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Post Operative Complications of Non-Traumatic Ileal Perforation in Patients Undergoing Emergency Laparotomy

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ABSTRACT

Background: Intestinal perforation is still a serious surgical emergency and can be caused by enteric fever, intestinal tuberculosis, or inflammatory bowel disease. Subsequent leakage into the peritoneal space causes peritonitis, sepsis, and considerable mortality if not attended to immediately. Emergency laparotomy is still considered a lifesaving intervention, but postoperative sequelae still pose considerable morbidity, especially in limited settings such as Peshawar. **Objective:** To find out the frequency of post-operative complications of non-traumatic ileal perforation in patients undergoing emergency laparotomy at our health setup. **Study Design:** Descriptive cross-sectional study. **Duration and Place of Study:** Conducted from December 2024 to May 2025 in the Department of Surgery, Lady Reading Hospital, Peshawar. **Methodology:** A total of 133 patients aged 18–40 years with confirmed non-traumatic ileal perforation were included through consecutive sampling. All underwent emergency laparotomy and were observed for complications including wound infection, peristomal excoriation, wound dehiscence, prolonged ileus, and fistula formation for up to 45 days post-surgery. **Results:** The mean age was 28.36 ± 6.73 years with 62.4% males. Enteric fever accounted for 62.4% of perforations, followed by tuberculosis (26.3%) and adhesions (11.3%). Wound infection occurred in 31.6%, peristomal excoriation in 17.3%, wound dehiscence in 10.5%, and prolonged ileus and fistula formation each in 3% of patients. **Conclusion:** Postoperative complications following emergency laparotomy for non-traumatic ileal perforation are common, with wound infection being the predominant issue.

INTRODUCTION

Ileal perforation is a serious surgical problem that commonly occurs because of an intestinal infection, injuries, and/or inflammatory bowel disease of the distal small bowel.[1] Leakage of contents into the peritoneal space occurs, causing peritonitis.[2] Presenting signs of this condition include acute abdominal pain, fever, vomiting, and abdominal distension.[4] There will be abdominal tenderness, guarding, and rigidity due to this condition.[4] The bowel sounds may be absent, and the patient can go into septic shock if not treated early.[5] Common causes include typhoid fever, tuberculosis, trauma, and non-specific enteritis.[6] Diagnosis is made through clinical signs and supported by imaging like an erect abdominal X-ray showing free gas under the diaphragm or an ultrasound suggesting peritoneal fluid.[7] Laboratory findings often show leukocytosis, dehydration, and electrolyte imbalance.[7] The condition is a surgical emergency, and any delay in treatment can cause high morbidity and mortality due to sepsis and multiple organ failure.

Emergency laparotomy is the main treatment procedure done for ileal perforation to control the source of infection and restore the intestinal continuity or exteriorize the bowel if needed.[8] Under general anesthesia, a midline incision is made to explore the abdomen.[8] The surgeon first suctions the contaminated fluid and pus, identifies the site of perforation, and assesses the viability of bowel loops.[9] Depending on the findings, primary closure of perforation with peritoneal lavage may be done if the contamination is minimal, but in severe peritonitis or multiple perforations, ileostomy is often preferred to divert fecal flow.[10] The entire abdomen is cleaned thoroughly, drains are inserted, and the wound is closed in layers. The patient is shifted to intensive care for postoperative monitoring. Adequate fluid resuscitation, broad-spectrum antibiotic coverage, and electrolyte balance correction are essential considerations during perioperative care.[11] Early surgeries and optimal decision-making during surgeries help save lives and decrease mortality.

Complications of surgeries can be common following an emergency laparotomy for ileal perforation, especially if

they present late and are generally ill.[12] Wound infections can be most common as a result of contamination and poor immunity.[12] They can be defined by pain, swelling, and pus discharge, as well as fever, and can be managed by dressing and antibiotics. Excoriation about the stoma can be experienced by some who have ileostomies, as the skin around the ileostoma may become irritated because of gastric enzymes and may need regular cleaning and application of a protective screen around it.[13] Dehiscence of wound is possibly due to separation of wound, and it may be due to infections and/or increased pressures of the abdomen, and wound care and measures can reverse this condition.

According to a study, the reported post-operative complications of non-traumatic ileal perforation in patients undergone emergency laparotomy were Wound infection (30.4%), Peristomal excoriation (21.6%), Wound dehiscence (7.2%), Prolonged ileus (5.6%), and Fistula formation (3.2%).[14]

This study need to be done in Peshawar because many patients suffering from ileal perforation come to hospital in very late stage with serious infection and weak health. There is very little information available about the post-operative complications after emergency laparotomy in this area. By doing this study, it will help to know how common problems like wound infection, peristomal excoriation, wound dehiscence, prolonged ileus, and fistula formation are in local patients. It will also help surgeons to find better ways to manage these cases and reduce the number of complications and death after surgery in hospitals of Peshawar.

METHODOLOGY

This descriptive research had been carried out in the Department of Surgery at Lady Reading Hospital, Peshawar, during the time between December 2024 to May 2025. The permission for this study had been obtained from the hospital ethical review board and approval was also taken from the CPSP before any data collection started. The number of patients for this study was calculated by using the WHO sample size calculator. Taking into account a complication rate of 3.2% for fistula formation after emergency laparotomy in similar patients,[14] with a 3% margin of error and 95% confidence interval, the final sample came to 133 patients. The method of sampling used was non-probability consecutive technique. Patients between the age of 18 to 40 years from both male and female gender who had non-traumatic ileal perforation and undergone emergency laparotomy were part of this study. Those with pregnancy, abdominal trauma, cancer, congenital defect, or severe metabolic disorder were left out. The term emergency laparotomy here meant a surgical opening of the abdominal cavity done quickly to manage sudden and life-threatening illness. Non-traumatic ileal perforation meant the condition where the lower small intestine got perforated without external injury, presenting with abdominal pain above 3 on the visual analog scale, with tenderness, rigidity and gas shadow seen under diaphragm on X-ray. Before starting data collection, every patient had been informed about purpose and safety of the study and a written consent had been taken from them or their attendant. They were assured that no extra harm or risk would come because of participation.

After surgery, each patient was assessed by a consultant surgeon having more than five years of post-fellowship experience. The assessment involved full medical history, physical check, and inspection of the operative wound at regular intervals up to 45 days after surgery. Wound infection was considered when discharge with pus along with redness, warmth, swelling, and pain of more than 3 on pain scale was observed. Peristomal excoriation was identified when the skin around stoma showed irritation, ulcer, or wet lesion. Wound dehiscence was noted when wound edges got separated or opened. Prolonged ileus was recognized if X-ray showed dilated intestinal loops with fluid levels together with distended abdomen and less bowel sound. Fistula formation was recorded when any abnormal opening was seen discharging continuously with irritation of nearby skin. These were the outcome variables of the research and were observed as per definitions mentioned.

All data had been entered into SPSS version 27 for analysis. Quantitative data had been shown as mean with standard deviation after checking their normality by Shapiro–Wilk test, or median with interquartile range when data were not normal. Qualitative data were given as frequency and percentage. Post-operative complications were also compared to identify if these factors affected the outcome. Chi-square test or Fisher exact test was used accordingly, and value of p less than or equal to 0.05 was counted significant for result interpretation.

RESULTS

The mean age of the patients were 28.36 ± 6.73 years and the mean BMI was found to be 27.14 ± 2.85 kg/m^2. Among the study population, males was 83 (62.4%) and females was 50 (37.6%). The most common cause of perforation was enteric fever which was seen in 83 patients (62.4%), followed by tuberculosis in 35 patients (26.3%), and adhesions in 15 patients (11.3%) as shown in Table 1

Table 1

Patient Demographics

Demographics		Mean ± SD / n (%)
Age (years)		28.36 ± 6.73
BMI (kg/m^2)		27.14 ± 2.85
Gender	Male n (%)	83 (62.4%)
	Female n (%)	50 (37.6%)
Cause of Perforation	Enteric Fever n (%)	83 (62.4%)
	Tuberculosis n (%)	35 (26.3%)
	Adhesions n (%)	15 (11.3%)

The post-operative complications that was observed in the study shows that wound infection was the most frequent complication, occurring in 42 patients (31.60%), while 91 patients (68.40%) did not developed wound infection. Peristomal excoriation was present in 23 patients (17.30%) and absent in 110 patients (82.70%). Wound dehiscence was observed in 14 patients (10.50%) whereas 119 patients (89.50%) did not had this complication. Prolonged ileus and fistula formation was each seen in 4 patients (3.00%), with 129 patients (97.00%) not experiencing these complications as shown in Table 2.

Table 2

Frequency of Post-Operative Complications in Patients Undergoing Emergency Laparotomy for Non-traumatic Ileal Perforation

Post-operative Complications		Frequency	%age
Wound Infection	Yes	42	31.60%
	No	91	68.40%
Peristomal Excoriation	Yes	23	17.30%
	No	110	82.70%
Wound Dehiscence	Yes	14	10.50%
	No	119	89.50%
Prolonged Ileus	Yes	4	3.00%
	No	129	97.00%
Fistula Formation	Yes	4	3.00%
	No	129	97.00%
	Total	133	100%

The association analysis of post-operative complications with demographic and clinical factors reveals several findings. For age stratification, patients ≤30 years shows wound infection in 25 patients (31.3%) compared to 17 patients (32.1%) in >30 years age group with p-value of 0.920. Peristomal excoriation was seen in 11 patients (13.8%) in ≤30 years group and 12 patients (22.6%) in >30 years group (p=0.184). Wound dehiscence occurred in 9 patients (11.3%) in younger age group and 5 patients (9.4%) in older age group (p=0.783). Prolonged ileus was present in 2 patients (2.5%) in ≤30 years and 2 patients (3.8%) in >30 years with p-value of 1.000. Fistula formation was observed in 2 patients (2.5%) in each age groups (p=1.000). When stratified by gender, wound infection was seen in 27 males (32.5%) and 15 females (30.0%) with p-value of 0.761. Peristomal excoriation occurred in 17 males (20.5%) and 6 females (12.0%) (p=0.210). Wound dehiscence was present in 8 males (9.6%) and 6 females (12.0%) with p-value of 0.667. Prolonged ileus was observed in 4 males (4.8%) and 0 females (0.0%) (p=0.166), while fistula formation was seen in 2 males (2.4%) and 2 females (4.0%) with p-value of 1.000. Regarding the cause of perforation, among patients with enteric fever, wound infection occurred in 25 patients (30.1%), tuberculosis showed wound infection in 10 patients (28.6%), and adhesions in 7 patients (46.7%) with p-value of 0.405. Peristomal excoriation was present in 15 patients (18.1%) with enteric fever, 4 patients (11.4%) with tuberculosis, and 4 patients (26.7%) with adhesions (p=0.407). Wound dehiscence was observed in 8 patients (9.6%) with enteric fever, 4 patients (11.4%) with tuberculosis, and 2 patients (13.3%) with adhesions (p=1.000). Prolonged ileus occurred in 3 patients (3.6%) with enteric fever, 1 patient (2.9%) with tuberculosis, and 0 patients (0.0%) with adhesions (p=1.000). Fistula formation was seen in 2 patients (2.4%) with enteric fever, 2 patients (5.7%) with tuberculosis, and 0 patients (0.0%) with adhesions with p-value of 0.598 as shown in Table 3.

Table 3

Association of Post-Operative Complications with Demographic and Clinical Factors

Factors		Wound Infection		p-value	Peristomal Excoriation		p-value	Wound Dehiscence		p-value	Prolonged Ileus		p-value	Fistula Formation		p-value
		Yes n(%)	No n(%)		Yes n(%)	No n(%)		Yes n(%)	No n(%)		Yes n(%)	No n(%)		Yes n(%)	No n(%)	
Age (years)	≤30	25 (31.3%)	55 (68.8%)	0.920	11 (13.8%)	69 (86.3%)	0.184	9 (11.3%)	71 (88.8%)	0.783*	2 (2.5%)	78 (97.5%)	1.000*	2 (2.5%)	78 (97.5%)	1.000*
	>30	17 (32.1%)	36 (67.9%)		12 (22.6%)	41 (77.4%)		5 (9.4%)	48 (90.6%)		2 (3.8%)	51 (96.2%)		2 (3.8%)	51 (96.2%)	
Gender	Male	27 (32.5%)	56 (67.5%)	0.761	17 (20.5%)	66 (79.5%)	0.210	8 (9.6%)	75 (90.4%)	0.667	4 (4.8%)	79 (95.2%)	0.166*	2 (2.4%)	81 (97.6%)	1.000*
	Female	15 (30.0%)	35 (70.0%)		6 (12.0%)	44 (88.0%)		6 (12.0%)	44 (88.0%)		0 (0.0%)	50 (100.0%)		2 (4.0%)	48 (96.0%)	
Cause of Perforation	Enteric Fever	25 (30.1%)	58 (69.9%)	0.405	15 (18.1%)	68 (81.9%)	0.407*	8 (9.6%)	75 (90.4%)	1.000*	3 (3.6%)	80 (96.4%)	1.000*	2 (2.4%)	81 (97.6%)	0.598*
	Tuberculosis	10 (28.6%)	25 (71.4%)		4 (11.4%)	31 (88.6%)		4 (11.4%)	31 (88.6%)		1 (2.9%)	34 (97.1%)		2 (5.7%)	33 (94.3%)	
	Adhesions	7 (46.7%)	8 (53.3%)		4 (26.7%)	11 (73.3%)		2 (13.3%)	13 (86.7%)		0 (0.0%)	15 (100.0%)		0 (0.0%)	15 (100.0%)	

*Fischer Exact Test

DISCUSSION

The current study was conducted to determine the post-operative complications of non-traumatic ileal perforation in patients undergoing emergency laparotomy. The findings of this study demonstrates that wound infection was the most common complication which occurred in 31.60% of patients. This high rate of wound infection can be attributed to the fact that ileal perforation leads to peritoneal contamination with enteric contents which contains large bacterial load, particularly gram-negative organisms and anaerobes. The compromised immunity and malnutrition in patients with enteric fever and tuberculosis further predisposes them to wound infections because their body defense mechanisms is already weakened by the underlying systemic illness. Additionally, the emergency nature of surgery often means that optimal pre-operative preparation including bowel decontamination was not possible, which increases the bacterial burden in the surgical field.

Peristomal excoriation was observed in 17.30% of patients in this study. This complication occurs because the intestinal effluent contains digestive enzymes and bile salts which is highly corrosive to the skin. When stoma is created in emergency settings, the precise placement and maturation of stoma may not be optimal due to inflamed and edematous bowel, leading to improper appliance fitting and subsequent skin exposure to intestinal contents. The high output from proximal stomas in ileal perforations also means more frequent contact between effluent and skin which aggravates the excoriation.

Wound dehiscence was found in 10.50% of patients which is a significant complication. This occurs due to multiple factors including hypoalbuminemia and poor nutritional status in patients with chronic conditions like tuberculosis

and prolonged enteric fever. The fascial tissues in these patients has reduced tensile strength and impaired collagen synthesis. The increased intra-abdominal pressure from post-operative ileus, coughing, or straining further stresses the suture line. Wound infection also contributes to dehiscence as the inflammatory process and proteolytic enzymes disrupts the healing tissues and breaks down the suture material.

Prolonged ileus and fistula formation was each observed in only 3.00% of patients. The low incidence of prolonged ileus may be explained by early post-operative mobilization and nasogastric decompression which helps in restoration of bowel motility. Fistula formation occurs when there is inadequate blood supply to the bowel edges, tension at the suture line, or ongoing infection which prevents proper healing of the intestinal anastomosis or repair site. The presence of distal obstruction or diseased bowel tissue also predisposes to fistula development.

The wound infection rate of 31.60% observed in current study was comparable to several previous studies. Siddiqui FG, et al. [15] reported that patients without defunctioning ileostomy had higher morbidity including wound infections, which supports our findings that contamination from enteric contents is major contributor to wound infections. Similarly, Chauhan S, et al. [16] found wound infection rate of 12.28% in emergency laparotomies which was lower than our study, this difference can be explained by the fact that their study included various types of abdominal emergencies not specifically ileal perforations which has more bacterial contamination. Chaudhary SH, et al. [17] reported wound infection in 22.2% of emergency laparotomy patients which was also lower than current study, the higher rate in our study may be because we specifically studied ileal perforation cases where intestinal spillage is more severe. Murtaza B, et al. [18] found wound infection rate of 21.6% in emergency laparotomies which again was lower than our findings. However, Anwar F, et al. [19] reported surgical site infection rate of 28.2% in emergency bowel resection patients which was very similar to our result of 31.60%, this similarity suggests that bowel perforation and resection cases inherently carries higher infection risk due to enteric contamination. Nazir MT, et al. [20] and Manoj P, et al. [21] both reported much higher surgical site infection rates of 47% and 47.2% respectively, these higher rates could be attributed to different patient populations, more severe peritoneal contamination, or variations in perioperative antibiotic protocols and surgical techniques. Begum M, et al. [22] also identified wound infection as most common complication in ileal perforation patients which was consistent with our findings, indicating that regardless of geographical location or specific surgical approach, wound infection remains the predominant concern in these patients.

The peristomal excoriation rate of 17.30% in our study was comparable to findings by Rajper NU, et al. [23] who reported skin excoriation in 14.08% of patients undergoing ileostomy for ileal perforation. This similarity indicates that stoma-related skin complications is common problem when ileostomy is created in emergency settings. The slightly higher rate in our study may be due to poor stoma site selection in emergency conditions or inadequate patient education about stoma care in immediate post-operative period. The corrosive nature of small bowel contents and high output from proximal stomas creates persistent challenge in maintaining skin integrity around stoma site.

Our study found wound dehiscence in 10.50% of patients which was higher than Rajper NU, et al. [23] who reported 11.43% wound dehiscence in ileal perforation patients, showing remarkable similarity. However, Murtaza B, et al. [18] reported lower wound dehiscence rate of 4.8% in emergency laparotomies and Chaudhary SH, et al. [17] found 5.3% wound dehiscence rate. The higher rates in studies specifically dealing with ileal perforation can be explained by severe malnutrition and hypoalbuminemia which is more common in patients with enteric fever and tuberculosis. These patients has compromised tissue healing capacity and reduced tensile strength of fascial layers. Chauhan S, et al. [16] did not specifically report wound dehiscence rates in their study which makes direct comparison difficult.

The prolonged ileus rate of 3.00% in current study was significantly lower than findings by Anwar F, et al. [19] who reported postoperative ileus in 34.5% of emergency bowel resection patients. This major difference may be because their study included more complex bowel resections with anastomosis which typically takes longer time for bowel function recovery. Nazir MT, et al. [20] reported ileus in 12% of patients and Manoj P, et al. [21] found paralytic ileus in 12.8% of cases, both of which was higher than our findings. The lower rate in our study could be attributed to early mobilization protocols, effective nasogastric decompression, and appropriate fluid management in post-operative period. Begum M, et al. [22] mentioned paralytic ileus as one of complications but did not provide specific percentage which limits comparison.

Fistula formation rate of 3.00% in our study was identical to Begum M, et al. [22] who reported fecal fistula in 3% of ileal perforation patients. This remarkable similarity suggests that with proper surgical technique and adequate bowel handling, fistula formation can be kept to minimal levels. However, Siddiqui FG, et al. [15] reported that fecal fistula occurred in 11.7% of patients who did not receive defunctioning ileostomy, indicating that without protective ileostomy the risk of fistula formation increases significantly. The presence of ileostomy in many of our patients may have contributed to lower fistula rate. Chauhan S, et al. [16] reported fecal fistula in 2% of emergency laparotomy patients which was slightly lower than our finding, this difference may be due to variations in surgical complexity and patient selection. Anwar F, et al. [19] found anastomotic leak rate of 9.1% which was higher than our fistula formation rate, this could be because their study specifically focused on bowel resection with anastomosis where anastomotic complications is more common due to technical challenges and tissue quality issues.

The current study has several limitations that needs to be acknowledged. Firstly, this was a single center study which was conducted at one institution only, therefore the findings may not be generalizable to other healthcare settings or populations with different demographic characteristics and resource availability. The sample size

of 133 patients, although adequate for initial analysis, was relatively small which limits the statistical power to detect significant associations between variables. Secondly, this study did not account for important confounding factors such as duration of symptoms before presentation, severity of peritoneal contamination, pre-operative nutritional status, and specific antibiotic regimens used which could have influenced the post-operative complication rates.

CONCLUSION

Our study has concluded that post-operative complications in patients undergoing emergency laparotomy for non-traumatic ileal perforation is common and represents significant clinical challenge. Wound infection was identified as the most frequent complication, followed by peristomal excoriation and wound dehiscence, while prolonged ileus and fistula formation was less common. The major causes of ileal perforation in our population was enteric fever, tuberculosis, and adhesions.

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