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IP International Journal of Medical Microbiology and Tropical Diseases

Journal homepage: https://www.ijmmtd.org/

Original Research Article

A cinical study of abdominal wound dehiscence at a tertiary care Centre in North India

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Abstract

Introduction: One dangerous postoperative complication that has a high death and morbidity rate is wound dehiscence. Wound dehiscence can be caused by a variety of risk factors, including emergency surgery, intra-abdominal infection, malnutrition, advanced age, systemic disorders, and so on. Understanding these risk variables is essential for effective prophylaxis.Wound infection increases the risk of wound dehiscence because of influx and activation of neutrophils, increases in levels of degradative matrix metalloproteinases and the release of endotoxins. Medical and surgical preventive measures are crucial throughout the primary peri-operative phase due to the high death rate.

Aims and Objective: To determine the frequency and important risk factors associated with abdominal wound dehiscence.

Materials and Methods**:** A total of 100 post operated abdominal surgical wound dehiscence patients were studied. Date of admission, clinical history, important risk factors, investigations, and postoperative infection were recorded.

Result: Eighty seven individuals underwent emergency surgery which were contaminated type. 72 patients had a BMI of 22 or above. Sixty three patients underwent midline incision surgery while 42 patients had intestinal perforation resulting in peritonitis. From pus discharge patient, *E. coli* was reported (42%) followed by *Klebsiella pneumoniae* (38%), *Enterococcus spp* (18%), *Staphylococcus aureus* (36%) and *Streptococcus pyogens* (6%), which were mostly multidrug resistant.

Conclusion: Male sex, older age, anaemia, malnutrition, obesity, obstruction of the intestines, emergency surgery, perforation closure and presence of infection are significant contributory variables for development of postoperative abdominal wound dehiscence. Effective aseptic procedures during surgery and following hospital infection control guideline are much needed for preventing wound dehiscence related complications.

Keywords: Abdominal, Postoperative, Wound dehiscence.

Received: 04-05-2025; **Accepted:** 28-06-2025; **Available Online**: 04-09-2025

1. Introduction

Wound dehiscence is the term used to describe a partial or complete breakdown of the closure of an abdominal wound, with or without protrusion or evisceration of the abdominal contents.

One unusual viscus protrusion through the musculoaponeurotic layer of surgical scar tissue, or behind a healed skin incision, is known as an incisional hernia.- A potentially fatal postoperative complication that has a high death and morbidity rate is wound dehiscence. It significantly affects the cost of medical care for both hospitals and patients.[2] A mortality rate of 15–25% is linked to wound dehiscence. While a number of systemic variables are linked to elevated risk, their clinical significance is overstated.[3]

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https://doi.org/10.18231/j.ijmmtd.v.11.i.3.16

Because of serious complications, theurapeutic preventive measures are prerequisite in pre and post operative period. A thorough understanding of risk factors is essential for prophylaxis. This study sought to clarify some of the mechanisms that contribute to incisional disruption.[4]

2. Aims and objectives

1. To determine important risk variables for individuals who experience dehiscence of abdominal wounds.
2. To determine which illnesses contribute to the onset of wound dehiscence.
3. To research the kind of cut that causes wound dehiscence.
4. To investigate the prevalence of wound dehiscence in emergency and elective procedures.

3. Materials and Methods

3.1. Study setting

From December 2022 to October 2024, the Department of Surgery at S.N. Medical College & Hospital in Agra carried out a clinical study on post-operative abdominal wound dehiscence.

3.2. Inclusion criteria

1. Patients with abdominal wound dehiscence who are 10 years of age or older and of any sex.
2. Individuals who have experienced evisceration of the abdomen
3. All patients who have had abdominal incisions developing wound dehiscence.

3.3. Sampling procedure

Included patients sent to S.N. Medical College & Hospital, Agra from other facilities who had elective or emergency abdominal surgeries followed by wound dehiscence. These cases are carefully investigated, such as the date of admission, clinical history, mode of presentation, important risk factors, investigations, type and time of surgery and postoperative diagnosis, until the patient is discharged. Postoperatively, the wound dehiscence was diagnosed according to the definitions given in the oxford textbook of Surgery 2nd edition.[5]

4. Results

100 patients out of 1570 abdominal surgery patients (incidence rate 6.36%) who experienced wound dehiscence were studied. The majority of patients were between the ages of 31 and 40; the youngest was 18 years old, and the oldest was 80. The affected patients were 47.1 years old on average (SD15.43). There were 22 female cases and 78 male cases out of 100. Thirteen individuals underwent elective surgery and 87 underwent emergency surgery (P 0.001, S). A total of seventy-one of the study's cases had surgery that was deemed contaminated. 28 patients had a BMI of 22 or less, while 72 patients had a BMI of 22 or more (p=0.001).

A total of 56 patients were having Hb% <10gm% and 44 patients had 10gm%and more than 10gm% (p=0.27 NS). 30 cases had diabetes mellitus (p=.0001)(**Table 1**)

Table 1: Demographic details

Parameter	**N (%)**
Total positive	100
Gender	
Male	78
Female	22
Age (years)	
Elective	13
Emergency	87
Type of surgical wound	
C	0
CC	7
C0	71
D	22
BMI	
>22	72
<22	28
Degree of anaemia (Hb%)	
>10	44
<10	56
Diabetes mellitus	
Hb1>6.5	33

Out of 100 cases, 63 cases were operated with midline incision and 35 cases were operated using paramedian incision (p=0.007, S).(**Table 2**)

Table 2: Distribution of type of incision in wound dehiscence cases

Type of incision	**N (%)**
Upper midline	23
Midline	36
Lower midline	04
Right -upper paramedin (RCP)	11
Right -lower paramedin (RLP)	24
Loin	01
Mc Burney's	01
Total	100

In 41 cases procedure of perforation closure and in 26 cases had resection and anastomosis while 24 cases of appendicectomy for appendicular pathology. 42 patients out of 100 cases were diagnosed of peritonitis secondary to hollow viscus perforation, 24 patients had appendicular pathology, 20 patients with intestinal obstruction and 8 patients suffered from malignancy.(**Table 3-4**) Out of total 100 patients 6 patients died.

Table 3: Distribution of related abdominal procedure

Symptoms	N (%)
Appendicectomy	24
Perforation closure	41
Resection and anastomosis	26
Others	09
Total	100

Table 4: Distribution of related abdominal pathology

Diagnosis	N (%)
Hollow viscus perforation	42
Duodenal ulcer	26
Others	16
Appendicular illness	24
Intestinal obstruction	20
Malignancy	08
Others	06
Total	100

Table 5: Distribution of cultured bacteria and sensitivity

	No.of isolates(140)	Amoxy- clavulanic acid	Amikacin	Piperacillin-Tazobactam	Linezolid	Clindamycin	Ceftazidime	Ciprofloxacin	Meropenem	Cefotaxime	Cefaperazone- sulbactam	Ceftriaxone	Gentamycin	Vancomycin
E. coli	42(30%)	22	34	82	-	-	42	28	86	48	88	-	20	-
Klebsiella spp	38(27%)	18	48	68	-	-	32	22	78	38	82	42	46	-
Enterococcus spp	18(12.8%)	38	-	52	100	-	-	38	-	-	-	-	64	100
Staphylococcus aureus	36(25.6%)	40	-	-	100	62	44	22	-	36	-	42	-	100
P. aeruginosa	6(4.2%)	28	62	70	-	-	54	34	82	40	-	-	64	-

Out of 100 wounds 68 wounds were infected by bacteria.In 46 wound pus sample monomicrobial growth was present while 22 pus sample had polymicrobial(two bacteria)growth. *E.coli* was most commonly isolated bacteria followed by *K.pneumoniae* and *P. aeruginosa* among gram negative bacteria.While *Staphylococcus aureus* was most common bacteria followed by *Enterococcus spp* among gram positive.We have observed that *Klebsiella pneumoniae* isolates were mostly multidrug resistant among gram negative isolates (**Table 5**).

5. Discussion

Abdominal wound dehiscence is a serious postoperative complication, with higher mortality and morbidity rates. Despite improvements in perioperative care and suture materials, the incidence complications related to abdominal wound dehiscence have not altered over the past few years.

In clinical study, a total of 100 patients out of 1570 operated abdominal surgical patients (incidence rate 6.36%) who developed abdominal post operated wound dehiscence were studied. The incidence, as described in the literature, ranges from 0.4% to 3.5%.[6] In the Modi J. study, among 167 patients who underwent emergency exploratory laparotomy, 37 (22.15%) patients developed wound dehiscence while 130 (77.84%) patients did not.[7] Afzal et al reported lower prevalence of wound dehiscence (8.13%) similar to our study.[8] While Hegazi et al and Hanif et al reported 14.15%, and 14.7% respectively.[9,10] Hegazi et al only included infective aetiology of wound dehiscence in their study which might be the reason of lower incidence of wound dehiscence.

5.1. Age and sex

In A 2007 study that involved 3500 abdominal laparotomies performed in the surgery department of Mesologgi General Hospital, 60% of males and a mean age of 69.5 years experienced abdominal wound dehiscence.[1] This study

dominated the picture with a 3.5:1 male to female proportion. This male preponderance might result from the fact that men are more likely to experience intestinal blockage and peptic ulcer perforation (78%). Chalya and associates additionally discovered that, among 872 patients who had midline laparotomies, there were more men than women (male-to-female ratio of 2.8:1), as in our study.[12]

In another similar study among 167 patients who underwent emergency exploratory laparotomy, 121 male and 46 female cases developed wound dehiscence.[7] The mean age of patients with wound dehiscence was 70 years, according to research conducted by Dr. Joseph Trueta in Spain on 12,622 patients who had laparotomies.[13] Since appendicular and duodenal ulcer perforations are more common in this age range, the mean age of the patients in our study was 47.1 years. According to our research, the age group of 41–50 years old is the most likely to experience mass closure of post laparotomy wound dehiscence, followed by 61–70 years old. Delays in wound healing in the elderly are associated with a modified inflammatory response, which includes diminished macrophage phagocytic capacity and delayed T-cell infiltration into the wound region with alterations in chemokine production.[14] Gejoe et al. discovered that emergency laparotomies were frequently performed on people between the ages of 40 and 80.[15]

5.2. Procedure

The higher incidence of wound dehiscence in our study may be due to emergency surgeries. According to Gejoe et al., blockage accounted for 37% of instances and perforation for 57% of cases. With 36% of cases presenting with obstruction and 30% with perforation, we discovered that obstruction happened more frequently than perforation in our study.[15] According to our research, 41 percent of patients who had surgery for peritonitis because of a hollow viscus perforation and whose wounds were deemed contaminated had abdominal wound dehiscence. According to the study conducted by Modi et al., there is a statistically significant increase in the risk of wound dehiscence in the filthy surgery group (p=0.0001) as compared to the clean contaminated operations.[7] This study also discovered that, among all operated instances of emergency exploratory laparotomy, ileal perforation accounted for the majority of cases (31.74%). They then discovered that our study had peptic perforation (21.96%), intestinal blockage (16.77%), ruptured appendicitis (14.37%), and ruptured liver abscess (11.38%).[7]

Patients with intraabdominal infections were more likely to have had emergency surgery (p O.02), colon surgery (p 0.005), or surgery with a higher wound classification (p 0.02), according to a study done on 107 patients with abdominal wound dehiscence in the Department of Surgery, Cleveland Veterans Affairs Medical Center USA.[16] Compared to 87% in our study, 60% of patients who experienced wound dehiscence underwent emergency surgery, according to another study done at Mesologgi General Hospital.[17] According to Spiliotis et al., who monitored 3,500 surgical patients, 15 of them experienced wound dehiscence. In this study, emergency procedures made up 92% of the procedures (n = 46), with elective treatments making up the remaining 8% (n = 4).[18] This could be due to recent advancements in surgical techniques and strict aseptic precautions, including postoperative care.

5.3. Incision

According to a 2001 study done in the Department of Surgical Gastroenterology at Hvidovre Hospital, individuals who have vertical incisions are more likely than those who have transverse incisions to experience abdominal wound dehiscence and burst abdomens (p = 0.0001).[19] Out of 100 patients in our study, 63 had midline incisions and 35 had right paramedian incisions; this means that 98% of patients with vertical incisions (p 0.007) experienced wound dehiscence.

Similar to our study, Carlson et al.'s research on 1,072 patients who underwent midline incisions in abdominal surgery found that the type of incision was not associated with wound issues after a mean follow-up of 22 months.[20]

5.4. Comorbid factors

In various studies comorbid factors predicted different outcome of wound dehiscence. We have included some important factors to find association of these factors.

Anaemia is a risk factor linked to decreased tissue oxygenation, blood transfusions, and elevated perioperative stress. The concomitant hypovolemia or hypoxia frequently exacerbates the impact of anemia on wound healing. Reduced tissue oxygenation from anemia and hypovolemia impairs wound healing by lowering the tensile strength of the wound.

The Talukdar has not found wound dehiscence rate to differ significantly between the study and control groups, similar to our results.[21] During their postoperative hospital stay, 74% of the surgical patients in our study experienced albuminuria due to sepsis-induced hypoalbuminemia. It makes an abdominal rupture more likely. Choudhury et al. reported that 76.79% of their wound dehiscence patients had hypoalbuminemia.[22] According to Jaiswal et al., hypoproteinemia, defined as serum total proteins less than 6 g%, was seen in 58% of patients of ruptured abdomen.[23]

Patients who are obese have a higher risk of SSI. Reduced oxygen and blood flow in the adipose tissue beneath the skin might lead to complications.

Adipose tissue may also make it more difficult to administer antibiotics. Increased stress on the borders of wounds is common in obese patients, and this can cause wound dehiscence. Tension in the wound raises tissue pressure, which lowers oxygen availability and microperfusion.[24]

A study conducted at Sundsvaell County Hospital's Department of Surgery in Sweden found that overweight (BMI > 25) increases the risk of wound infection. However, if patients are sutured with a suture length to wound length ratio of 4 to 4.9, these wound dehiscence rate could be decreased.[25] As we also found high BMI patients in our study.

Diabetes is considered as one of the significant risk factor in the Safdarjung hospital study as 44(22%) out of 200 patients were associated with diabetes.[26] As it is known Diabetes has significant impact on all stages of wound healing. Moreover Increased sugar level, Granulocyte defects and local ischemia in diabetes are main culprit for further increases chances of more susceptibility to secondary infections resulting in wound dehiscence. In another s study done in Stanley Medical college out of total 50 wound dehiscence cases around 32% cases had random blood sugar level >200 mg/dl.[27] Our study have found similar results as in 30 % cases of wound dehiscence had diabetes mellitus.

5.5. Microbiological factors

Intra-abdominal sepsis and wound infection increases the risk of wound dehiscence. Continued presence of bacteria causes influx and activation of neutrophils, increases in levels of degradative matrix metalloproteinases (MMPs) and the release of endotoxins accelerates the process of wound dehiscence.[28] This correlation goes in favour of many studies. In present study pus culture and sensitivity report of all pus discharge patient, *E. coli* was reported most (420%). Other organisms were also found such that *Klebsiella* (38%), Enterococcus (18%), Staphylococcus (36%) and Streptococcus (6%), which is more same as other studies. In Ramneesh et al study, *E. coli* was reported more commonly (40%). Other organisms *Klebsiella* (22.2%), Pseudomonas (11.1%), staphylococcus (17.8%) and streptococcus (8.9%) were found.[29]

5.6. Mortality

Evisceration from abdominal wound dehiscence necessitates prompt medical attention because of extended hospital stay, elevated risk of death, and a high frequency of incisional hernias. Two individuals (4%) died out of 48 patients who experienced wound dehiscence in a research conducted at Oula University Hospital. This study's mortality rate was comparable to ours, at 6%.However, Modi et al. found a mortality rate of about 45% because of abdominal wound dehiscence, which is the contradictory of our findings.[7]

6. Conclusion

Patient variables such as older age, male sex, anaemia, malnutrition, obesity, patients with peritonitis owing to intestinal perforation or obstruction, and those who underwent emergency surgery are significant risk factors for the development of postoperative abdominal wound dehiscence. Midline incisions, incorrect suture technique, and inadequate aseptic measures may result in wound infection and, ultimately, wound dehiscence.

As consequently, postoperative abdominal wound dehiscence can be avoided by enhancing the patient's nutritional status, following stringent aseptic procedures and hospital infection control guidelines and avoiding midline incisions.

7. Limitation

Since our set up is tertiary care hospital that receive significant cases of referral from various primary and secondary care hospitals so there are surgical cases which are already complicated ,which possibly exaggerate the rate of wound dehiscence. We have not analyzed the role of the accompanying surgeon, who obviously plays an important role.

8. Conflicts of Interest

There is no Conflicts of Interest.

9. Source of Funding

The authors did not receive funding (institutional, private and/or corporate financial support) for the work reported in the menuscript.

10. Acknowledgement

This paper and the research would not have been possible without the exceptional support of my all co-authors. Their expertise has improved this study in innumerable ways and saved me from many errors.

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Cite this article: Singhal S, Srivastava S, Agrawal D, Singhal S, Garg P. A cinical study of abdominal wound dehiscence at a tertiary care Centre in North India. *IP Int J Med Microbiol Trop Dis*. 2025;11(3):330-335.