



A STUDY OF RISK FACTORS OF WOUND DEHISCENCE FOLLOWING EMERGENCY LAPAROTOMY IN NORTH BIHAR

General Surgery

Prof (Dr.) Sushant Kumar

Professor, dept of surgery, DMCH Bihar.

Dr. Priyanka Kumari

Senior resident, dept of surgery, DMCH Bihar.

Dr. Ravi Rohan Kumar

Junior resident (2nd year), dept. of surgery, DMCH Bihar.

Dr. Anita Kumari

Junior resident (2nd year), dept. of surgery, DMCH Bihar.

Dr. Manjary Singh*

Junior resident (2nd year), dept. of surgery, DMCH Bihar.

ABSTRACT

Aims And Objectives: Wound dehiscence still remain a serious complication in 21st century and lead to significant postoperative morbidity and mortality. The aim of the present study to evaluate the risk factors and their management in a patient of wound dehiscence following emergency laparotomy. **Materials And Methods:** A prospective observational study evaluated 70 patients who underwent emergency laparotomy were studied for risk factors leading to abdominal wound dehiscence, their clinical presentation and their ultimate outcome from 1st dec 2023 to 30th nov 2024. **Results:** A total of 70 patients evaluated in the study underwent emergency laparotomy, out of which 14.28% patients had wound dehiscence and mortality among patients with burst abdomen was 20%. The risk factors observed among patients with burst abdomen were low body mass index, low hemoglobin and albumin, renal diseases, COPD, presence of wound infection, infection at remote site, postoperative coughing, vomiting, abdominal distension or mechanical ventilation. Two risk factors reported to cause burst abdomen that is emergency surgery and technique of abdomen closure were standardized for all patients. Average postop day at which dehiscence occurred ranges 5-11 day. In 10 patients of wound dehiscence 2 had burst abdomen who underwent repeat surgery. Following which 1 has normal abdominal wound healing and 1 had re-dehiscence. Rest 8 patients were managed conservatively. **Conclusion:** Wound dehiscence often reflects an error of judgment on the part of surgeon, a thorough pre-operative assessment, identification and removal if possible is essential to minimize incidence of wound dehiscence and associated mortality.

KEYWORDS

Wound dehiscence; Burst abdomen; Emergency laparotomy

INTRODUCTION

"The elimination of postoperative wound dehiscence is entirely within the jurisdiction of operating surgeon."

Despite constantly improved knowledge of physiology of wound healing process as well as the advancement in surgical techniques wound dehiscence continues to occur despite all precautions taken.

Wound dehiscence or acute wound failure is defined as "The postoperative separation of previously approximated surgical wound due to failure of normal wound healing" which is recognized with in several days and requires some form of intervention; usually during the same hospitalization. Disruption of abdominal surgical wound may lead to certain complication like burst abdomen; massive evisceration; sepsis; intra-abdominal abscess and bowel fistulae. A thorough preoperative assessment of patient keeping in mind these risk factors is essential so as to identify and remove them if possible; in order to minimize the incidence of wound dehiscence.

Wound dehiscence has been shown to be more common after emergency laparotomy. In elective laparotomy the health of the patient has been optimized and all factors under study under are either not present or controlled.

Mechanism Of Wound Healing



Factors Implicated As Cause Of Wound Dehiscence

Age: Advanced age has been found a risk factor not only after emergency laparotomy but after elective laparotomy as well [8]. Studies of hospitalized surgical patients show a direct correlation between older age and poor wound healing outcome such as dehiscence and incisional hernia.

Male gender: most reviews of wound disruption report male gender as a risk factor on the basis of among patients; men outnumber women by at least 2 to 1 [7,15-17].

Diabetes mellitus [2,6]: it causes abdominal wound dehiscence by altering the immune response, thus increasing the susceptibility to wound infection [8]. Along term complication is damaged microcirculation which increases the rate of wound dehiscence [14].

Hypertension: HTN damages microcirculation in long term predisposes to wound infection and dehiscence.

Renal failure [2,6,7,18]: Anecdotal experience suggests that acute renal failure causes wound dehiscence.

Smoking: It causes clinically significant vasoconstriction. Smoking one cigarette lowers wound and tissue PO₂ in normal volunteers by 30% for the better part of 1 hour [19]. Also due to acquired collagen deficiency, incisional hernias are more common in smokers [20].

COPD: Excessive coughing in the postop period suffering from COPD raises intra-abdominal pressure predisposing to wound dehiscence [5,6].

Use of steroids: Steroid use leads to immunosuppression which further aggravates the intraabdominal sepsis, which is already playing a major role in acute wound failure [8]. There is reduced cell migration, proliferation and angiogenesis. They also inhibit wound contraction. The stronger anti-inflammatory effects of steroid compound used, greater the effect on wound healing [14].

Drugs: Lower doses of D-penicillamine decreases cutaneous wound

strength and increase its collagen solubility

Antineoplastic agent [2]: All chemotherapeutic antimetabolite drugs adversely affect wound healing by inhibiting early cell proliferation and wound DNA and protein synthesis, all of which are critical for successful repair [14].

Ionizing radiation [2]: It cause endothelial cell injury with end arteritis and result in atrophy, fibrosis and delayed tissue repair.

- Malignancy [6,7,18]
- HIV infection

Malnourishment [2,5-7]: TNF released during sepsis results in cachexia and loss of appetite resulting in poor food intake, hypercatabolism, negative nitrogen balance, immunosuppression which further aggravate the sepsis. Thus, the patient enters a vicious cycle of sepsis-protein energy malnutrition-sepsis [8].

Obesity: It has been reported a risk factor for burst abdomen [2,6,18,24]. Also incisional hernia occurs most often in obese individuals Tissue perfusion and oxygenation [14]

Anemia [5,7]- a major factor.

Hypoalbuminemia: It is probably a true risk factor for fascial dehiscence [5, 7,18].

Emergency surgery: The risk for dehiscence from emergency operation may be related to more hemodynamic instability than to the unscheduled procedure .

Duration of surgery: Duration of surgery >2.5 hours has been considered for a risk factor.

AIMS AND OBJECTIVES

To study the prevalence, etiological factors, investigations required, treatment is given and outcomes of various surgical problems in patients 10-80years of age, attending the emergency Department of a tertiary care center DMCH Laheria Sarai bihar.

METHODS AND METHODOLOGY

Study Design

Prospective observational study.

Study Setting

Tertiary care center based from 1st dec 2023 to 30th nov 2024. (12 month)

Study subject patients

Inclusion Criteria:

- Patients undergoing emergency laparotomy.
- Age group 10 year to 80 year.

Exclusion Criteria:

- Patients not giving consent
- Patients who leave against medical advice or abscond
- Patients less than 10 year and more than 80 year.

Sample Size- 70

Risk Factors Under Study

- Age
- Sex
- Preoperative hospitalization >24 hours
- Previous abdominal surgery
- Medical disease-DM, HTN, uremia, jaundice, COPD
- Smoking
- Immunocompromised state-corticosteroids, cancer chemotherapy, malignancy, HIV
- History of exposure to ionizing radiation
- Nutrition-anemia, hypoproteinemia, BMI<25 Kg/m2
- Duration of surgery
- Incision type and location
- Type of operation (classification of surgical wound)
- Postoperative coughing, vomiting.

Plan Of Study

After a decision for emergency laparotomy had been taken for a patient

on the basis of clinical presentation and imaging studies, an informed consent, detailed history was taken and clinical examination done with special emphasis on the risk factors under study. Routine emergency investigations were sent. Emergency laparotomy was done under GA in standard manner under all aseptic precautions. Non-suction drain left in situ (if required) and ostomies (if any) were brought through separate incision. Abdominal closure was also done in standard manner. Postoperative the type and duration of surgery, type of incision, location and intraoperative findings were noted.

Patient was given routine postop care. On postop day 2 dressing was removed and wound assessed.

Any wound discharge was sent for culture and sensitivity and antibiotics was given accordingly.

Wound was assessed for any wound dehiscence during postop day 5-11. In patients who developed wound dehiscence, if the size of defect was small or the patients was critically ill or overwhelming wound sepsis then the dehiscence was managed conservatively. Large size wound dehiscence was packed with moist sterile dressing and generous strip of adhesive tape placed transversely across the abdomen. An abdominal binder was used for support and patients advised against excessive physical activity. Patients were asked to follow up for detection and repair of incisional hernia later.

RESULTS

Total number of patient studied: 70

Number of patients developed wound dehiscence: 8 (14.28%)

Demographic profile of patients:

- Age ranged between 10 years-80years
- Total 58 men and 12 women studied

Hemoglobin levels: Low hemoglobin levels is a risk factor for burst abdomen (Table 1)).

Hypoalbuminemia -serum albumin is a risk factor for burst abdomen (Table 2)

A total of 70 patients evaluated in the study underwent emergency laparotomy, out of which 14.28% patients had wound dehiscence and mortality among patients with burst abdomen was 20%. The risk factors observed among patients with burst abdomen were low body mass index, low hemoglobin and albumin, renal diseases, COPD, presence of wound infection, infection at remote site, postoperative coughing, vomiting, abdominal distension or mechanical ventilation . Two risk factors reported to cause burst abdomen that is emergency surgery and technique of abdomen closure were standardized for all patients. Average postop day at which dehiscence occurred ranges 5-11 day. Most prominent cause was seen as low albumin and hemoglobin.

Table 1

1. Hb 8.0 % – frequency of dehiscence : 7
2. Hb 10.0%- frequency of dehiscence: 3
3. Hb 12.0%- frequency of dehiscence : 0
4. Hb 14. 0% - frequency of dehiscence: 0
5. Hb 16.0%- frequency of dehiscence: 0

Table 2

1. S. Albumin level 1.5 g/dl- frequency of dehiscence: 3
2. S. Albumin level 2 g/dl -frequency of dehiscence: 4
3. S. Albumin level 2.5 g/dl – frequency of dehiscence: 3
4. S. Albumin level 3.0 g/dl – frequency of dehiscence: 0
5. S. Albumin level 3.5 g/dl – frequency of dehiscence: 0

DISCUSSION

This prospective observational study evaluated 70 patients who underwent emergency laparotomy between 1st dec 2023 and 30th nov 2024.

Occurrence and mortality: In our study 10 out of 70 patients had abdominal wound dehiscence (14.28%) and 2 out of 10 was burst abdomen. Emergency laparotomy is the main reason for occurrence of burst abdomen in our study.

Risk factors: Two risk factors reported to cause burst abdomen, namely emergency surgery and technique of abdominal closure were standardized for all patients. The risk factors which differed

significantly among patients with burst abdomen and those without were low BMI, low levels of hemoglobin and serum albumin, renal disease, COPD, presence of wound infection, infection at a remote site, postop coughing, vomiting, abdominal distention.

CONCLUSION

Wound dehiscence often reflects an error of judgment on the part of surgeon, a thorough preoperative assessment, identification and removal of risk factors if possible is essential to minimize incidence of wound dehiscence and mortality.

Conflicts Of Interest: None

Abbreviations: DM: Diabetes Mellitus; HTN: Hypertension; COPD: Chronic Obstructive Pulmonary Disease.

REFERENCES

1. Carton MA. Acute wound failure. *Surg Clin North Am.* 1997;77:607-636.
2. Kulaylat MN, Dayton MT. Surgical complication. In: Townsend CM, Beauchamp RD, Evers DM, Mattox KL, editors. *Sabiston Textbook of Surgery.* 18th ed. Vol. 1. Philadelphia: Saunders; 2008;p:328-378.
3. Witte MB, Barbul A. General principles of wound healing. *Surg Clin North Am.* 1997;77:509-28.
4. Spiliotis J, Tsiaveriotis K, Datsis AD, Vaxevanidou A, Zacharis G, Giasis K, et al. Wound dehiscence: is still a problem in the 21st century: a retrospective study. *World J Emerg Surg.* 2009;4:1-5.
5. Mäkelä JT, Kiviniemi H, Juvonen T, Laitinen S. Factors influencing wound dehiscence after midline laparotomy. *Am J Surg.* 1995;170:387-90.
6. Pace A, Armitage NCM. Post-operative care. In: Williams NS, Bulstrode CJK, O'Connell PR, editors. *Bailey and Love's short practice of Surgery.* 25th ed. London: Edward Arnold; 2008;p:258-268.
7. Burt BM, Tavakolizaden A, Ferzoco SJ. Incisions, closures and management of abdominal wound. In: Zinner MJ, Ashley SW editors. *Maingot Abdominal operations.* 11th ed. USA: McGraw Hill; 200;p:711-101.
8. Afzal S, Bashir MM. Determinants of wound dehiscence in abdominal surgery in public sector hospital. *Ann King Edward Med Univ.* 2008;14:119.
9. Heller L, Levin SL, Butler CE. Management of abdominal wound dehiscence using vacuum assisted closure in patients with compromised healing. *Am J Surg.* Feb 2006;191:165-172.
10. Lazarus GS, Cooper DM, Knighton DR, Margolis DJ, Percoraro RE, Rodeheaver G, et al. Definitions and guidelines for assessment of wounds and evaluation of healing. *Wound Repair Regen.* 1994;2:165-170.
11. Lodhi FB, Asrar R, Akram M, Hussain R. Incidence of abdominal wound dehiscence (midline vs paramedian incision closed with vicryl no. 1). *King Edward Med Coll.* 2001;7:38-40.
12. Black E, Vibe-Petersen J, Jorgensen LN, Madsen SM, Ågren MS, Holstein PE, et al. Decrease of collagen deposition in wound repair in type 1 diabetes independent of glycemic control. *Arch Surg.* 2003;138:34-40.
13. Allen DB, Maguire JJ, Mahdavian M, Wicke C, Marcocci L, Scheuenstuhl H, et al. Wound hypoxia and acidosis limit neutrophil bacterial killing mechanisms. *Archives of surgery.* 1997;132:991-996.
14. Barbul A, Efron DT. Wound healing. In: Brunicaudi FC, Andersond DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, et al, editors. *Schwartz's Principles of Surgery.* 9th ed. USA: McGraw Hill; 2010;p:209-233.
15. Keill RH, Keitzer WF, Nichols WK, Henzel J, DeWeese MS. Abdominal wound dehiscence. *Arch Surg.* 1973;106:573-577.
16. Hampton JR. The burst abdomen. *Br Med J.* 1963;2:1032. *Surgery Curr Res, Vol. 11 Iss. 1 No: 109 OPENACCESS* Freely available online
17. Kronborg O. Polyglycolic acid (Dexon) versus silk for fascial closure of abdominal incisions. *Acta Chirurgica Scandinavica.* 1976;142:9-12.
18. Moche Schein. Abdominal Closure. In: Schien M, Rogers PN, editors. *Schien common sense of emergency abdominal wall surgery.* 2nd ed. Berlin: Springer- Verlag; 2006;p:337-341.
19. Jensen JA, Goodson WH, Hopf HW, Hunt TK. Cigarette smoking decreases tissue oxygen. *Arch Surg.* 1991;126:1131-1134.
20. Kingsnorth AN, Giorgobini G, Bennett DH. Hernias, umbilicus and abdominal wall. In: Williams NS, Bulstrode CJK, O'Connell PR, editors. *Bailey and Love's short practice of Surgery.* 25th ed. London: Edward Arnold; 2008;p:268-290.