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CAUSES, FREQUENCY AND RISK FACTORS OF BURST ABDOMEN IN PATIENTS WITH PERITONITIS

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ABSTRACT

Background: Abdomen wound dehiscence (abdominal burst) is a severe postoperative complication and is linked to increased morbidity, re-operation, longer hospital stays and increased mortality. Patients with peritonitis have a high risk due to contamination of operative fields, systemic sepsis, poor wound healing and malnutrition. Understanding the causes, incidence, and modifiable risk factors in this population is critical, to guide peri-operative optimisation and targeted interventions to prevent incidence and enhance outcomes.

Objective: To identify the causes, incidence and risk factors for a ruptured abdomen in those who present with peritonitis.

Study design: Cross-sectional observational study

Place and Duration of study: This study was conducted at Rawal Institute of Health Sciences Islamabad Pakistan from March 2025 to March 2026

Methodology: Patients with clinical and operative diagnosis of peritonitis, who were presented in the emergency department, were consecutively included. Demographic data, clinical findings and operative diagnoses were recorded on pre-designed proformas. Included in the analysis were the following recorded variables: age, sex, primary cause of peritonitis and potential risk factors for abdominal wound dehiscence (hypoalbuminemia, postoperative respiratory tract infection/cough, intra-abdominal collection, anemia, and paralytic ileus and obesity (BMI >30)). Data on outcomes such as the occurrence of a burst abdomen and final disposition recorded. The data were analysed for frequencies, percentages and common risk factors associated with the problem of burst abdomen.

Results: 120 patients with acute peritonitis were involved. The mean age of the patients was 40 ± 6 year (range: 13–70 years). There were 80 (66.7%) male and 40 (33.3%) female patients. The incidence of "burst abdomen" was 36 (30.0%) patients. The distribution of causes of peritonitis was: typhoid ileal perforation n = 52 (43.3%), duodenal ulcer perforation n = 25 (20.8%), ruptured appendix n = 20 (16.7%), intestinal tuberculous ileal perforation n = 12 (10.0%), ruptured liver abscess n = 8 (6.7%), and colonic perforation n = 3 (2.5%).

The commonest risk factors in 36 patients who had developed burst abdomen were hypoalbuminemia (24/36, 66.7%), postoperative respiratory tract infection/cough (15/36, 41.7%), intra-abdominal collection (12/36, 33.3%), paralytic ileus (6/36, 16.7%), anemia (3/36, 8.3%), and obesity (BMI >30) (3/36, 8.3%). In all, 90 (75.0%) patients recovered without incident and the others had an "incident" course or needed further interventions.

Conclusion: This population had typhoid ileal perforation as a common cause of peritonitis and nearly 1 in 3 patients had a burst abdomen. The most common associated risk factors were hypoalbuminemia, postoperative respiratory infection and intra-abdominal collections. The prevalence of abdominal wound dehiscence in patients with peritonitis can be reduced with early recognition and optimisation of nutritional status, careful intra-abdominal drainage and careful monitoring of patients in the postoperative period.

Keywords: Burst Abdomen, Abdominal Wound Dehiscence, Hypoalbuminemia, Typhoid Ileal Perforation and Risk Factors.



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INTRODUCTION

Abdominal wound dehiscence, or burst abdomen, is a severe postoperative event that is defined as separation of the layers of the abdominal wound, with or without evisceration. It has been linked to high morbidity, long hospital stays, reoperation and high mortality. Despite the advancement in surgical techniques, suturing materials, and perioperative care, burst abdomen still remains a big challenge especially in the case of emergency surgeries of abdomen where the patient presents with peritonitis and systemic sepsis [1, 2].

Peritonitis is a surgical emergency that is caused by the contamination of the peritoneal cavity after perforation of a hollow viscus, ruptured appendix or intra-abdominal infection. While in low and middle income countries infectious causes like typhoid ileal perforation and tuberculous bowel disease are still more common, diverticulitis and malignancy are more common in developed countries. [3] A patient with peritonitis may have signs of septic shock, dehydration, electrolyte disturbance, and malnutrition, which all affect the ability of the body to heal wounds and repair tissue. These factors all contribute to the complications after surgery such as wound dehiscence [4].

Burst abdomen in emergency laparotomy ranged from 1 per cent to as high as 30 per cent in high-risk patients [5]. There is considerable variability, which is related to the patient's age, nutritional status, anemia and associated comorbidities, and to the degree of peritoneal contamination and the delay between onset of illness and presentation. Type of incision, suturing technique, suturing material and intraoperative contamination are also of great importance surgical factors [6].

Hypoalbuminemia is among the most consistently reported risk factors, and is known to strongly correlate with poor wound healing. Low albumin levels correlate with decreased collagen production, impaired fibroblast proliferation and tissue integrity, and are markers of nutrition and systemic inflammation [7]. Likewise, anemia results in tissue hypoxia, which also disrupts wound healing and makes them prone to disruption. Postoperative respiratory complications like cough and chest infections increase the intra-abdominal pressure and can mechanically interfere with the fascial closure [8].

Other significant causes of “burst abdomen” are intra-abdominal collections and surgical site infections. During infection, enzymatic activity causes the breakdown of collagen and makes the

wound more prone to separation [9]. By causing bowel distention and increasing intra-abdominal pressure, paralytic ileus further contributes to mechanical stress on the abdominal wall closure. Another known risk factor is obesity because it increases wound tension, poor vascularity of adipose tissue and higher incidence of infections [10].

Peritonitis is a high risk condition for abdominal wound failure as it is a combination of bad physiological factors, being systemic inflammatory response, sepsis induced catabolism and immunologic dysfunction. In these patients, emergency laparotomy is commonly conducted under suboptimal conditions, and little time can be dedicated to the process of optimisation before surgery. Therefore the surgical results are usually inferior as compared with elective surgery [11].

Burst abdomen not only is a clinical burden but also an economic one. Wound failure often leads to long intensive care unit (ICU) stays, multiple surgical operations, vacuum-assisted closure (VAC) wound therapy and extended hospitalisation, which are all burdens on health care resources [12]. Furthermore, there are long-term complications including incisional hernia, which further diminishes quality of life and possibly requires further surgical correction [13].

Although this is a major complication clinically, there is a demand for data specific to the context, in particular in resource-limited settings where the pattern of peritonitis is likely to be different than in high-income countries. It is crucial to recognize these groups and their modifiable risk factors to optimize peri-operative care and minimize preventable morbidity. A few possible measures that might decrease the incidence of burst abdomen are nutritional optimisation, early detection of sepsis, proper care of the respiratory tract, and careful surgical technique [14].

Hence, this study aimed to establish the incidence, etiology and risk factors of post-operative burst abdomen in patients presenting with peritonitis. Awareness of these relationships will be useful to inform strategies of prevention and enhance the surgical outcomes of high-risk patients who are undergoing surgery in the abdomen in emergency situations [15].

METHODOLOGY

The study was conducted as a cross-sectional retro-spective observational study of patients presenting to the emergency department of a tertiary care surgical unit with clinical features of peritonitis. All patients who proceeded to laparotomy with intra-operative diagnosis of peritonitis were selected consecutively so that this group of patients was representative of the usual emergency surgical workload rather than being selected for some specific criteria. Patients under 13 years were excluded as were those with incomplete

postoperative records and those who had had a laparotomy within 1 month of the procedure to avoid confounding from other wound healing problems.

A structured proforma was used to collect information for this study which was to be completed at various points throughout the patient's admission. Demographic data (age and sex), clinical data, and the presumed cause of peritonitis were recorded at presentation. The underlying pathology, level of contamination and abdominal closure technique were verified by reviewing operative notes. Special consideration was given to variables that have been shown to affect wound integrity. These comprised serum albumin levels, presence of postoperative respiratory tract infection/persistent cough, radiological/clinical evidence of intra-abdominal collection, postoperative paralytic ileus, anaemia and obesity. The variables selected were those that are commonly associated with wound healing abnormalities and are often seen in patients with peritonitis.

The surgical team followed all patients during the period of their hospitalisation and documented any complications as they arose. The main outcome measured was the abdominal wound was disrupted either visibly or palpably (clinical diagnosis) with serosanguinous discharge or the wound was gaped (clinical diagnosis), which we defined as burst abdomen. Where diagnosis was unclear, the operation was used to confirm the diagnosis. The study also noted the overall course of the post-operative period, including recovery without any further interventions or recovery with additional interventions.

All the collected data was entered in a secure data base and analysed descriptively. Means and standard deviations were used to summarize continuous variables and frequencies and percentages were used for summarizing categorical variables. Burst abdomen was computed as a percentage of the population and risks factors were analyzed among the patients that had the event to determine if there were any patterns that could help explain why some

patients were more vulnerable than others. This was not meant to be a study of causality but rather to give a clear picture of the clinical context in which each case of burst abdomen happened, especially in the case of peritonitis, where several physiological stressors set in against wound healing.

RESULTS

From all patients undergoing emergency laparotomy for suspected or intra-operatively confirmed peritonitis, 120 patients were analysed. The age of the cohort ranged from 13 to 70 years with a mean age of 40 ± 6 years. The sample was predominantly male (66.7%) as is usual with acute abdominal emergencies. The causes of peritonitis were very varied, though typhoid ileal perforation was the most common, and accounted for just over two-fifths. The other common causes were duodenal ulcer perforation, ruptured appendix, less frequently encountered were tuberculous perforation, ruptured liver abscess and colonic perforation.

Thirty-six patients (30%) had an episode of burst abdomen. Upon closer inspection, there were a number of clinical factors that showed up over and over again among the patients who experienced wound dehiscence. Hypoalbuminemia was the most striking, and was seen in two thirds of patients with the disease. Other frequent postoperative complications included infection of the respiratory tract or persistent cough, and intraabdominal collections. Other less common but significant causes were postoperative paralytic ileus, anaemia and obesity. The study did not attempt to demonstrate causality, but the association of these factors in patients with a burst abdomen is still meaningful and worthy of further study in future analytical studies.

Postoperative complications were minimal and most patients (75%) recovered. The other 25% had an abdomen that burst or other problems that required further intervention, prolonged hospital stay or more monitoring. Summaries of the overall pattern of outcomes are provided in the tables below.

Table 1. Baseline Characteristics and Causes of Peritonitis

Variable	Frequency (%)
Total patients	120
Age (mean \pm SD)	40 ± 6 years
Sex	
– Male	80 (66.7%)
– Female	40 (33.3%)
Causes of peritonitis	
– Typhoid ileal perforation	52 (43.3%)

– Duodenal ulcer perforation	25 (20.8%)
– Ruptured appendix	20 (16.7%)
– Tuberculous ileal perforation	12 (10.0%)
– Ruptured liver abscess	8 (6.7%)
– Colonic perforation	3 (2.5%)

Table 2. Frequency of Risk Factors among Patients with Burst Abdomen (n = 36)

Risk Factor	Frequency (%)
Hypoalbuminemia	24 (66.7%)
Postoperative respiratory infection/cough	15 (41.7%)
Intra-abdominal collection	12 (33.3%)
Paralytic ileus	6 (16.7%)
Anaemia	3 (8.3%)
Obesity (BMI >30)	3 (8.3%)

DISCUSSION

Burst abdomen was observed in 30% of the cases undergoing emergency laparotomy for peritonitis, which is quite high compared to many general surgical series, but not very different from the higher risk one would expect in contaminated and physiologically stressed patients. Typhoid ileal perforation was the most common cause of peritonitis as is also evident in several LMICs, where enteric fever is a significant problem causing AAE. Such patients are also likely to be more vulnerable because of the high rate of systemic sepsis and the nutritional compromise and delayed presentation.

Low serum albumin was also one of the most important factors associated with wound dehiscence in emergency abdominal surgery, as reported by Gupta et al. [16], which was also found to be very strongly associated with wound dehiscence in our cohort. Their findings, as well as our own, stress the role of nutritional status at the time of surgery and its importance, even if the time available for nutrition optimisation is short. In the study conducted by Khan's group and others, who looked at the outcome in perforation peritonitis, another common factor in the postoperative morbidity was hypoalbuminemia, which included dehiscence of the fascia [17]. The similarities and parallels of these observations in various populations further support the biological plausibility of albumin as a surrogate marker of the impaired healing capacity.

The second most common risk factors in our series were postoperative respiratory tract infection and persistent cough. This is consistent with

observations of Patel et al., who showed that the increase in intra-abdominal pressure due to coughing episodes would predispose to wound disruption after midline laparotomy [18]. Their research pointed to the mechanical stress that is put on newly sutured fascia, especially when infected or if the tissue is of low quality. Odom et al. reported that higher rates of wound failure in emergency gastrointestinal surgery was associated with respiratory complications, independently [19].

Intra-abdominal collections were also a fairly common finding when patients had burst abdomen. The results are similar to those of Rahman et al who found that inadequate source control and postoperative abscess were strongly associated with wound dehiscence in cases of peritonitis [20]. Their study showed that continuous intra-abdominal sepsis may lead to a deficit of collagen deposition and a delay in wound maturation, which may lead to a breakdown of the fascial layer. Similar findings were found by Silva et al. who demonstrated a significantly higher incidence of superficial and deep wound complications in patients with postoperative collections [21].

We did not see obesity or anaemia as common as they are seen in the broader surgical literature, but they were seen in our patients who had a burst abdomen. Torres et al. showed that obesity (BMI >30) was related to wound edge tension and a decrease in vascularity, leading to a higher risk of dehiscence in a multi-centre study [22]. The numbers we had in our study were small but the pattern was consistent with these observations.

The results of the present study corroborate the multifactorial nature of burst abdomen, especially in the context of peritonitis: the systemic inflammation, contamination and physiological derangement. There is significant overlap between our results and those of prior studies, reinforcing the importance of a tailored peri-operative approach, such as early nutritional assessment, aggressive respiratory optimisation, careful intra-abdominal drainage and careful postoperative monitoring. Due to the cross-sectional design, this specific study cannot conclude causation, but the associations found across multiple studies make these risk factors a clinically meaningful and possibly modifiable risk factors.

CONCLUSION

The results of this study reflect the significant morbidity of a burst abdomen in patients who were taken to the emergency department for the treatment of peritonitis, as almost one-third of the patients developed this potentially serious postoperative complication. The risk factors profile seen, especially hypoalbuminemia, postoperative respiratory infection and intra-abdominal collections, further emphasizes the multifactorial aspect of failure of the wound in the setting of severe intra-abdominal sepsis. While some contributors like underlying disease cannot be influenced, others are potentially treatable using early optimisation of nutritional status, careful respiratory management and careful postoperative management of the development of sepsis or collections. The uniformity of these relationships to previous publications further supports the argument for targeted peri-operative strategies in high risk patients. The study highlights the importance of early detection of potential patients' risk and implementing structured preventive measures to minimize the incidence of abdominal wound dehiscence and improve surgical outcomes in peritonitis.

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