

Pattern and Frequency of Ileostomy-Related Complications Following Emergency Surgery for Perforation Peritonitis in a Tertiary Care Setting

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ABSTRACT

Background: Ileal perforation is a surgical emergency in developing nations, and the condition is linked to high morbidity and mortality rates. In patients with peritonitis, emergency ileostomy is commonly done to minimise the risk of anastomotic leak. Nevertheless, ileostomy alone is complex with dozens of postoperative complications, which affect patient outcomes.

Methods: This was a prospective observational study that involved 50 patients who had an emergency surgery for ileal perforation. The patients were grouped as traumatic and non-traumatic perforations; non-traumatic perforations were classified as typhoid and tuberculosis. The data on demographic profile, period between the onset of symptoms and hospitalization, procedures carried out during the operation, postoperative conditions, and mortality were collected and assessed.

Results: There were more non-traumatic ileal perforations (56%) compared to the traumatic ones (44%), and the most frequent cause of non-traumatic perforations was typhoid fever. Non-traumatic perforations had a more delayed presentation. The most popular procedure done in infective perforations was loop ileostomy, whilst resection and anastomosis were done more in traumatic cases. The most common postoperative complications in all the groups were wound sepsis and partial wound dehiscence. The total mortality was 20 percent, with the increased mortality in non-traumatic perforations.

Conclusion: The present study concluded that non-traumatic causes constitute the predominant etiology of ileal perforation, with enteric fever emerging as the leading underlying factor, thereby emphasizing the continued public health relevance of preventable infectious diseases.

Key-words: Ileal perforation, Emergency ileostomy, Perforation peritonitis, Postoperative complications, Mortality

INTRODUCTION

The most commonly encountered surgical emergency is perforated peritonitis. Sex, age, site, duration, and extent of perforation are some of the factors that are associated with mortality and morbidity. It requires fecal diversion to decrease the risk of contamination or sepsis [1].

In such cases, an ileostomy helps in reducing the mortality and morbidity that are associated with anastomotic leakage in small gut and colonic anastomosis. Ileostomies also prevent morbidities in ileal perforation caused by tuberculosis, typhoid, ruptured appendix, or trauma. Although there are complications like skin excoriation, dehydration due to electrolyte and fluid loss, and stomal obstruction occurring in 16.9% of patients within 60 days [2]. Relieving the obstruction of the bowel, diverting the evacuation of stool in cases where the colon is removed, or for the protection of the distal anastomosis after bowel defunctioning are indications of ileostomy [3].

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Diverting ileostomy created during surgery is not only associated with morbidity, but it is also a life-saving procedure. Dietary regimen combined with antimotility therapy or fluid resuscitation is given for ileostomy complications. A typical output should not be more than 1500 ml per day after ileostomy ^[3,4].

Mucocutaneous suppuration, peritonitis, laceration, and separation of the stoma from the skin are complications of an ileostomy. Strangulation and decreased blood flow after the surgery cause stoma necrosis. As the proximal bowel slides towards the stoma orifice and when the displacement of stoma occurs, it causes stoma prolapse. One of the late complications of ileostomy is stoma retraction, which occurs when there is approximately a 5cm reduction of the stoma below the surface of the skin, which mainly occurs after gaining weight. Certain surgical procedures, adhesion, sepsis, and intestinal radiation are some of the conditions where stomal retraction occurs. Higher rates of complications are seen in loop ileostomies, but these are not life-threatening. Performing an ileostomy can prevent life-threatening complications that are caused by anastomotic leakage. Most of the complications caused by ileostomy require surgical intervention ^[2,5].

Stoma-related complications are stressful for patients and surgeons. Necrosis, retraction, prolapse, parastomal hernia, stenosis, hemorrhage, skin excoriation, infection, non-functioning stomas, and fistula are the stoma complications with high morbidity. When there is exposure of skin to ileostomy contents, ulceration and excoriation are commonly observed. A retracted stoma presents many difficulties where the contents spill over the skin and cause pain, infection, and excoriation ^[2,6]. A fistula is a serious complication that occurs in the first 15 days of surgery and causes loss of fluid, protein, and electrolytes. Necrosis is also a stomal complication that is caused by inadequate blood supply. Recognizing the frequency and patterns of complications plays an important role in maintaining perioperative care, clinical decision-making, and enhancing the surgical outcomes in patients undergoing ileostomy ^[2,7].

MATERIALS AND METHODS

Research design- This is a prospective research design for the evaluation of the pattern and the frequency of complications related to the ileostomy after the surgery conducted for the perforation peritonitis. The study was

conducted in the PMCH Medical College, Udaipur, Rajasthan. The study was conducted during the period of one year. Patients who were diagnosed with an ileal perforation and visited the department for treatment were selected for the study. A total of 50 patients were selected for the study. Suspected diagnosis was made based on the clinical presentation and radiographic image findings. The presence of pneumoperitoneum confirmed laparotomy. Both traumatic and non-traumatic etiologies were recommended for the ileal perforation. Well-informed, both verbal and written consent was taken for the study. All the participants were selected based on certain inclusion and exclusion criteria.

Inclusion criteria

- Patients who were diagnosed with both traumatic and non-traumatic ileal perforation for over 11 years were selected for the study.
- Only informed participants were selected for the study.

Exclusion criteria

- Patients aged less than 10 years were not considered for the study.
- Patients diagnosed with any other peritonitis apart from ileal perforation were not considered.
- Patients with large, duodenal or gastric bowel-like syndrome were excluded.
- Not informed were excluded from the study.

Procedure- After selecting each participant based on the selection criteria, patients underwent clinical investigation, a physical examination was performed, and the findings of the radiographic imaging were analyzed. The diagnosis of ileal perforation was made based on clinical evidence, specifically the presence of pneumoperitoneum, which indicated the possibility of surgical intervention. Both traumatic and non-traumatic reasons were indicated at the time of diagnostic assessment. During the surgical process, intraoperative evaluation was conducted for the determination of site, size, and number of perforations, along with the degree of the peritoneal contamination and the related pathological outcomes. In case of non-traumatic cases, edge biopsy was done for histopathological evaluation from the edge of the ileal portion for determination of

the etiology associated with it. A specific operative process was considered for a specific individual based on the intraoperative findings. Parameters related to operation, such as the type of surgical procedure and other intraoperative complications, were recorded and observed. Close monitoring of all the participants was done postoperatively. All parameters were recorded, such as the recovery, complications like infection at the site, sepsis, or impaired organ function, and associated mortality. Specific and individualised treatment strategies were performed based on the diagnosis. Follow-up was performed at regular intervals, with a minimum of 6 months of follow-up period maintained. Clinical outcomes, recovery, and late complications associated were analysed and recorded.

Statistical Analysis- Collected data was tabulated and analyzed by the use of Microsoft Excel. Statistical Package for the Social Sciences (SPSS) version 27 was utilized for statistical analysis. All Categorical data and discrete variables were expressed with the help of frequencies and percentages. Continuous variables were represented by the use of mean and standard deviation.

RESULTS

Table 1 shows the etiological distribution of ileal perforation among 50 patients. Nontraumatic patients were predominant over the traumatic ones. Non-traumatic patients were 28 (56%), and the non-traumatic patients were 22, which accounts for 44%. This table highlights that non-traumatic aetiology is more predominant over traumatic aetiology, which highlights the significance of regulating both traumatic and non-traumatic conditions.

Table 1: Etiological examination of cases of ileal perforation

Aetiology	No of patients	Percentage
Non-traumatic	28	56
Traumatic	22	44
Total	50	100

Table 2 shows the aetiological evaluation of non-traumatic cases of ileal perforation, where typhoid fever is the predominant reason for ileal perforation. 24 patients were accounted for non-traumatic perforation

among the 50 total study population. While tuberculosis was observed among 4 patients, at an estimated for 15.4%, highlighting low prevalence. The table also highlighted that enteric fever is the crucial factor for ileal perforation among patients. However, Tubercular ileal perforation is not so common, but it is a crucial factor for the high rate of suspicion.

Table 2: Aetiological evaluation of cases of non-traumatic ileal perforation

Aetiology	No of patients	Percentage
Tuberculosis	4	15.4
Typhoid	24	84.6
Total	28	100

Table 3 shows the aetiological evaluation of traumatic cases of ileal perforation, where penetrating injuries were commonly observed among patients rather than the blunt trauma. These were observed among 12 patients, accounting for 54.53%, while 10 patients were observed with blunt injuries. In case of blunt trauma, the most predominant cause was the road traffic accidents, accounting for 27.27%, which was followed by 13.63% of fall from height and 4.55% of assault-related blows. In case of the penetrating trauma, 31.8% were observed with firearm injuries, and 22.73% accounted for stab injuries. These findings demonstrated that high-energy trauma, specifically firearm injuries and road traffic accidents, was important for traumatic ileal perforation.

Table 3: Aetiological evaluation of cases of traumatic ileal perforation

Aetiology	Mode of injury	No of patients	Percentage
Blunt	Blow (assault)	1	4.55
	Fall from height	3	13.63
	Road traffic accident	6	27.27
Penetrating	Stab injury	5	22.73
	Firearm injury	7	31.8
Total		22	100



Table 4 demonstrates the incidence of age and gender in non-traumatic perforation caused by tuberculosis and typhoid. Ileal perforation due to typhoid is most seen in males compared to females, with the highest incidence seen in the age range of 21-30 (33.3%), highlighting high risk among young adults. This was followed by 31-40 years (22.2%) among the older population. Tubercular

perforations are least commonly seen with male predominance and an age range of 31-40 years (33.3%). Neither of the diseases was observed among children aged 0 to 10 years, but a sharp reduction had been noticed above the age of 60. 75% of males were observed with both conditions.

Table 4: Incidence of age and gender on non-traumatic perforation

Age (year)	Typhoid						Tuberculosis					
	Male		Female		Total		Male		Female		Total	
	case	%	case	%	case	%	case	%	case	%	case	%
0-10	-	-	-	-	-	-	-	-	-	-	-	-
11-20	3	16.7	1	16.7	4	16.6	-	-	-	-	-	-
21-30	6	33.3	3	50	9	37.5	1	33.3	-	-	1	25
31-40	4	22.2	1	16.7	5	20.8	1	33.3	1	100	2	50
41-50	2	11.5	1	16.7	3	12.5	1	33.3	-	-	1	25
51-60	2	11.5	-	-	2	8.3	-	-	-	-	-	-
61-70	1	6.25	-	-	1	4.2	-	-	-	-	-	-
Total	18	100	6	100	24	100	3	100	1	100	4	100

Table 5 shows the incidence of age and gender on traumatic perforation of the ileum. Among 22 cases, males were predominant, accounting for 68.2%, rather than 31.8% of females. The 31–40 years of age group was the most predominant age group, estimated with 27.3% of all of the total cases. A rare incidence was

observed in 41–50 years, accounting for 22.7%, and 21–30 years, accounting for 18.2%. While the population aged 0–10 years had no cases of incidence. Overall data findings suggested that the age group of 31–50 years, predominantly males, were mostly affected.

Table 5: Incidence of age and gender on traumatic perforation of the ileum

Age (year)	Male	%	Female	%	Total	%
0-10	-	-	-	-	-	-
11-20	2	13.3	1	14.3	3	13.6
21-30	3	20	1	14.3	4	18.2
31-40	4	26.7	2	28.6	6	27.3
41-50	3	20	2	28.6	5	22.7
51-60	2	13.3	1	14.3	3	13.6
61-70	1	6.6	-	-	1	4.5
Total	15	68.2	7	31.8	22	100

Table 6 shows the time interval between the onset of symptoms and emergency admission in traumatic and non-traumatic cases. In case of non-traumatic cases, 53.6% were predominant between 48–72 hours, followed by the 24–48 hours, which accounts for the possibility of delay in the presentation. Only 3.6% of non-

traumatic cases were represented within the initial 12 hours. Contrastingly, early traumatic cases account for 45.5% and are observed within 0 to 12 hours, and 31.8% observed from 12 to 24 hours. A few cases of trauma can be presented after 24 hours, which suggests medical consultation, as was followed by trauma.

Table 6: Time interval between symptom onset and emergency admission in cases of traumatic and non-traumatic perforation

	Non-traumatic		Traumatic	
Time (hours)	Total Cases No.	%	Total Cases No.	%
0-12	1	3.6	10	45.5
12-24	3	10.8	7	31.8
24-48	6	21.4	3	13.6
48-72	15	53.6	1	4.5
>72	3	10.8	1	4.5
Total	28	100	22	100

Table 7 shows the types of operative procedures used in ileal perforation, among populations suffering from typhoid, tuberculosis, and traumatic disorder. In typhoid-related ileal perforation, loop ileostomy was the most frequently performed procedure, accounting for 45.83% of cases, reflecting a preference for fecal diversion in the presence of gross contamination and compromised bowel integrity. Simple closure constituted 29.16% of cases, while resection with anastomosis was undertaken in a smaller proportion (16.66%), suggesting selective use in patients with relatively localized disease and stable bowel condition. Tubercular perforations,

although limited in number, demonstrated an equal predominance of loop ileostomy and simple closure through bypass, each constituting 50% and 25%, respectively, indicating cautious surgical approaches due to poor tissue quality and chronic inflammation. In contrast, traumatic ileal perforations were most commonly managed by resection and anastomosis, representing 63.6% of cases, which reflects healthier bowel margins and a greater feasibility of primary restoration of continuity. Simple closure was performed in 27.2% of traumatic cases, while bypass procedures were infrequently required.

Table 7: Types of operative procedures that could be used in the various cases of ileal perforation

Operative procedure	Typhoid (n=24)	Tuberculosis (n=4)	Traumatic (n=22)
	Total Cases No.	%	Total Cases No.
Loop ileostomy	11	45.83	2
Simple closure	7	29.16	1
Resection and anastomosis	4	16.66	-
Simple closure through bypass	2	8.33	1
Total	24	100	4

Table 8 shows the rate of complications in ileal perforations. Wound sepsis is the most common complication seen in all the groups, 20.83% in typhoid, and 22.7% in traumatic cases. Partial wound dehiscence was also most commonly seen, mainly in tuberculosis perforation (25%), typhoid perforations (16.66%), and Traumatic perforations (13.6%). Septicaemia is noted least commonly seen in all the groups. Toxaemia is seen only in the typhoid group (8.3%). All of the groups were

observed with septicaemia, and commonly, 25% of the population had been observed with tuberculosis, and 13.6% had been observed among traumatic cases. Toxaemia has been observed among 8.3% of patients. Most predominant were the wound-related complications, highlighting the significance of post-operative care, specifically in cases of infectious and traumatic disorders.

Table 8: Rate of complications in all types of ileal perforation

Complications	Typhoid (n=24)	Tuberculosis (n=4)	Traumatic (n=22)	Complications	Typhoid (n=24)
	Total Cases No.	%	Total Cases No.		Total Cases No.
Toxaemia	2	8.3	-	Toxaemia	2
Septicaemia	1	4.16	1	Septicaemia	1
Wound sepsis	5	20.83	0	Wound sepsis	5
Faecal fistula	3	12.5	1	Faecal fistula	3
Burst abdomen	4	16.66	0	Burst abdomen	4

DISCUSSION

A study evaluated the stoma-related morbidity in 279 patients. Ileus, parastomal hernia, stoma retraction, stomal prolapse, mucocutaneous separation, and stoma retraction are common complications seen in the study. 47% of patients in the study had peristomal dermatitis. The techniques used in the study for ileostomies are heterogeneous and have higher relevance to complications. An increased distance from the ileocecal valve to the ileostomy showed an increased risk of ileus and decreased risk of stoma retraction; also, the height of the distal limb of the ileostomy showed a higher incidence of mucocutaneous separation and parastomal dermatitis. The study concluded that certain techniques in the creation of diverting loop ileostomies showed a higher incidence of morbidities related to the stoma [8]. A study aimed to assess the risk factors that are associated with postoperative complications after performing a diverting loop ileostomy. The study concluded that a diverting loop ileostomy showed an approximately 20% complication rate. Bleeding disorders, longer duration of surgery, High ASA class, and functional status were identified as the risk factors for complications associated with loop ileostomy [9].

Minimal incisions show low infections and hernia formation after laparoscopy. It is not known currently whether the specimen extraction from the stoma site affects the surgical outcomes. A study evaluated the postoperative complications after laparoscopic colorectal surgery in stomal site extraction. The study concluded that stoma site extraction showed an increase in complications. It should be done carefully and in association with other procedures to reduce the incidence of hernias in patients with increased BMI or a permanent stoma [10].

Recently, most of the studies showed 83% of stoma-related complications. A study aimed to evaluate the most common indication for ileostomy and also evaluate the differences in rates of complication depending on the type of surgery, whether elective setting or an emergency. The study stated that ileostomies performed in emergency settings, as well as those formed due to colorectal malignancies, showed higher complications related to the stoma. The stoma-related complications are a common presentation to the emergency department [11].

A study explored the early post-operative complications in patients with ileal perforation undergoing ileostomy

and laparotomy in 100 patients diagnosed with peritonitis secondary to ileal perforation. All the patients underwent midline laparotomy with the formation of a loop ileostomy. The outcomes of the surgery were assessed 2 weeks postoperatively. More than 50% of patients have shown stoma-related complications in patients with ileal perforation, with fluid loss due to electrolytes and wound infection being the most common complications reported. Electrolyte balance and optimal care are important in the prevention of complications ^[12].

A study investigated the effect of emergency and elective colorectal surgery on complications and risk factors associated with surgery. The study stated that early ostomy complications are most commonly found in emergency colorectal surgery compared to an elective setting. Ostomy and patient-related risk factors for the occurrence of complications are different for both elective and emergency settings ^[13].

Emergency intestinal stoma is a life-threatening condition where the primary anastomosis is not safe and is also associated with post-operative complications. A study aimed to assess the frequency of early complications in emergency intestinal stomas. The rate of complications is generally high in comorbid patients and in those who require postoperative ICU care. The study concluded that an emergency intestinal stoma is a surgical intervention in acute abdominal emergencies. Higher incidence of complications requires proper surgical technique and stoma care to enhance patient outcomes ^[14].

A study evaluated the early, intermediate, and late complications of ileostomy in patients with perforated peritonitis. Ileostomy is a life-saving surgical procedure where the patient shows late and severe sepsis. The study stated that approximately 32% of the patients developed post-operative ileostomy complications. Among them, 42% is due to peristomal skin excoriation ^[15].

CONCLUSIONS

The present study concludes that non-traumatic causes remain the predominant etiology of ileal perforation, with enteric fever identified as the leading underlying factor, emphasizing the persistent public health burden of preventable infectious diseases. Traumatic perforations were comparatively fewer and were mainly

associated with high-energy mechanisms such as road traffic accidents and firearm injuries, reflecting the increasing impact of trauma-related gastrointestinal emergencies. A clear male predominance was observed in both groups, with young and middle-aged adults being most commonly affected, likely due to greater exposure to risk factors. Delayed hospital presentation was more frequent in non-traumatic perforations, particularly typhoid-related cases, contributing to increased disease severity and poorer outcomes. In contrast, traumatic cases tended to present earlier owing to the acute nature of injury. Surgical management varied according to etiology, with diversion procedures preferred in infective perforations and resection with primary anastomosis more feasible in traumatic cases with healthier bowel margins. Postoperative morbidity, especially wound-related complications, remained significant, highlighting the importance of early diagnosis, appropriate surgical strategy, and meticulous postoperative care for improved outcomes.

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