7	86.7±9.8	0.067
Systolic Blood Pressure	121.3±51.6	122.3±12.7	0.886
Diastolic Blood Pressure	78.9±12.6	82.9±9.0	0.027

*chi-square (X2) test was employed to analyze the data; Figures in the parenthesis denote the corresponding percentage.

The mean pulse rate and mean systolic pressure were almost identical between the groups (89.5±14.7 vs. 86.7±9.8, $p=0.067$ and 121.3±51.6 vs. 122.3±12.7, $p=0.886$ respectively). In contrast, the mean diastolic blood pressure was significantly lower in patients with wound dehiscence compared to that in patients without wound dehiscence

Table 7: Number of risk factors among participants of both groups (n=460)

Number of Risk Factors	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
≤3 risk factors	9 (16.7)	214 (53.0)	<0.001
>3 risk factors	45 (83.3)	190 (47.0)	

*chi-square (X²) test was employed to analyze the data; Figures in the parenthesis denote the corresponding percentage.

It was observed that among the 54 patients who had developed wound dehiscence, 83.3% had more than 3 risk factors present, while among those without wound dehiscence, the majority (53%) had 3 or fewer risk factors present. The difference between the number of risk factors among these two groups was statistically significant.

V. DISCUSSION

Wound dehiscence is a very distressing complication that generally occurs due to various factors after a surgery. Every surgeon has an intention to retain the original architecture of the wound site after surgery, but wound dehiscence becomes a problem in his work. At the very least, patients require a second operation and hospital stay is prolonged, in a high proportion of case wound infection precedes and determine the results.^[3]Wound dehiscence commonly presents about one week after surgery and may be preceded by a serosanguinous discharge. The skin and subcutaneous tissue to the involvement of deeper fascial layer, resulting in complete failure of the wound with exposure of the viscera. Wound dehiscence plays a major role in increasing postoperative morbidity and mortality. The present study was conducted with a total of 460 emergency laparotomy cases consisting of both wound dehiscence developed and non-developed cases, to observe the significance of various factors as risk factors for abdominal wound dehiscence. It was observed in our study that abdominal wound dehiscence was more frequent in elderly (60 or >60 years old) patients compared to the young and middle-aged ones. The mean age was significantly higher in patients with postoperative wound dehiscence than in those who did not develop wound dehiscence. Gender distribution was similar among the two groups, with male predominance observed in both groups. The age distribution was similar to the study of Meltem et al., who had the majority of patients over the age of 65 years, but their study had a higher female prevalence, which was contradictory to our study.^[10]In the present study, the history of receiving steroid and cytotoxic drug were significantly more common in patients with wound dehiscence than those in patients without wound dehiscence. The immunosuppressive drug, however, was not found to be associated with wound dehiscence. In our study history of receiving Immunosuppressive drugs preoperatively was too low to make a valid analysis, which might be the reason for an insignificant association of wound dehiscence with Immunosuppressive drugs. The majority (87%) of the patients with wound dehiscence did not have a bath and/or changed clothing before the operation. This lack of proper hygienic measures was recognized as a significant risk factor for wound dehiscence. Among the other observed risk factors, statistical significance was observed in regards to tuberculosis, diabetes mellitus, jaundice, bronchial asthma, anemia, edema and dehydration, as these factors were observed in much higher frequency among the wound dehiscence group compared to the other participants. However, hypertension, ischemic heart disease, and malignancy were not found to be significantly associated between the two groups. This was similar to the findings of Toshiro et al., who also reported that neoplastic diseases did not significantly associate with wound dehiscence.^[11]The mean pulse rate and mean systolic blood pressure did not have much difference between the two groups, but mean diastolic blood pressure was significantly lower among those with wound dehiscence. The summation of our study findings demonstrated that patients with multiple risk factors present were more likely to have wound dehiscence. It was observed that the majority (83.3%) of the wound dehiscence patients had 4 or more risk factors. This was in line with the findings of Begum et al. that showed patients with 5 or more risk factors had a higher risk of wound dehiscence and unfavorable postoperative outcome.^[12]

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

VI. CONCLUSION

The present study suggests that patients-related risk factors should be assessed before surgery and should be rectified immediately. High-risk patients should be operated on by an experienced surgeon. The study also suggests that baseline characteristics like age and BMI have a significant impact on the development of wound dehiscence. Patient hygiene prior to surgery plays a big role in the occurrence of wound dehiscence.

Patients with comorbidities like tuberculosis, diabetes, asthma, jaundice, and anemia have a higher chance of developing wound dehiscence.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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