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# Risk Factors and Operative Findings 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. 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 risk factors and operative findings of abdominal wound dehiscence cases in 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 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. 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 fecal 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. ***Conclusion:*** The current study recommends evaluating patient-related risk factors before to surgery and quickly addressing them. A skilled surgeon should do surgery on high-risk patients. The study contends that the development of wound dehiscence is significantly influenced by baseline traits like age and BMI. The degree of patient cleanliness before surgery greatly influences the likelihood of wound dehiscence. According to the study, other factors that may affect the occurrence of postoperative abdominal wound dehiscence include surgical procedures, skin preparation, the length of the procedure, and the type of wound closure. Coughing, vomiting, and subsequent infection are additional postoperative side effects that increase the risk of wound dehiscence.

**Keywords:** Wound Infection, Laparotomy, and Dehiscence.



## INTRODUCTION

Wound dehiscence is a kind of acute wound failure that occurs in 1-3 percent of cases [1]. It is characterized by partial or complete rupture of any or all layers of the surgical wound. Evisceration is the rupture of all layers of the abdominal wall and extraction of abdominal viscera. Wound dehiscence is a complex condition that is influenced by both local and systemic variables, as well as preoperative, preoperative, and postoperative factors. Other variables, including as medicine and local wound issues, are also at work. One of the most painful surgical consequences in the hospital is abdominal wound dehiscence. It is an unanticipated and terrifying surgical consequence [2]. Although it is a highly upsetting condition, it is thankfully relatively uncommon. Even if every surgeon

intends to keep the original architecture of the wound site after surgery, wound dehiscence is a concern in his job. At the very least, the patients require a second operation, and their hospital stay is prolonged in a large proportion of cases when wound infection precedes and determines the outcome [3]. Wound dehiscence usually appears one week after surgery and is preceded by a serosanguinous discharge. Improving a patient's postoperative recovery and rehabilitation is heavily reliant on rapid and sustained wound healing. SWD has been demonstrated to raise morbidity and mortality rates, as well as the hidden and explicit costs to patients and healthcare providers [4-7]. Wound dehiscence is much more common following emergency procedures, in patients with difficult neoplastic illnesses, in patients with complicated inflammatory diseases, and to a lesser extent in patients with bleeding or non-complicated inflammatory disorders. Many attempts have been made to identify the fundamental causes of wound dehiscence following surgery. 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]. Laparotomy can significantly lower the likelihood of these occurrences. Additionally, it can be utilized to identify additional issues with the patient's body. Several studies have shown a considerable decrease in the frequency of wound dehiscence following emergency laparotomies, leading to a reduction in the overall percentage of wound dehiscence. The present study was conducted to observe such cases of abdominal wound dehiscence after emergency laparotomy, their risk factors and additional post-operative findings among patients.

## OBJECTIVE

**General Objective**

- To identify the common risk factors of abdominal wound dehiscence following emergency laparotomy.
- To observe the operative findings of abdominal wound dehiscence in emergency laparotomy patients.

## 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

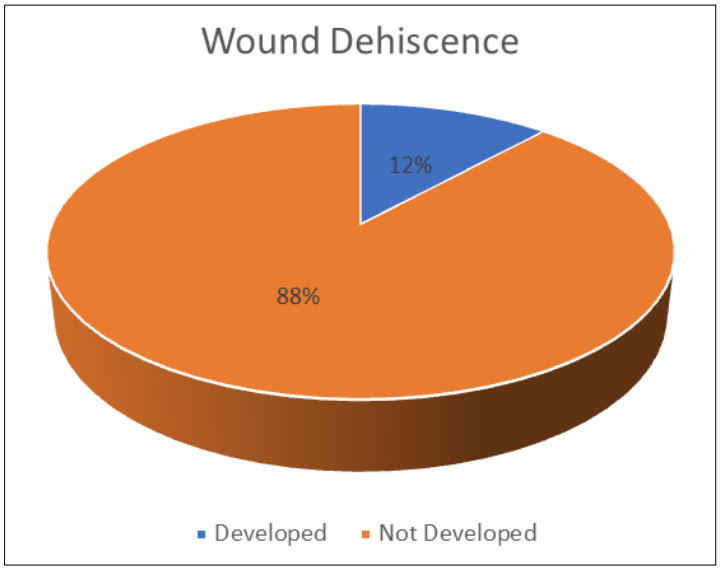


**Figure 1: Distribution of the participants by wound dehiscence status (n=460)**

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**

| 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 |

| Risk Factors | Wound dehiscence (n, (%)) | | P-Value |
|---|---|---|---|
| | Developed (n=54) | Not developed (n=406) | |
| 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 numbers of risk factors among these two groups was statistically significant.

**Table 8: 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 9: 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 10: 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).

## DISCUSSION

An extremely upsetting side effect that frequently develops after surgery is wound dehiscence. Every surgeon wants to keep the wound site's original architecture after surgery, but wound dehiscence complicates his job. Patients at the absolute least need a second operation and have a longer hospital stay; in a large percentage of cases, wound infection comes first and affects the outcome [3]. Commonly occurring one week after surgery, wound dehiscence may be preceded by a serosanguinous discharge. The deeper fascial layer's involvement in the skin and subcutaneous tissue caused the incision to completely collapse, exposing the viscera. An important factor in the rise in postoperative morbidity and death is wound dehiscence. The goal of the current study was to determine the importance of various characteristics as risk factors for abdominal wound dehiscence using a total of 460 emergency laparotomy patients, including instances with and without wound dehiscence. In our study, it was shown that elderly (60 or >60 years old) patients had abdominal wound dehiscence more frequently than young and middle-aged patients did. Individuals who experienced postoperative wound dehiscence had considerably older means of age than patients who did not. Male preponderance was seen in both groups, and gender distribution was comparable across the two groups. The bulk of the patients in Meltem *et al.*, study were over 65 years old, and the age distribution was comparable; however, their study showed a larger female prevalence, which was contrary to our analysis [9]. In the current study, patients with wound dehiscence had considerably higher rates of obtaining steroids and cytotoxic drugs than patients without wound dehiscence. However, there was no evidence linking the immunosuppressive medication to wound dehiscence. Our study's history of preoperative immunosuppressive medication use was too small to conduct a reliable analysis, which may account for the study's inconsequential finding that immunosuppressive medications cause wound dehiscence. The vast majority (87%) of patients with wound dehiscence did not take a bath or change into new clothes before to surgery. It has been acknowledged that improper hygiene practices are a substantial risk factor for wound dehiscence. Other risk variables included TB, diabetes mellitus, jaundice, bronchial asthma, anemia, edema, and dehydration, all of which were statistically significantly more common in the wound dehiscence group than in the other subjects. However, there was no evidence of a significant association between the two groups and hypertension, ischemic heart disease, or cancer. The results of Toshiro *et al.*, who also observed that neoplastic illnesses did not substantially correlate with wound dehiscence, were identical to these ones [10]. The current study also showed that the length of the procedure had a substantial impact on the postoperative wound dehiscence, with the length of the procedure

increasing the change in wound dehiscence. In addition to being discovered as predictors of wound dehiscence ($p<0.05$), Prolene suture used for closure, midline incision, mass closure method, and drain administered were also noted. These results are in line with research by Freddy *et al.*, [11]. The development of wound dehiscence was significantly correlated with the presence of ascitic fluid, pus, and contaminated material among post-operative observations. These results matched those of the research of Bucknall *et al.*, [12]. Wound dehiscence is more commonly linked to certain postoperative symptoms than its opposite, such as abdominal distension, coughing, and wound infection. Few more studies also shared these results [13, 14].

***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 current study recommends evaluating patient-related risk factors before to surgery and quickly addressing them. A skilled surgeon should do surgery on high-risk patients. The study contends that the development of wound dehiscence is significantly influenced by baseline traits like age and BMI. The degree of patient cleanliness before surgery greatly influences the likelihood of wound dehiscence. According to the study, other factors that may affect the occurrence of postoperative abdominal wound dehiscence include surgical procedures, skin preparation, the length of the procedure, and the type of wound closure. Coughing, vomiting, and subsequent infection are additional postoperative side effects that increase the risk of wound dehiscence.

**FUNDING**

No funding sources.

**CONFLICT OF INTEREST**

None declared.

**ETHICAL APPROVAL**

The study was approved by the Institutional Ethics Committee.

# REFERENCES

1. Bartlett, D. C., & Kingsnorth, A. N. (2006). Abdominal wound dehiscence and incisional hernia. *Surgery (Oxford)*, *24*(7), 234-238.
2. Cushieri, A., Giles, G. R., & Moosa, A. R. (1995). Wound and their management, In: Essential of Surgical Practice. *Butterworth and Heinelnann*, 185, 1434.
3. Al-Fallouje, M. A. R., & McBrien, M. P. (1986). Abdominal wound dehiscence In: Post graduate Surgery. *Buttenvolth Heinemann*, 31-33.
4. van Ramshorst, G. H., Nieuwenhuizen, J., Hop, W. C., Arends, P., Boom, J., Jeekel, J., & Lange, J. F. (2010). Abdominal wound dehiscence in adults: development and validation of a risk model. *World journal of surgery*, *34*(1), 20-27.
5. Webster, C., Neumayer, L., Smout, R., Horn, S., Daley, J., Henderson, W., & Khuri, S. (2003). Prognostic models of abdominal wound dehiscence after laparotomy. *Journal of surgical Research*, *109*(2), 130-137.
6. Phan, T. Q., Depner, C., Theodorou, P., Lefering, R., Perbix, W., Spilker, G., & Weinand, C. (2013). Failure of secondary wound closure after sternal wound infection following failed initial operative treatment: causes and treatment. *Annals of plastic surgery*, *70*(2), 216-221.
7. Leaper, D. J., Van Goor, H., Reilly, J., Petrosillo, N., Geiss, H. K., Torres, A. J., & Berger, A. (2004). Surgical site infection–a European perspective of incidence and economic burden. *International wound journal*, *1*(4), 247-273.
8. Altemeier, W. A. (1964). Hospital Acquired Infections in Surgery and Their Significance. *Northwest Med*, 63, 589.
9. Col, C., Soran, A., & Col, M. (1998). Can postoperative abdominal wound dehiscence be predicted. *Tokai J Exp Clin Med*, *23*(3), 123-127.
10. Fashiro, S. (1944). Wound Disruption. *Surg. Gynecol. Obstet.*, 78, 487.
11. Penninckx, F. M., Poelmans, S. V., Kerremans, R. P., & Beckers, J. P. (1979). Abdominal wound dehiscence in gastroenterological surgery. *Annals of surgery*, *189*(3), 345-352.
12. Bucknall, T. E., Cox, P. J., & Ellis, H. (1982). Burst abdomen and incisional hernia: a prospective study of 1129 major laparotomies. *Br Med J (Clin Res Ed)*, *284*(6320), 931-933.
13. Col, C., Soran, A., & Col, M. (1998). Can postoperative abdominal wound dehiscence be predicted. *Tokai J Exp Clin Med*, *23*(3), 123-127.
14. Gallen, F., & Moore, S. W. (1971). Disruption of abdominal wound. *Surg. Gyn. Obst.*, 72, 1041.