



Abdominal Wound Dehiscence after Emergency Laparotomy and Factors Contributing

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ABSTRACT:

Introduction: Abdominal wound dehiscence is one of the most serious postoperative complications faced by surgeons. The reported mortality rates of this complication are as high as 45% based on the severity of the condition. Emergency surgery, faulty abdominal wall closure, malnutrition, obesity, age, sex, congestive heart failure, anemia, jaundice, uremia, malignancy, use of steroids, diabetes, wound infection, postoperative cough, vomiting, paralytic ileus, abdominal distension are all important risk factors. The purpose of our study is to assess the extent of the problem and identify the risk factors associated with abdominal wound dehiscence following emergency laparotomy. This will guide various prophylactic measures in identifying potentially preventable complications.

Aim: To estimate the incidence of abdominal wound dehiscence in a tertiary care hospital and to identify risk factors in patients developing abdominal wound dehiscence.

Materials and Methods: This descriptive study was conducted in the NRI Medical College, General Hospital, Guntur district of Andhra Pradesh State in India. Conducted between September 2019 and August 2021, the study involved 107 patients aged more than 20 years who underwent emergency exploratory laparotomy. The day of dehiscence, day of discharge, pre-operative serum albumin, hemoglobin, obesity, uremia, serum lactate, malignancy, diabetes, wound contamination and condition of the patient during discharge were recorded. The data was entered in MS office Excel, analyzed and presented as tables in percentages. Important findings were subjected to statistical tests of significance like Chi square at 5% level of significance.

Results: Incidence of wound dehiscence in this study was 10.28%. 72.72% of the patients had wound dehiscence between 3 to 7 days. Factors found to be significantly associated were Obesity (BMI), Type 2 Diabetes mellitus, presence of cough, contaminated wound, hypoalbuminaemia and uremia. As age advances, collagen deposition after surgery decreases significantly. Diabetes has a significant impact on all stages of wound healing. Hypoalbuminaemia is an important risk factor for the development of abdominal wall dehiscence. The incidence of postoperative wound infection can be reduced by the usage of prophylactic antimicrobials.

Conclusion: Patients 50 years and above with delayed presentation and malignancy showed higher vulnerability for wound dehiscence.

Keywords: Emergency laparotomy, Abdominal Wound dehiscence, Albumin, Haemoglobin, obesity,



sepsis, malignancy

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INTRODUCTION: Abdominal wound dehiscence after laparotomy is a surgical emergency with high morbidity and mortality leading to increased hospital costs and prolonged illness¹. Abdominal wound dehiscence (acute wound failure or a burst abdomen) refers to the postoperative separation of the abdominal Musculo-apo-neurotic layers. It is one of the most serious postoperative complications faced by surgeons and is of the greatest concern because of the need for intervention, the risk of evisceration, surgical wound infection, recurrence, and incisional hernia formation. Dehiscence most often develops around 5 to 8 days following surgery². The reported mortality rates of the complication are as high as 45% associated with the severity^{3, 4}. The incidence rate mentioned in the international literature ranges from 0.4 to 3.5%⁵.

The factors responsible for the development of wound dehiscence can be classified into patient factors and surgeon-related factors. Emergency surgery, faulty abdominal wall closure, malnutrition, obesity, age, sex, congestive heart failure, anemia, jaundice, uremia, malignancy, use of steroids, diabetes, wound infection, postoperative cough, vomiting, paralytic ileus, abdominal distension are all important risk factors. Post operative abdominal wound dehiscence can be adopted as a surrogate safety outcome measure since it impacts morbidity, length of stay, health care quality and re-admission rates⁶.

The purpose of our current study is to assess the extent of the problem and identify the risk factors associated with abdominal wound dehiscence following emergency laparotomy. This will serve as a guide to undertake various prophylactic measures in identifying potentially preventable complications.

AIMS AND OBJECTIVES:

1. To estimate the incidence of abdominal wound dehiscence in a tertiary care hospital
2. To identify risk factors in patients

developing abdominal wound dehiscence.

MATERIALS & METHODS: This descriptive study was conducted in the NRI Medical College, General Hospital between September 2019 and August 2021. After obtaining approval from the Institutional Ethical Committee, 107 patients aged more than 20 years admitted to the hospital and underwent emergency exploratory laparotomy were included in the study. Patients on steroids, immunosuppressant or anticancer therapy and emergency laparoscopic patients aged less than 12 years were excluded from the study. The day of dehiscence, day of discharge, and condition of the patient during discharge were recorded. Baseline data was entered in MS office Excel, analyzed and presented as tables in percentages. Important findings were subjected to statistical tests of significance like Chi square at 5% level of significance. Association between risk factors and development of wound dehiscence in cases were analyzed using Intergraph Pad version 3.01, 32bit.

RESULTS: In this study, the mean age of patients affected was 55.63 years (range 30 years to 68 years). Out of 80 male patients, 9 (11.25%) had wound dehiscence as compared to 2 female patients out of 27 (7.4%). 72.7% of the wounds were contaminated or dirty. Out of 11 cases, 5 cases are perforation closure, and 2 cases are resection and anastomoses. 8 (72.72%) patients had wound dehiscence between 3 to 7 days while 3 patients had wound dehiscence on the eighth day. Over weight based on BMI was seen in 17 patients of which 7 (41.2%) developed wound dehiscence and of those with normal BMI only 6.7% developed wound dehiscence. This difference is statistically significant (Chi square 11.14 Yates corrected, p value 0.0008). Out of 26 patients who had Type 2 diabetes, 7 (26.9%) had wound dehiscence as compared to 4 (4.94%) patients out of 81 non diabetics. This difference is statistically significant (Chi square 8.07 Yates corrected, p value 0.004). Of the 30 patients who were smokers, 5 (16.66%) had

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wound dehiscence as compared to 6 (7.79%) out of the remaining 77 non smokers. This finding was however not statistically significant. Out of 25 patients who took alcohol regularly, 4 (16.0%) developed abdominal wound dehiscence. 15 patients had cough during their post operative period and of them 6 (40.0%) developed abdominal wound dehiscence. (Chi square 13.17, p value 0.0003). Out of 15 patients found to be anaemic, 6 (40.0%) had developed wound dehiscence compared to 5 (5.43%) out of the 92 non anaemic patients. This finding is also statistically significant (Chi square 13.17, p value 0.0003). Out of 25 patients whose wound culture report was positive, 9 (36.0%)

developed wound dehiscence as compared to only 2 out of 82 patients with negative culture reports. E. coli was isolated in 5 (45.5%) patients, staphylococci in 2 patients, Streptococci in 1 patient and Klebsiella in 3 patients. This finding is statistically significant (Chi square 19.9, p value 0.000008). Tests done revealed that there were 29 patients who had hypoalbuminaemia of whom 6 (20.69%) developed wound dehiscence which was statistically significant (Chi square 4.67, p value 0.03). Out of 36 patients who had elevated creatinine levels, 7 (19.44%) developed wound dehiscence which value was however not statistically significant (Chi square 3.56, p value 0.06).

Tables:

Table 1: Surgical procedure done before occurrence of AWD

S.No	Surgical procedure	No. of Patients (%)
1	Appendicectomy	1 (9)
2	Perforation closure	5 (45)
3	Ileostomy	1 (9)
4	Peritoneal lavage and pus drainage	1 (9)
5	Resection and anastomosis	2 (18)
6	Adhesiolysis	1 (9)

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Table 2 : Factors identified for Abdominal wound dehiscence (AWD) (Total pts 107, AWD 11)

S.No	Factor	(%) / (No.)	Remaining % (No.)	Chi square (Yates corrected)	p value
1	Gender - Male	12.7% (9/71)	5.55% (2/36)	0.04	0.8
2	Overweight as per BMI	41.18% (7/71)	4.44% (4/90)	11.14	0.0008**
3	Diabetes (Type 2)	26.92% (7/26)	4.94% (4/81)	8.07	0.004**
4	Presence of cough	40.0% (6/15)	5.43% (5/92)	13.17	0.0003**
5	Smoking	16.67% (5/30)	7.79% (6/77)	1.01	0.3
6	Alcohol	16.0% (4/25)	8.54% (7/82)	0.49	0.5

** Highly Significant



Table 3 : Laboratory findings identified for Abdominal wound dehiscence (AWD)

S.No	Factor	(%) / (No.)	Remaining % (No.)	Chi square (Yates corrected)	p value
1	Wound culture positive	36.0 % (9/35)	2.44 % (2/82)	19.9	0.000008**
2	Hypoalbumaemia	20.69 % (6/29)	6.41 % (5/78)	4.67	0.03*
3	Uremia	19.44 % (7/36)	5.63 % (4/71)	3.56	0.06

*Significant, ** Highly Significant

DISCUSSION: Abdominal wound dehiscence is still a significant cause of morbidity after major abdominal operations; with an incidence ranging from 0.4% to 3.5%. The incidence of Abdominal Wound Dehiscence was found to be 10.28% in our study. Hegazy TO et al reported an incidence of 12.4% burst abdomen in Egypt⁷. Harvin JA et al in their study at Houston, Texas, reported 21% major abdominal complications following emergency laparotomy⁸. Bansiwala RK et al in their study at Chandigarh reported abdominal wound dehiscence of 12.3% after emergency midline laparotomy⁹.

The precise contribution of any one factor toward increasing the dehiscence risk is difficult to know, but certainly, a patient with many putative risk factors is at a higher risk than a patient with none. Though the surgeon has no control over patient related factors like advanced age, male sex, malignancy etc, which increase the risk of wound disruption, the surgeon can however still play a major role in the prevention of this complication. The majority of the cases operated in our hospital presented as emergencies. The delay in presentation to the hospital also affects the outcome of the patient in terms of the presence of septic shock and infective foci. The more the delay in presentation, the worse is the outcome. The delayed presentation of patients to the hospital in emergency situations is one of the important causes for

the increased incidence rate of abdominal wound dehiscence.

Advanced age was identified as a risk factor in wound disruption in a study conducted by Riou JP et al¹⁰. Lenhardt R. et al. suggest in their study that collagen deposition after surgery decreases significantly with advancing age¹¹. Ramneesh G et al in their study at Patiala found that the mean age for wound dehiscence was 41.61 years¹. In the current study, the mean age for abdominal wound dehiscence was 55.63 years.

Obesity is said to be a risk factor for abdominal wound dehiscence. This was seen clearly in our study. The presence of excessive adipose tissue in the subcutaneous layers makes obliteration of the dead space more difficult. Because of increased difficulties with hemostasis there may be a formation of hematoma and wound infection. The results are similar to those found in a study conducted by Israelsson LA et al¹².

In a study conducted by Sinha A et al, 43.8% of the patients involved had a hemoglobin level of less than 10 gm%¹³. The effect of anemia on wound healing often is compounded by the associated hypovolemia or hypoxia. Anemia and hypovolemia cause decreased tissue oxygenation leading to impairment of wound healing by the decrease in wound tensile strength. In our study, anemia was found to be a significant risk factor.

Serum albumin plays a key role in process of wound healing. In this study,



hypoalbuminaemia was also found to be one of the risk factors for the development of abdominal wall dehiscence. In a study carried out at a teaching hospital in Denmark, 65% of the patients who developed wound dehiscence were found to have pre-operative hypoalbuminaemia¹⁴. They also found other risk factors like anemia, malnutrition and chronic lung disease.

In our study, uremia is also found to be a significant risk factor. Similar results were observed in a clinical study conducted by Khan M et al.¹⁵ from Multan, Pakistan and Aziz A et al. from Karachi¹⁶. Renal failure can be predicted by higher levels of serum creatinine. In this study, patients with higher levels of serum creatinine developed AWD. Serum lactate is also said to be one of the list of risk factors of AWD by many authors as also seen in this study.

The study done by Riou JP et al. identified malignancy as a risk factor in wound disruptions¹⁰. Malignancy per se might not predispose to wound disruption, but associated general debility and Hypoproteinaemia can certainly cause an increase in the incidence.

Diabetes has a significant impact on all stages of wound healing. Moreover, diabetics are furthermore susceptible to infections. Diabetes is often associated with poor wound healing. Granulocytes from diabetic patients demonstrate decreased phagocytic activity and poor chemotaxis. These granulocyte defects and local ischemia secondary to accelerated atherosclerosis and small vessel disease result in increased susceptibility to infection which can in turn increase the risk of developing dehiscence¹⁷. In our study also diabetes is seen to be a significant risk factor. This result is comparable to similar results obtained in a study carried out by Soni P et al. in Bilaspur, India¹⁸.

Emergency surgical procedures have a higher risk of dehiscence than elective procedures. As the patients undergoing surgery in an emergency are in suboptimal condition, hemodynamically unstable, and the risk of contamination of the surgical field is high. The surgeon facing such a distressing situation may be at risk of an inappropriate closure of the

abdomen towards the end of the surgical procedure.

Contamination was also found to be a significant risk factor for AWD in the present study. Irvin TT et al. found in their study that wound infection is associated with a tenfold increase in the incidence of wound disruption¹⁹. The incidence of postoperative wound infection can be reduced by the usage of prophylactic antimicrobials. In established cases of wound infection, pus should be drained, and appropriate antibiotics started based on culture sensitivity reports. In our study, the most common organism grown in the abdominal wounds was E. Coli.

The triad of abdominal distention, vomiting, and cough increase the intraabdominal pressure and wound disruption¹⁰. Postoperative cough should be considered as an independent risk factor and therefore chest physiotherapy and tracheobronchial toilet will reduce the frequency of wound failure. The day of wound dehiscence in the current study ranged from 5th post-operative day to the 8th post-operative day with an average of 6 days. Keill RH et al. reported similar findings, with an average postoperative day of dehiscence of 7 days²⁰.

CONCLUSION: The incidence of abdominal wound dehiscence in this study was around 10.28%. The use of appropriate antimicrobial prophylaxis and during the postoperative period is essential for prevention of surgical site infections. Improving the nutritional status of the patients by providing a high protein diet and maintaining a hemoglobin level in near normal limits is of essence. Prevention of increased abdominal tension by suppressing cough, avoiding hiccups, avoiding urinary retention by continuous drainage of the bladder, employing good surgical techniques during the closure of the abdominal wounds, proper peritoneal toileting with warm saline before the abdominal closure particularly in contaminated and dirty cases, advising abdominal binder in the immediate postoperative period are all important steps in preventing abdominal wound dehiscence.

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