

Original Research Article

Clinical study of factors influencing wound dehiscence after emergency exploratory laparotomy

Ankit Kamboj¹, A. R. Bansal^{1*}, Harsha Kamalhans¹, Joy Bansal², Simon Lanah¹

¹Department of General Surgery, Postgraduate Institute of Medical Sciences, Rohtak, Haryana, India

²Department of General Surgery, Maharishi Markandeshwar University, Solan, Himachal Pradesh, India

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*Correspondence:

Dr. A. R. Bansal,

E-mail: drarbansal@hotmail.com

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ABSTRACT

Background: Wound dehiscence is a major complication following surgery, particularly after emergency exploratory laparotomies. It occurs due to the failure of proper wound healing, resulting in higher patient morbidity, longer hospital stays and increased healthcare costs. The risk factors associated with wound dehiscence is crucial for enhancing patient outcomes and thus minimizing complications. The present study was thus planned to identify and address.

Methods: A total of 100 consecutive patients were studied in the period from May 2022 to April 2023 who underwent emergency laparotomy for conditions like intestinal perforation, obstruction and ruptured appendix were assessed for risk factors associated with wound dehiscence including age, BMI, diabetes mellitus, neoplasia, preoperative respiratory conditions, contamination during surgery, serum albumin, serum creatinine and anaemia. The incidence of wound dehiscence was recorded from postoperative days 3 to 7.

Results: Out of 100 patients, 35 had superficial wound dehiscence, while 6 developed deep dehiscence. There was significant correlations between wound dehiscence and low serum albumin levels as well as preoperative respiratory abnormalities and associated comorbidities like DM, neoplasia. Contamination with either bilious or fecopurulent material significantly increased the risk of wound dehiscence.

Conclusions: Wound dehiscence remains a significant concern following emergency laparotomy. Factors like hypoalbuminemia, respiratory abnormalities and intraoperative contamination play a pivotal role in causing wound dehiscence following exploratory laparotomy. Early identification and management of these risk factors along with appropriate postoperative care are essential in reducing the incidence of wound dehiscence.

Keywords: COPD, Diabetes mellitus, Emergency laparotomy, Hypoalbuminemia, Neoplasia, Superficial dehiscence, Wound dehiscence

INTRODUCTION

Every surgical intervention inevitably leads to a wound, making its care essential for successful patient recovery. Emergency laparotomy is a surgical procedure performed to explore the abdomen, often due to various intra-abdominal conditions like obstructed or gangrenous hernias, bowel ischemia, bowel obstruction, perforation, trauma to abdominal organs and the drainage of abdominal abscesses. Postoperative complications are

influenced by factors like type of surgery, the patient's pre-existing health conditions like DM, COPD, anaemia, hypoproteinemia and the quality of perioperative care.¹ These complications are like surgical site infection, wound dehiscence, atelectasis, pneumonitis, intra-abdominal collections, DVT etc. Amongst these, wound dehiscence is classified into two categories: superficial dehiscence, which involves the skin and subcutaneous tissue and deep or fascial dehiscence, which involves the fascia and can lead to more serious complications, such

as the protrusion of abdominal contents. Fascial dehiscence is among the most feared complications in abdominal surgery due to the high risk of further infection, repeat dehiscence and the development of incisional hernias.²

Many risk factors have been associated with wound dehiscence, including patient age, with individuals over 65 being more susceptible due to slower tissue repair mechanisms.³ Other risk factors include malnutrition, anemia, diabetes, emergency surgery and conditions that increase intra-abdominal pressure, such as coughing, vomiting or abdominal distension. Surgical factors, including the length of the operation, the type of incision and the use of certain sutures, also influence the risk of wound dehiscence. Obesity, chronic obstructive pulmonary disease (COPD), pneumonia and malignancy further complicate wound healing.⁴

Wound dehiscence affects 0.4% to 3.5% of surgeries globally, with mortality rates reaching 45%. Despite advancements in surgical techniques, the incidence and associated mortality of wound dehiscence have not significantly decreased, largely due to rising patient risk factors.⁵ It leads to prolonged hospital stays, reoperations and increased healthcare costs.

Preventive measures include improving surgical methods, using appropriate sutures and reducing tension during wound closure. Midline incisions benefit from continuous mass closure techniques with monofilament or non-absorbable sutures. Infection risks can be minimized through proper skin preparation, prophylactic antibiotics and careful tissue handling.⁶

The objective of this study was to study the clinical factors influencing wound dehiscence post emergency laparotomy that help in early identification and management along with appropriate postoperative care that are essential in reducing the incidence of wound dehiscence.

METHODS

Study place

This prospective observational study was conducted in the Department of General Surgery at Pt. B. D. Sharma Institute of Medical Sciences, Rohtak.

Study duration

The study was conducted from May 2022 to April 2023.

Sample size

Involving 100 consecutive patients undergoing exploratory laparotomy for conditions like perforation, intestinal obstruction and burst appendix. Informed consent was obtained from all participants.

Inclusion criteria

Inclusion criteria included patients over 14 years of age undergoing emergency laparotomies.

Exclusion criteria

Exclusion criteria involved patients with immunocompromising conditions (e.g., AIDS, hematological disorders or immunosuppressants) and polytrauma patients with chest or lower limb injuries.

A detailed history with reference to fever, pain, vomiting, abdominal distension, constipation and any treatment prior to admission was taken. Vital signs, hydration, abdominal distension, tenderness, guarding and presence of free fluid were noted.

All routine investigations were done. All the patients were managed with nasogastric aspiration, catheterization and intravenous fluid resuscitation. A final decision regarding exploratory laparotomy was taken depending upon clinical and radiological investigations. As part of preoperative work up, all such patients were prescribed triple parenteral antibiotics like cefoparazone +sulbactam with amikacin and metronidazole.

Intraoperatively, following factors were taken into consideration and noted. All the patients were operated by a surgeon not below the rank of Senior Resident. Duration of surgery.

Any faecal/bilious/purulent contamination or spillage during surgery. Postoperatively, all the patients were followed up with the following biochemical, parameters and adequate measures were taken to correct them if any derangement was seen haemoglobin, serum creatinine, serum albumin

Depending upon the preoperative values and deranged clinical conditions like pitting pedal edema, fresh frozen plasma (FFP) transfusions were done in laparotomy, patients till their requirements were met. Adequate blood products were transfused in anaemic patients. Patients with uncontrolled blood sugar levels were managed with systemic insulin in consultation with a physician. The condition of the wound was first seen on 2nd post op day for any sero-sanguineous discharge. Sero-purulent discharge. If any purulent discharge was observed, the same was sent for culture/sensitivity. If no discharge was seen on 2nd post op day, the wound was kept exposed and mercurochrome applied on the wound. If any discharge was seen on 2nd post op day, daily ASD was carried out with betadine and gauge with window dressing till the discharge subsided. All the patients were assessed till a maximum of 7th post op day for wound condition. If the wound condition and other parameters were within normal limits with no active discharge then the patients were discharged and followed up for removal of stitches, otherwise they remained admitted for wound

dressings and were observed for any wound dehiscence thereafter.

Ethical approval

Ethical approval was sought from the ethics committee of the institution and was approved w.e.f No. BREC/22/541 dt. 18-04-2022.

Statistical analysis

Data was coded and recorded in MS Excel spreadsheet program. SPSS v23 (IBM Corp.) was used for data analysis.

RESULTS

In this study, most patients (45%) were in the age group of 36-50 years, with the majority being under 50. The patients' ages ranged from 22 to 82 years, with a mean age of 46.72 ± 13.87 years. This age group is often engaged in outdoor work, travel and activities like smoking, alcohol consumption and eating outside, all of which increase the risk of abdominal issues such as hollow viscous perforation, obstruction and ruptured liver abscesses. The p value in the present study for correlation of presence of diabetes mellitus with wound dehiscence came out to be 0.001 which was significant, showing a strong positive correlation ($p < 0.05$). This was probably owing to the fact that diabetes per se increases susceptibility to infections, microangiopathy and poor wound healing etc. The p value in this study for the correlation between albumin levels and wound dehiscence was 0.001, indicating a significant positive correlation ($p < 0.05$). This is probably because low

albumin levels lead to impaired collagen synthesis, impaired fluid balance and edema. A significant p value of 0.003 was seen in patients with intraperitoneal contamination in this study showing a positive correlation with wound dehiscence ($p < 0.05$). It is noteworthy that maximum patients showing dehiscence had hollow viscus perforation. Proportion of dehiscence was relatively less in patients in which no contamination was seen. The p value for correlation of wound dehiscence with presence of neoplasia came out to be 0.002 which was significant ($p < 0.05$) showing a strong positive correlation. This is probably because such patients have an overall poor recovery owing to poor tissue healing, impaired immune response, nutritional deficiencies, concurrent chemotherapy or radiotherapy etc. In this study, a significant p-value of 0.002 ($p < 0.05$) indicated a strong positive correlation between preoperative respiratory abnormalities and wound dehiscence.

Patients with compromised respiratory conditions are more likely to develop postoperative complications like cough, pneumonitis and pleural effusion, which increases the use of accessory respiratory muscles. This added stress on the weakened abdominal wall may lead to dehiscence. In the present study it was observed that maximum number of patients were in the age group 35-50 years in which there was maximum incidence of wound dehiscence. The p value was 0.152 ($p > 0.05$) which was not significant. The p value in the present study for correlation of hemoglobin levels with wound dehiscence came out to be 0.979 which was not significant ($p > 0.05$), thus showing no positive correlation. This was probably because prompt correction with adequate blood products and parenteral iron was done in anaemic patients.

Table 1: Distribution of cases according to age of the patients (n=100).

Age (in years)	Number of cases
21-35	22
36-50	45
51-65	21
More than 65	12
Mean	46.72
Standard Deviation	13.87541

Table 2: Distribution of cases according to sex of the patients (n=100).

Sex of the patient	Number of cases
Male	79
Female	21

Table 3: Wound dehiscence with presence of diabetes mellitus.

		Dehiscence (superficial /deep)	
		Deep	Superficial
Diabetes mellitus	Absent (77)	4	26
	Present (23)	2	9
Total		6	35

P value: 0.001.

Table 4: Wound dehiscence with serum albumin.

		Dehiscence (superficial / deep)	
		Deep	Superficial
Albumin	Less than 3.5(47)	6	35
	More than 3.5(53)	0	0
Total		6	35

P value: 0.001.

Table 5: Wound dehiscence with presence of contamination.

		Dehiscence (superficial / deep)		P value
		Deep	Superficial	
Intra operative findings	Contamination present (68)	4	20	0.03
	No contamination (32)	2	15	0.23
Total		6	35	

Table 6: Wound dehiscence with presence of neoplasia.

		Dehiscence (superficial/deep) POD3-7	
		Deep	Superficial
Neoplasia	Absent (96)	5	34
	Present (4)	1	1
Total		6	35

P value: 0.002.

Table 7: Wound dehiscence with pre-operative respiratory abnormality.

		Dehiscence (superficial/deep) POD3-7	
		Deep	Superficial
Pre operative respiratory examination (COPD)	Present (37)	5	13
	Absent (63)	1	22
Total		6	35

P value: 0.002.

Table 8: Wound dehiscence with Age.

		Dehiscence (superficial / deep) POD3-7	
		Deep	Superficial
Age	21-35 (22)	0	8
	36-50 (45)	3	12
	51-65 (21)	1	8
	More than 65 (12)	2	7
Total		6	35

P value: 0.152.

Table 9: Wound dehiscence with anemia (Hb<10mg/dl).

		Dehiscence (superficial / deep) POD3-7			Total
		Deep	No	Superficial	
Haemoglobin	Less than 10 mg/dl	4	40	23	67
	More than 10 mg/dl	2	19	12	33
Total		6	59	35	100

P value: 0.979.

DISCUSSION

Wound dehiscence refers to the partial or complete disruption of abdominal wall layers, with or without organ protrusion. It can present as superficial or deep and is influenced by factors such as suture technique, incision

type, coughing, obesity, diabetes and wound infection. Surgeons can prevent burst abdomen despite predisposing factors.⁷ In the present study, 100 patients were included, with 79 males and 21 females. The age of the patients ranged from 21 to 82 years, with a mean age of 46.72±13.87541. The study observed an incidence of

superficial dehiscence in 35% (35/100) and deep dehiscence in 6% (6/100) of cases. Modi et al, reported a superficial dehiscence incidence of 17.3% (29/167) and deep dehiscence of 5.8% (8/137).⁸ Rahman et al, noted wound dehiscence in 10.4% of cases, with 3.03% deep dehiscence.⁹ Gupta et al, found superficial dehiscence in 5.5% (78/1400) and deep dehiscence in 1.57% (22/1400), though these studies included both emergency and elective cases.¹⁰

Several factors influence wound dehiscence. Patient factors encompass demographics, presentation delays and underlying etiology, while hospital factors depend on infrastructure, staff and workload. As a tertiary care center, patients at our institute often arrive with complications such as sepsis, electrolyte imbalances and shock. In this study, age was not a significant factor for wound dehiscence ($p>0.05$), unlike findings by Satyanarayana et al, and Gupta et al, who reported increased incidence in patients over 50.¹¹ However, diabetes was a significant risk factor ($p<0.05$), in agreement with Mahey et al, Choudhury et al and Panigrahi et al, who highlighted diabetes as a major risk due to higher infection rates and postoperative complications.¹²⁻¹⁴

In this study, neoplastic etiology was found to significantly increase the risk of wound dehiscence ($p<0.05$), consistent with the findings of Rahman et al, Talukder et al and Kumar et al.^{9,10,15} Preoperative respiratory abnormalities also emerged as a significant risk factor ($p<0.05$), which aligns with studies by Talukder et al, and Gupta et al.^{10,16} These respiratory problems likely lead to increased intra-abdominal pressure postoperatively, contributing to dehiscence.

Intraoperative contamination significantly increased wound dehiscence risk in this study ($p<0.05$), especially in perforation cases, as also reported by Modi et al, Rahman et al and Bhaduria et al.^{8,9,17} Hypoalbuminemia ($p<0.05$) was a significant risk factor, supported by Modi et al, Rahman et al and Choudhury et al.^{8,9,13} Conversely, anemia was not significant ($p>0.05$), despite earlier studies by Talukder et al, Rahman et al and Gupta et al, concluding otherwise.^{9,10,16}

There are many more factors that influence wound dehiscence which were due to time and funding constraints not included making it a limitation of this study.

CONCLUSION

Abdominal wound dehiscence causes significant morbidity, particularly in patients with risk factors like older age, male sex, anemia, malnutrition, obesity, peritonitis, diabetes and neoplasia. Emergency surgeries, especially for perforation peritonitis, are more prone to dehiscence due to contamination. Simple tests like hemoglobin, RBS, RFT, LFT, serum albumin and chest

X-rays can identify predisposing factors. Preventive measures include improving nutritional status, maintaining aseptic precautions, postoperative chest physiotherapy and good surgical techniques. Preoperative resuscitation, fluid management and strict postoperative care focusing on preventing wound infection and chest complications are crucial in reducing wound dehiscence and its associated costs.

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REFERENCES

1. Tolstrup MB, Watt SK, Gögenur I. Morbidity and mortality rates after emergency abdominal surgery: an analysis of 4346 patients scheduled for emergency laparotomy or laparoscopy. *Langenbeck's Arch Surg.* 2017;402:615-23.
2. Slater NJ, Bleichrodt RP, van Goor H. Wound dehiscence and incisional hernia. *Surgery (Oxford).* 2012;1;30(6):282-9.
3. Anderson K, Hamm RL. Factors that impair wound healing. *J Am Coll Clin Wound Special.* 2012;1;4(4):84-91.
4. Nyce AL, Patel S. Abdominal/Gastrointestinal. *Emergency Medicine Review: Preparing for the Boards.* Expert Consult. 2010;5:19.
5. Kapoor KK, Hassan MM. A clinical study of abdominal wound dehiscence with emphasis on surgical management in Bangalore medical college and research institute, Karnataka, India. *Int Surg J.* 2017;4(1):134-40.
6. Burkhardt R, Lang NP. Influence of suturing on wound healing. *Periodontol.* 2015;68(1):270-81.
7. Shreyas N. Clinical Study of Abdominal Wound Dehiscence and Its Management at KR Hospital, Mysore (Master's thesis, Rajiv Gandhi University of Health Sciences (India). 2021;2:45-9.
8. Modi J, Patel Y, Trivedi M, Bochiya G. An abdominal wound dehiscence of emergency explorative laparotomy and their management at tertiary care centre: an observational study. *Int Surg J.* 2023;10(9):1448- 54.
9. Rahman UA, Iftikhar MA, Miraj MZ, Butt MJ, Ahmed I, Yousaf H. Incidence of wound dehiscence and factors causing wound dehiscence in patients undergoing laparotomy in a newly established surgery department at a tertiary care hospital. *Professional Med J.* 2023;30(10):1225-9.
10. Gupta R, Shrivastava SK, Malpani P, Songra MC. A prospective study of assessment of prognostic factors in early and late wound dehiscence in midline vertical incision. *Int Surg J.* 2020;23;7(8):2578-85.
11. Satyanarayana PA, Gutupalli S, Manikya PP. Abdominal wound dehiscence after emergency

- laparotomy and factors contributing. *Neuro Quantol.* 2022;20(8):5230.
12. Mahey R, Ghetla S, Rajpurohit J, Desai D, Suryawanshi S. A prospective study of risk factors for abdominal wound dehiscence. *Int Surg J.* 2016;4:24–8.
 13. Choudhury A, Deka RK, Gogoi B, Kumar N. A clinical study of abdominal wound dehiscence including its causes and management. *J Evol Med Dent Sci.* 2017;6:1519-23.
 14. Panigrahi S, Sethy S, kiShan Bhoi SS, Panigrahi M. Factors Affecting Wound Healing after Laparotomy at a Tertiary Care Hospital, Odisha, India: A Prospective Interventional Study. *Int J Anat Radiol Surg.* 2023;12(3):SO01-SO03.
 15. Kumar R. Evaluation of Risk Factors of Surgical Wound Dehiscence in patients After Laparotomy. *Euro J Cardiovas Med.* 2023;13(3):47.
 16. Talukdar M, Gopalarathnam S, Paul R, Shaan AR. Clinical study on factors influencing wound dehiscence in emergency exploratory laparotomy. *J Evol Med Dental Sci.* 2016;5(34):1934-9.
 17. Bhadauria NS, Kumar P, Singh A. A prospective study to assess etiology of abdominal wound dehiscence in a Tertiary Care Hospital. *Indian Bas Appl Med Res.* 2020;10(1):67.

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