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Operative Findings and Outcome of Abdominal Wound Dehiscence in Emergency Laparotomy

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Abstract **Original Research Article**

Introduction: Dehiscence is the partial or complete separation of previously approximated wound margins as a result of inadequate wound healing. Wound dehiscence is most common following an open wound surgery. It's also known as wound breakdown, wound disruption, or wound separation. Various preoperative and postoperative variables might impact it, and these factors can also influence the patient's result following surgery. ***Aim of the Study:*** The aim of the study was to observe the operative findings and outcome of patients with abdominal wound dehiscence that had undergone emergency laparotomy. ***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 mean duration of operation, prolene suture used for closure, midline incision, mass closure technique and drain given had significant influence on development of wound dehiscence. Presence of ascitic fluid, pus and contaminated faecal material demonstrated their significant presence in patients who develop wound dehiscence than those who did not develop wound dehiscence. Postoperative conditions like abdominal distention, coughing and wound infection tend to be associated with wound dehiscence more frequently than their counterpart. About 9.3% of patients who had developed wound dehiscence died of the disease compared to 0.7% of those who did not develop the same. ***Conclusion:*** According to the findings of this study, surgical procedures, skin preparation, operation time, and wound closure method are all factors that might impact the occurrence of postoperative abdominal wound dehiscence. Postoperative abdominal distension, coughing, vomiting, and subsequent infection are all risk factors for wound dehiscence. After most types of surgery, patients with wound dehiscence have a much greater mortality risk than patients who do not.

Keywords: Surgery, Wound, Dehiscence, Discharge.

INTRODUCTION

Wound dehiscence, an acute wound failure, occurs between one and three percent of the time [1]. It is characterized by a partial or complete rupture of one or more of the surgical wound's layers. Evisceration is the term used to describe the complete rupture of the abdominal wall and removal of the viscera. In addition to preoperative, preoperative, and postoperative variables, local and systemic factors also play a role in the multifactorial issue of wound dehiscence. Additionally, there are other elements at play, including local wound issues and medicines. One of the most painful surgical consequences in hospitals is abdominal wound dehiscence. It is a terrible surgical complication that was unanticipated [2]. Fortunately, it is a fairly uncommon issue while being quite upsetting. Even though wound dehiscence is a challenge in his line of work, every surgeon has the objective to preserve the original architecture of the wound site following surgery. In a large percentage of cases when wound infection occurs first and affects the outcomes, patients

at the very least need a second operation, and their hospital stay is prolonged [3]. Commonly occurring one week after surgery, wound dehiscence may be preceded by a serosanguinous discharge. Prompt and sustained wound healing is essential for a patient's postoperative recovery and rehabilitation. It has been demonstrated that surgical wound dehiscence (SWD) raises mortality and morbidity rates as well as the implicit and direct costs to patients and healthcare providers [4-7]. In patients with difficult neoplastic illnesses, complicated inflammatory diseases, and emergency surgeries, wound dehiscence happens far more frequently than it does in patients with bleeding or non-complicated inflammatory disorders. Understanding the main elements that lead to wound dehiscence following surgery has been the subject of several investigations. The results of this research suggest that the existence of wound dehiscence can be significantly influenced by variables ranging from an operating method, such as the kind of surgery and suture, post- surgical infection, etc., to predisposing factors, such as anemia, malignancy, obesity, etc. Technical errors are usually to blame for wound dehiscence that occurs following transverse incisions in the epigastrium [8]. Following an emergency surgical surgery, abdominal wound dehiscence occurs more frequently than after an intervention. Clinical signs of wound dehiscence include cardiopulmonary symptoms, prolonged ileus, serosanguinous discharge from the wound after two to three days, failure to develop an inflammatory healing ridge during the first ten postoperative days, sudden disruption of the wound upon removal of the skin suture with exposure of the knuckle of the intestine through the wound, weakness and bulging straining during the convalescent period, etc. [9]. Wound infections remain a major source of postoperative morbidity, accounting for about a quarter of the total number of nosocomial infections. Infectious complications are the main causes of postoperative morbidity in abdominal surgery [10]. Surgical site infections (SSIs) are associated not only with increased morbidity but also with mortality. Seventy-seven percent of the deaths of surgical patients are generally related to surgical wound infections [11]. However, the rate of postoperative wound infection is found to vary with types of operation, circumstances in which the patients were operated, the disease for which they were operated. Identification of such factors can have major impact on reducing the rate of postoperative infectious complications and mortality rates.

OBJECTIVE

General Objective

- To observe the operative findings of abdominal wound dehiscence in emergency laparotomy patients.

Specific Objectives

- To observe the operative outcome of emergency laparotomy patients with abdominal wound dehiscence.
- To observe and compare the mortality rates of emergency laparotomy patients with and without abdominal 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 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.

RESULTS

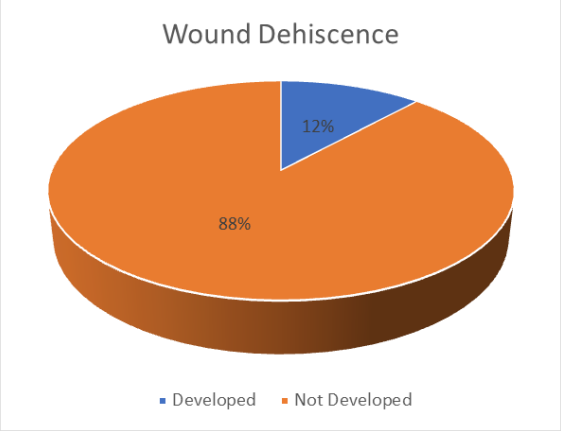

Figure 1: Distribution of the participants by wound dehiscence status (n=460)

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
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 (n=460)

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

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

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: Distribution of participants by preoperative variables (n=460)

Preoperative variables	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
Operation Duration in Hours			
Mean Duration	1.9 ±1.2	1.2 ± 0.9	0.001
Suture material for closure			
Prolene	36 (66.7)	161 (39.7)	<0.001
Vicryl	18 (33.3)	245 (60.3)	
Type of Incision			

Midline	40 (74.1)	161 (39.7)	<0.001
Paramedian	13 (24.1)	124 (30.5)	
Grid Iron	1 (1.9)	121 (29.8)	
Closure Technique			
Mass Closure	39 (73.6)	167 (41.3)	<0.001
layered Closure	14 (26.4)	237 (58.7)	
Drain			
Given	51 (94.4)	305 (75.1)	0.001
Not Given	3 (5.6)	101 (24.9)	

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

The mean duration of operation was found significantly higher in patients having postoperative wound dehiscent compared to patients without wound dehiscent (1.9 ± 1.2 ± vs. 0.9, p= 0.001). Prolene suture was used in significantly higher amounts among patients. Midline incision, mass closure and drain given cases had significant higher percentage of wound dehiscence cases (<0.05).

Table 6: Distribution of participants by per-operative findings (n=460)

Per-Operative Findings	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
Ascitic fluid	11(20.4)	30(7.4)	0.004
Pus	11(20.4)	51(12.5)	0.037
Contaminated fecal material	21(38.9)	11(2.7)	<0.001
Gastric juice/bile	24(44.4)	162(39.9)	0.523

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

Presence of ascitic fluid, pus and contaminated fecal materials demonstrated significant presence in patients who had developed wound dehiscence than those who did not develop wound dehiscence. However, no significant association was observed between the groups in terms of presence of bile (>0.05)

Table 7: Distribution of participants by post-operative findings (n=460)

Post-Operative Conditions	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
Abdominal distension	31 (57.4)	42 (10.3)	<0.001
Coughing	39 (72.2)	82 (20.2)	<0.001
Vomiting	7 (13.0)	62 (15.3)	0.655
Wound Infection	40 (74.1)	100 (24.6)	<0.001

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

Postoperative conditions like abdominal distension, coughing and wound infection tend to be associated with wound dehiscence more frequently than their counterpart (57.4% vs. 10.3%, p>0.001, 72.2% vs. 20.2%, p>0.001 and 74.1% vs.24.6% p<0.001 respectively).

Table 8: Distribution of the participants of both groups by patient mortality (n=460)

Patient Mortality	Wound dehiscence (n, (%))		P-Value
	Developed (n=54)	Not developed (n=406)	
Yes	5(9.3)	3(0.7)	<0.001
No	49(90.7)	4.3(99.3)	

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

9.3% of patients who developed wound dehiscence died of the disease compared to 0.7% of those who did not develop the same condition. This mortality rate was significantly higher among patients who had developed wound dehiscence.

DISCUSSION

Wound dehiscence is a very unpleasant complication that usually develops after surgery owing to a variety of circumstances. Every surgeon wants to keep the original architecture of the wound site after surgery, but wound dehiscence complicates his job. At the very least, patients require a second operation and a longer hospital stay; in a large proportion of cases, wound infection precedes and determines the outcome [3]. The current study included 460 emergency laparotomy cases, including both wound dehiscence developed and non-developed cases, to examine the importance of several risk variables for abdominal

wound dehiscence. In our study, abdominal wound dehiscence was more common in older (60 or >60 years old) patients than in young and middle-aged individuals. Patients with postoperative wound dehiscence had a considerably older mean age than those who did not develop wound dehiscence. Gender distribution was comparable across the two groups, with male preponderance reported in both. The age distribution matched that of Meltem *et al.*, who found that the majority of patients were above the age of 65, but their research showed a larger female predominance, which contradicted our findings [12]. The history of receiving steroid and cytotoxic drugs was considerably more prevalent in patients with wound dehiscence than in patients without wound dehiscence in the current investigation. However, the immunosuppressive medication was not linked to wound dehiscence. In our investigation, the number of patients who had received immunosuppressive medications before to surgery was too low to conduct a proper analysis, which might explain the negligible correlation of wound dehiscence with immunosuppressive drugs. The vast majority (87 percent) of patients with wound dehiscence did not bathe or change their clothes before the procedure. A substantial risk factor for wound dehiscence was identified as a lack of sufficient sanitary precautions. The present study also demonstrated that duration of operation had significant influence on postoperative wound dehiscence with higher the duration higher is the change of wound dehiscence. Prolene suture used for closure, midline incision, mass closure technique and drain given were also identified to be the predictors of wound dehiscence ($p<0.05$). These findings correlate well with a study conducted by Freddy *et al.,* [13]. Among per- operative findings, the presence of ascitic fluid, pus and contaminated material had a significant association with development of wound dehiscence. These findings were similar to the study of Bucknall *et al.,* [14]. Certain postoperative conditions like abdominal distension, coughing and wound infection tend to be associated with wound dehiscence more frequently than their counterpart. These findings were also common in few other studies [15, 16]. Patient mortality rate was significantly higher among patients who had developed wound dehiscence compared to those who did not. About 9.3% of the participants of wound dehiscence group had died in our study, compared to only 0.7% among the patients without wound dehiscence. This was different from the findings of Cavit *et al.,* who had observed no mortality among their patients [15].

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.

CONCLUSION

The present study suggests that surgical techniques, skin preparation, duration of operation and method of wound closure are factors that can influence the occurrence postoperative abdominal wound dehiscence. Postoperative distension of abdomen, coughing, vomiting and subsequent infection is also predisposing factors for wound dehiscence. Mortality rate is significantly higher among patients who have wound dehiscence compared to patients who don't after most forms of surgery.

FUNDING

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CONFLICT OF INTEREST

None declared.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

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