



INCIDENCE, RISK FACTORS, AND MANAGEMENT OF ABDOMINAL WOUND DEHISCENCE FOLLOWING EMERGENCY MIDLINE LAPAROTOMY: A PROSPECTIVE OBSERVATIONAL STUDY

General Surgery

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ABSTRACT

Background: Abdominal wound dehiscence (AWD) represents a major postoperative issue, especially after emergency laparotomies, leading to elevated morbidity rates, extended hospital stays, and additional healthcare expenses. Even with improvements in surgical methods and perioperative management, AWD continues to be a significant problem, particularly in settings with limited healthcare resources. This study aimed to determine the incidence of AWD and identify associated clinical, biochemical, and operative risk factors among patients undergoing emergency laparotomy with midline incisions in a tertiary care center located in the sub-Himalayan region of India. **Methods:** This is a prospective observational study and it was carried out in the Department of Surgery at Dr. RPGMC Kangra, Tanda, between from May 2024 to April 2025. A total of fifty consecutive patients undergoing emergency midline laparotomy were included in the study. Relevant data, including patient demographics, hemoglobin levels, serum protein and albumin concentrations, as well as the presence of surgical site infections (SSI), were systematically documented. Postoperative wounds were monitored daily for 15 days for signs of dehiscence. Incidence, type, and management of AWD were noted. Statistical analysis was performed using SPSS v27, with Chi-square tests applied and $p < 0.05$ considered statistically significant. **Results:** Out of 50 patients, 30 (60%) developed AWD. Hypoalbuminemia (75.7%, $p < 0.001$), hypoproteinemia (73.1%, $p = 0.049$), anemia (72.7%), and SSI (77.4%, $p = 0.0013$) were significantly associated with AWD. Complete AWD occurred in 30% of cases. Bogota bag application was the most common management (43.3%), followed by delayed secondary suturing (20%). **Conclusion:** A high incidence of AWD was observed in emergency laparotomy patients, with hypoalbuminemia emerging as the strongest predictor. Nutritional optimization and strict infection control are vital for reducing AWD risk in high-risk, emergency settings

KEYWORDS

Abdominal wound dehiscence, emergency laparotomy, hypoalbuminemia, surgical site infection, risk factor.

INTRODUCTION

Abdominal wound dehiscence (AWD) is one of the most serious and potentially life-threatening complications following laparotomy procedures, particularly in emergency settings. It is marked by partial or full disruption of the abdominal wound layers, resulting in higher postoperative complications, extended hospitalization, and often necessitating further surgical procedures. According to the World Health Organization (WHO, 2019), AWD is a significant cause of morbidity and mortality worldwide, with reported incidence rates ranging from 1% to 10%. Despite the progressive advancements in surgical techniques, suture materials, perioperative management, and infection control measures, AWD continues to challenge surgeons globally, especially in resource-constrained and emergency care environments.^[1]

Acute wound failure may be partial or complete. In cases of partial dehiscence, only the outer or certain layers of the wound separate. Conversely, in complete wound dehiscence, all layers of the wound separate, revealing the underlying tissues and sometimes allowing internal organs to protrude.^[1]

Historically, literature on wound failure was limited, likely due to reluctance among surgeons to report adverse outcomes. However, considerable data are now available on risk factors contributing to poor wound healing and strategies to prevent dehiscence. Numerous factors contribute to AWD, encompassing patient-specific risks like older age, poor nutritional status, anemia, low albumin levels, obesity, diabetes, and immunosuppressive conditions, as well as operative and postoperative risks such as suboptimal surgical technique, emergency interventions, infection at the wound site, and raised intra-abdominal pressure.^[1]

Nutritional status, particularly serum albumin and total protein levels, remains one of the most reliable prognostic markers influencing wound healing capacity and surgical outcomes. Serum albumin, a readily available and clinically accepted nutritional biomarker, has been repeatedly validated as a predictor of postoperative complications. Hypoalbuminemia not only impairs collagen synthesis and fibroblast proliferation but also compromises immune responses

and wound tensile strength, thereby predisposing patients to dehiscence.^[1] Similarly, anemia reduces tissue oxygenation, delays wound healing, and increases susceptibility to infections - another major precipitating factor for AWD.^[1] Elevated leukocyte counts and the presence of surgical site infections (SSI) have also been directly associated with increased rates of wound failure.^[1]

Intra-abdominal pressure (IAP) plays a significant role in the pathophysiology of abdominal wound dehiscence, especially in patients undergoing emergency laparotomy. Elevated IAP increases mechanical stress on the abdominal wall and suture lines, thereby impairing wound healing and increasing the risk of fascial separation.^[1] In the beginning of 20th century wound dehiscence were managed with open dressing and wound was allowed to heal by secondary intention and skin grafting was added if wound was big. These cases had higher chances of abdominal wall hernias. Later tension suturing was done also known as retention suture. Retention sutures are typically composed of non-absorbable materials such as silk, cotton, or synthetic fibers. Using heavy absorbable sutures for this purpose is generally avoided due to concerns about their strength and the significant tissue reaction they may provoke from the large quantity of absorbable material left in place. Non-absorbable retention sutures are usually removed once the wound has sufficiently healed, which is generally within two to three weeks.^[1]

If primary tension-free abdominal closure is not possible, relaxing incisions in the abdominal muscles may be used. Temporary abdominal closure techniques include the Bogota bag, first described by Osvaldo Borraez in 1984, which involves suturing a sterilized irrigation bag to the abdominal wall, and the Wittmann Patch, introduced by Dietmar H. Wittmann in 1987, consisting of sterile hook-and-loop sheets for managing open abdomen cases.^[1] Negative Pressure Wound Therapy (NPWT), developed by Morykwas et al. in the late 1990s, uses a vacuum-assisted dressing system to promote wound healing by enhancing blood flow, reducing edema, maintaining moisture, and lowering bacterial counts. Applied in damage control surgeries and trauma cases since the 2000s, NPWT has been associated with improved fascial closure rates and reduced mortality.^[1]

Although wound dehiscence has been extensively studied in elective

surgical settings, there is a paucity of focused, region-specific data on its incidence and associated risk factors in patients undergoing emergency laparotomy via midline incisions, particularly in the sub-Himalayan region of India. Understanding these associations is vital for improving clinical outcomes in high-risk emergency surgeries, where patient optimization opportunities are limited, and postoperative complications can have dire consequences.

Therefore, this prospective observational study was conducted to evaluate the incidence of abdominal wound dehiscence in patients undergoing emergency laparotomy with midline incisions and to identify the clinical, biochemical, and operative risk factors contributing to this complication. By identifying these factors, this study aims to support targeted interventions for prevention, guide intraoperative and postoperative management protocols, and improve overall patient outcomes in emergency abdominal surgeries.

METHODS:

Study Setting

The study was carried out in the Department of Surgery, Dr. R.P.G.M.C. Kangra at Tanda, a multispecialty tertiary healthcare facility located in the Kangra valley of Himachal Pradesh in India.

Study Design

The study was prospective observational study.

Study Duration

This study was carried out over a one-year period from May 1, 2024, to April 30, 2025, following approval from the Institutional Ethics Committee (IEC).

Inclusion Criteria

Patients who provided written informed consent and those admitted for emergency midline laparotomy in the surgical ward of Dr. RPGMC Kangra at Tanda were included.

Exclusion Criteria

Patients with malignancy who have undergone radiotherapy and/or chemotherapy within 6 months. Patients on immunosuppressive agents. Patients with non resectable abdominal malignancy. Patient who developed intestinal fistula in the post op period. Patients not willing to participate.

Study Intervention

All patients undergoing emergency laparotomy via midline incision and admitted to the surgical ward at Dr. RPGMC Kangra at Tanda were assessed and who qualified the inclusion criteria and did not fall under any of the categories of exclusion criteria were enrolled in the study. Post-surgery, patients were monitored closely for 15 days, and relevant clinical findings were systematically documented for analysis. Daily aseptic dressings were done of the surgical wound with betadine in all the patients. These wounds were specifically noted for clinical findings suggestive of infection or dehiscence such as any discharge (pus/serosanguinous/ hemorrhagic), gaping of sutures or feeling of give away as in partial or complete wound dehiscence.

In each case, the occurrence of abdominal wound dehiscence was documented, including the type of dehiscence, its mode of presentation, and the postoperative day it manifested and then compared with those having anemia, hypoproteinemia, hypoalbuminemia and surgical site infection. The distribution of AWD was also examined across various demographic categories.

Different types of abdominal wound dehiscence were managed using different types of conservative and operative techniques.

Statistical Analysis

The data was collected, cleaned and entered using Microsoft Excel spreadsheet; and was analyzed in Statistical Package for Social Science (SPSS) v 27 draw relevant conclusions. The observations were tabulated in the form of frequency & percentage. Bar chart and pie chart were used for displaying categorical data and proportions respectively. To find the significance Chi square test for categorical data was applied. Level of significance was assessed based on its p value with $p < 0.050$ as significant.

RESULTS

This prospective study was conducted at Dr. RPGMC Kangra, Tanda,

from April 2024 to March 2025, involving 50 patients who underwent emergency midline laparotomy with midline incisions. Various factors associated with abdominal wound dehiscence (AWD) were evaluated, and the following observations were made.

Out of the 50 enrolled patients, 30 cases (60%) developed AWD. The 31–40-year age group reported the most cases (24%), followed by equal proportions (20%) in the 21–30 and 51–60-year age brackets. The highest prevalence of AWD (100%) was seen in the 41–50 years age group, followed by 70% in those aged 51–60 years. Among the 30 AWD cases, 17 (56.7%) were males and 13 (43.3%) were females, yielding a male-to-female ratio of 1.31:1.

In our study out of 30 patients of AWD, 9(30%) had complete AWD. Whereas 21(70%) patients had partial AWD.

Most patients with abdominal wound dehiscence 18(78.2%), in our study were having low socio-economic status followed by 7 (77.2%) of middle socio-economic status, 3 (25.0%) of upper-middle socio-economic status and 2 (33.3%) of high socio-economic status as per the Kuppuswamy scale.

Within the subset of 33 patients with hemoglobin ranging from 8–12 gm%, 24 individuals (72.7%) experienced wound dehiscence.

In our study, 19 (73.1%) patients out of 30 patients with abdominal wound dehiscence had hypoproteinemia with a statistically significant p-value of 0.049 indicating association between hypoproteinemia and abdominal wound dehiscence. Among the 30 cases of abdominal wound dehiscence, 28 (75.7%) exhibited hypoalbuminemia. Whereas out of 13 patients who having normal albumin level, 2(15.4%) patients had AWD and hypoalbuminemia was found to be a highly significant risk factor, with a p-value of < 0.001 .

It was observed that amongst the 30 patients with AWD, 24(77.4%) patients were having surgical site infection. Whereas 19(38%) patients were not having SSI, out of which 6(31.5%) patients had AWD.

For management, the Bogota bag was the preferred intervention, applied in 43.3% of cases, with delayed secondary suturing performed in 20%. Conservative management accounted for 16.7%, immediate resuturing for 13.3%, and NPWT for 6.7% of cases.

DISCUSSION

The present research was carried out in Dr. RPGMC Kangra at Tanda over the period from April 2024 to March 2025, a multispecialty tertiary healthcare facility located in the Kangra valley of Himachal Pradesh. The study aimed to determine the incidence of AWD in patients undergoing emergency laparotomy with midline incision, identify the risk factors for AWD in this patient population and evaluate the effectiveness of current wound closure techniques and postoperative care protocols in preventing AWD.

In this study, AWD occurred in 60% of cases, a high rate likely influenced by the emergent surgical context, associated patient comorbidities, and potential constraints in healthcare infrastructure. In our study out of total 50 patients, 15 patients belonged to age group of 41–60 years, out of which 12(80%) patients had AWD and incidence was relatively comparable between genders, out of total 30 patients, with AWD 17 (56.7%) male patients and 13(43.3%) female patients were affected with male-female ratio was 1.31:1. In a study done by **Mahey R et al.**¹¹ abdominal wound dehiscence was seen at all ages, the most common age group was 41–60 years (40%) followed by 21–40 years (34%) and Males (56%) were found to be more affected than females (44%).

In our study 23(46%) patients belonged to low socio-economic status, out of which 18 (78.2%) had AWD. 9 (18%) patients belonged to middle socio-economic status, out of which 7 (77.7%) had AWD. 12 (24%) patients belonged to upper middle socio-economic status, out of which 3(25.0%) had AWD. 6 (12%) patients belong to upper socio-economic status, out of which 2(33.3%) had AWD. No other study has studied the incidence of AWD in different socio-economic status.

In our study among 33(66%) patients with Hb levels between 8–12 gm%, 24(72.7%) patients developed AWD. 15 (30%) patients were having Hb level > 12 gm% out of which 5(33.3%) patients had AWD. 2 (4%) patients were having Hb level < 10 gm%. **Sreedhara AM et al.**¹¹

concluded in their study of management of abdominal wound dehiscence that 53% of the patients included in the study showed hemoglobin < 10gm%. **Kapoor KK et al.**^[1] reported that 53.33% of patients had anaemia at the time of presentation. **Kenig J et al.**^[1] reported that in the study on abdominal wound dehiscence, 60% of the patients were found to have anaemia.

In our study, total 26(52%) patients were having hypoproteinemia, out of which 19 (73.1%) patients had abdominal wound dehiscence with a statistically significant p-value of 0.049. Out of total patients in our study 24(48%) patients were having normal serum protein level out of which 11(45.8%) had AWD. In a prospective study by **Jaiswal et al.**^[1] out of total 82 patients the incidence of AWD was significantly high. In their study out of 82 patients 60 (73.2%) patients had AWD out of which 48(80%) hypoproteinemia. This in accordance with our observation.

In our study involving 50 patients, 37 (74%) were found to have hypoalbuminemia, of whom 28 (75.7%) developed abdominal wound dehiscence, with the association being statistically significant (p value < 0.001). Out of total patients 13(26%) patients were having normal serum albumin level, out of which 2(15.4%) had AWD. **Aksamija et al.**^[1] in a study of 354 patients, postoperative abdominal wound dehiscence was observed in 125 patients, out of them 62(50%) were having hypoalbuminemia.

In our study out of total 50 patients 31(62%) had Surgical Site Infection (SSI) out of which 24(77.4%) patients were having AWD. SSI was significant risk factor for AWD with p-value 0.0013. SSI was absent in 19(38%) patients out of which 6(31.5%) had AWD. In a prospective study carried out by **Jaiswal et al.**^[15] it was observed that SSI favors high incidence of burst abdomen. In their study on 82 patients, 66 patients were having SSI out of which 60 patients developed AWD.

Among the various treatment modalities, the Bogota bag was the most commonly employed, used in 43.3% of cases. Delayed secondary suturing was performed in 20% of patients, while conservative management was adopted in 16.7%. Immediate resuturing was carried out in 13.3% of cases, and negative pressure wound therapy (NPWT) was utilized in a limited proportion of patients (6.7%). In a study carried out by **Sreedhara AM et al.**^[12] out of 60 patients who had AWD, 32(53.3) were managed with conservative management, 16(26.7) were managed with secondary suturing, 8(13.3%) were managed with tension suturing and 4(6.7%) were managed with mesh repair.

Limitations

A key limitation of this study is its single-center design and relatively small sample size, which may limit the generalizability of the findings. Further multicentric, large-scale prospective studies are warranted to validate these associations and to formulate standardized risk assessment and management protocols for AWD in emergency abdominal surgeries.

CONCLUSION

This prospective observational study conducted at Dr. RPGMC Kangra at Tanda highlights a notably high incidence (60%) of abdominal wound dehiscence (AWD) among patients undergoing emergency laparotomy with midline incisions. The study identifies multiple significant clinical, biochemical, and operative risk factors contributing to AWD, including hypoalbuminemia, hypoproteinemia, anemia, surgical site infection (SSI), and low socio-economic status. Among these, hypoalbuminemia emerged as the most significant independent predictor of AWD, with a highly significant association (p < 0.001).

These outcomes underscore the crucial importance of optimizing nutritional health, maintaining stringent infection control practices, and adhering to meticulous surgical techniques to reduce the incidence of AWD, especially in resource-constrained emergency care environments. The predominance of AWD in middle-aged adults and its higher prevalence among patients from lower socio-economic backgrounds underscore the need for targeted perioperative optimization strategies in vulnerable populations.

Management outcomes favored the use of Bogota bag application and delayed secondary suturing as effective interim and definitive wound management techniques, although Negative Pressure Wound Therapy

(NPWT) remains underutilized in this setting.

Financial Disclosure: Nil

Conflict Of Interest: None

Ethical Approval: The study was conducted after the due permission from the protocol review committee (PRC) vide letter no. **HFH-H(DRPGMC)PRC/2023- 113 Dated: 11/03/2024**, Institutional Ethics Committee (IEC) vide letter no. **HFH-H DRPGMC/ETHICS/ 2024/55 Dated: 27/04/2024**.

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