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Original Article

A Retrospective Observational Study of Clinical Profile, Operative Management, and Outcomes of Ileal Perforation in a Tertiary Care Center

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ABSTRACT

Background: Ileal perforation is a common surgical emergency in tropical countries and remains associated with high morbidity and mortality due to delayed presentation, sepsis, and fecal contamination. The optimal operative strategy remains controversial, with primary repair, ileostomy, and resection-anastomosis all being accepted procedures depending on intraoperative findings and patient condition.
Aim: To evaluate the clinical presentation, etiological spectrum, surgical management, and postoperative outcomes of patients operated for ileal perforation in a tertiary care center.
Materials and Methods: This retrospective observational study included 20 patients with intraoperatively confirmed ileal perforation managed in the Department of General Surgery at a tertiary care hospital. Demographic profile, etiology, intraoperative findings, type of surgery performed, postoperative complications, ICU stay, mortality, and hospital stay were analyzed using descriptive statistics.
Results: The mean age of patients was 38.4 years, with a male predominance (70%). The most common etiology was nonspecific perforation (45%), followed by typhoid perforation (25%).
The procedures performed included:

- Primary repair: 45%
- Ileostomy: 25%
- Resection and anastomosis: 30%

Postoperative recovery was uneventful in 60% of patients. Common complications included surgical site infection (10%), prolonged ileus (5%), and re-exploration (5%). ICU care was required in 20%, and the overall mortality was 15%.
Conclusion: Primary repair is effective in selected patients with small solitary perforations and healthy bowel margins. Ileostomy remains the preferred option in delayed presentation, gross contamination, and septic patients, while resection-anastomosis is best suited for multiple perforations or segmental bowel pathology. Timely resuscitation and individualized operative planning remain the key determinants of outcome.

Keywords*: Ileal perforation; Typhoid perforation; Primary repair; Loop ileostomy; Resection anastomosis; Peritonitis; Emergency laparotomy.*

INTRODUCTION

Ileal perforation is a common and life-threatening cause of secondary peritonitis in the Indian subcontinent and other tropical developing countries. It continues to be associated with significant morbidity and mortality because of delayed presentation, fecal contamination, sepsis, malnutrition, and associated systemic illness [1]. The common etiologies include typhoid fever, tuberculosis, nonspecific inflammation, trauma, ischemia, and Meckel′s diverticular pathology [2]. In endemic regions, typhoid perforation remains one of the most frequent causes, usually involving the terminal ileum during the second or third week of enteric fever [3].

Despite advances in critical care, antibiotics, and surgical techniques, ileal perforation still poses a major challenge because the optimal operative procedure remains controversial. The commonly employed procedures include primary repair, loop ileostomy, and segmental resection with primary anastomosis [4]. The choice of surgery depends on several factors, including:

- number and size of perforations
- degree of peritoneal contamination
- bowel viability
- duration of perforation
- patient hemodynamic status
- underlying etiology [5].

Primary repair is often preferred in small solitary perforations with healthy bowel margins, whereas ileostomy is favored in delayed presentation, gross contamination, unhealthy bowel, and septic patients. Segmental resection and anastomosis is generally reserved for multiple perforations, ischemic bowel, strictures, or diseased bowel segments [6].

The present study was undertaken to analyze the clinical profile, etiological spectrum, operative management, and postoperative outcomes of ileal perforation, and to evaluate the factors influencing the choice of surgical procedure in a tertiary care center.

MATERIALS AND METHODS

Study design

This was a retrospective observational study conducted in the Department of General Surgery at [SCL hospital, Saraspur], [Ahmedabad], India, including patients operated for ileal perforation over a study period of [insert duration, e.g., January 2025 to january 2026].

Study population

A total of 20 patients diagnosed intraoperatively with ileal perforation were included in the study.

Inclusion criteria

- Patients aged >12 years
- All patients with intraoperatively confirmed ileal perforation
- Both traumatic and non-traumatic etiologies
- Patients undergoing emergency laparotomy

Exclusion criteria

- Gastric, duodenal, jejunal, colonic, or appendicular perforation
- Perforation due to cancer
- Patients managed conservatively
- Incomplete clinical records

Preoperative evaluation

All patients were admitted through the emergency department and evaluated clinically with:

- abdominal pain
- distension
- vomiting
- fever
- guarding/rigidity
- signs of peritonitis
- septic shock where present

Routine investigations included:

- complete blood count
- renal function tests

- serum electrolytes
- liver function tests
- blood sugar
- Widal / Typhoid IgM where indicated
- chest and erect abdominal radiograph
- ultrasonography abdomen
- contrast-enhanced CT abdomen in selected stable patients

All patients underwent aggressive resuscitation with intravenous fluids, nasogastric decompression, urinary catheterisation, and broad-spectrum intravenous antibiotics before surgery [7].

Operative procedure
After adequate resuscitation, all patients underwent emergency exploratory laparotomy through a midline incision under general anesthesia.

The following intraoperative findings were noted:
- site of perforation
- size and number of perforations
- distance from ileocecal junction
- bowel viability
- presence of strictures or diverticulum
- mesenteric hematoma
- peritoneal contamination
- associated bowel necrosis

Based on intraoperative findings and hemodynamic status, one of the following procedures was performed:
1. Primary repair / closure
2. Loop or end ileostomy
3. Segmental ileal resection with primary anastomosis
4. Resection with ileoascending anastomosis
5. Double-barrel ileostomy where indicated

Peritoneal lavage with warm normal saline was performed in all cases, and abdominal drains were placed selectively.

Postoperative follow-up
Patients were monitored for:
- surgical site infection
- prolonged ileus
- burst abdomen
- fecal fistula
- pulmonary complications
- need for ICU care
- mortality
- duration of hospital stay

Patients with tubercular pathology were started on anti-tubercular therapy after histopathological confirmation.

Data collection and statistical analysis
Data were retrieved from hospital records, operative notes, discharge summaries, and follow-up files.

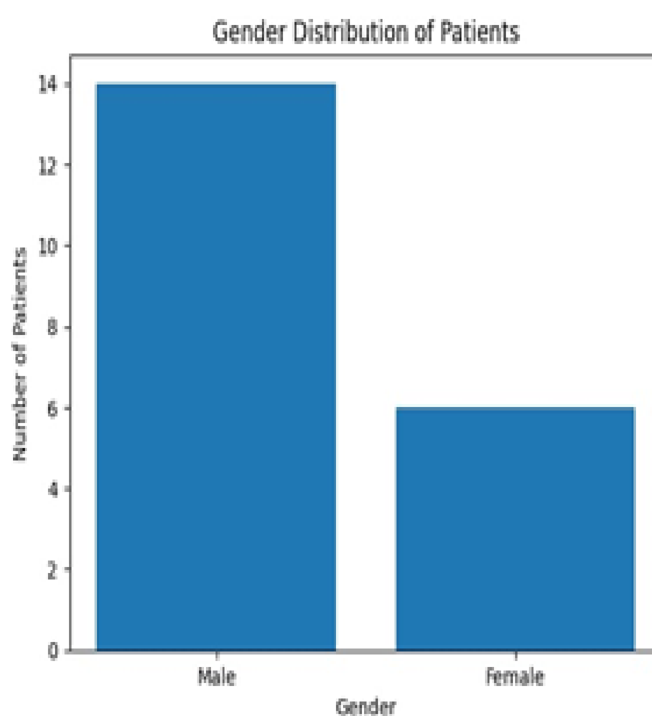
The variables analyzed included:
- age
- sex
- etiology
- presentation
- intraoperative findings
- surgical procedure
- postoperative complications
- ICU stay
- mortality
- duration of hospitalization

Data were entered in Microsoft Excel and analyzed using descriptive statistics. Continuous variables were expressed as mean ±standard deviation, while categorical variables were presented as frequency and percentage.

OBSERVATION

Table 1: Demographic profile

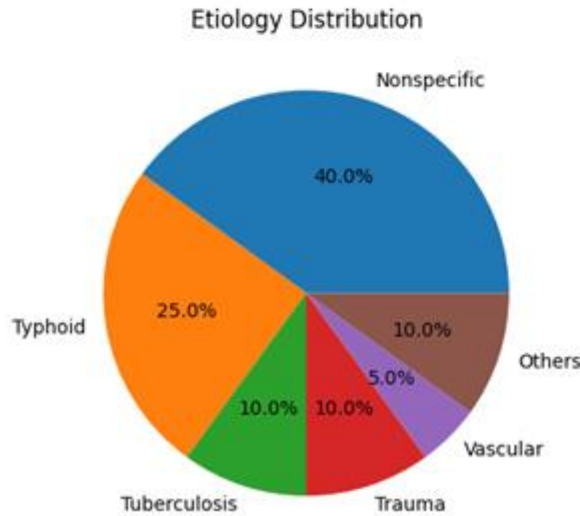
Variable	Observation
Total patients	20
Mean age	38.4 years
Age range	14-63 years
Male	14 (70%)
Female	6 (30%)



The most common etiology was nonspecific ileal perforation (45%), followed by typhoid perforation (25%), while tubercular, traumatic, vascular, and Meckel's diverticular causes formed the remainder.

Table 2: Etiological distribution

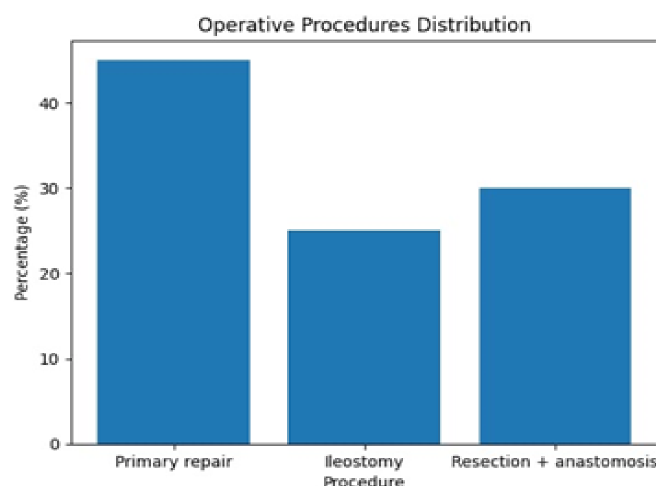
Etiology	Number	Percentage
Nonspecific	9	45%
Typhoid	5	25%
Tuberculosis	2	10%
Traumatic	2	10%
SMA thrombosis	1	5%
Meckel's diverticulum	1	5%



The etiological distribution shows that nonspecific causes are the most common, accounting for 45% of cases, indicating that nearly half of the patients did not have a clearly identifiable or specific underlying diagnosis. Among the defined causes, typhoid is the leading specific etiology (25%), suggesting it remains a significant contributor in this population. Tuberculosis and traumatic causes each represent 10%, highlighting their moderate but notable roles. Less common causes include SMA thrombosis and Meckel′s diverticulum, each contributing 5%, indicating they are relatively rare. Overall, the data suggest that while infectious causes—particularly typhoid and tuberculosis—are important contributors, a substantial proportion of cases remain nonspecific, emphasizing the need for improved diagnostic evaluation.

Table 3: Operative procedures

Procedure	Number	Percentage
Primary repair	9	45%
Ileostomy	5	25%
Resection + anastomosis	6	30%

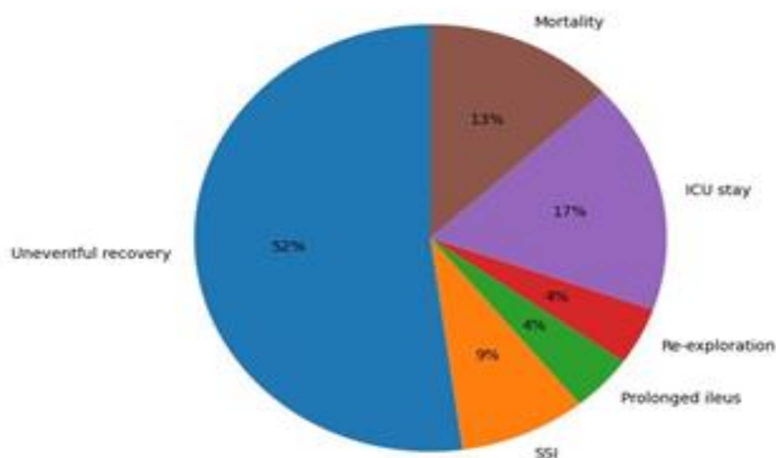


Primary repair was preferred in small solitary perforations with healthy bowel margins, while ileostomy was mainly performed in cases of large perforation, gross fecal contamination, delayed presentation, sepsis, or unhealthy bowel. Segmental resection and anastomosis was used for multiple perforations, strictures, necrosed bowel, vascular ischemia, and Meckel′s diverticular pathology.

The postoperative course was uneventful in 12 patients (60%). The common complications included surgical site infection in 2 cases (10%), prolonged ileus in 1 case (5%), and need for re-exploration in 1 case (5%). ICU care was required in 4 patients (20%). The overall mortality in this series was 15% (3 patients).

Table 4: Postoperative outcomes

Outcome	Number	Percentage
Uneventful recovery	12	60%
SSI	2	10%
Prolonged ileus	1	5%
Re-exploration	1	5%
ICU stay	4	20%
Mortality	3	15%

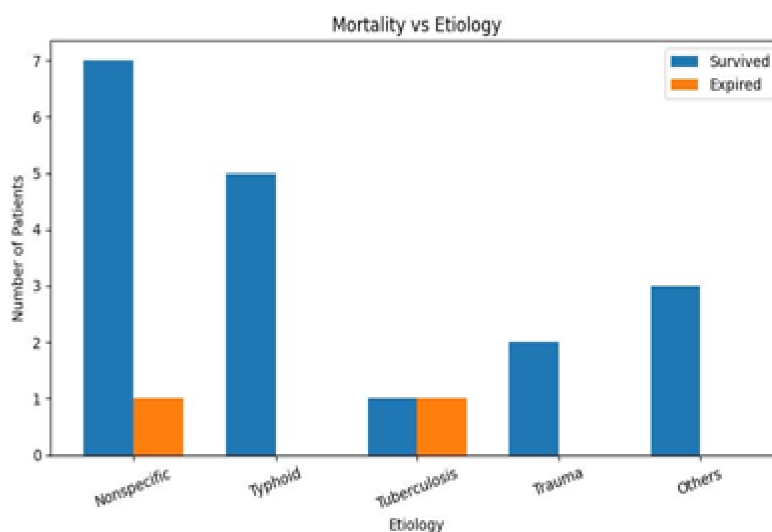


Interpretation

The patient results after surgery, showing that the majority experienced an uneventful recovery (60%), indicating generally favorable outcomes. However, a notable proportion developed complications: surgical site infection (SSI) occurred in 10% of patients, while smaller percentages experienced prolonged ileus (5%) and required re-exploration (5%). Additionally, 20% of patients needed ICU care, suggesting that a significant subset had more serious postoperative conditions. The mortality rate was 15%, which is relatively high and highlights the severity or risk associated with the procedures or patient population. Overall, while most patients recovered without issues, the presence of complications and a considerable mortality rate indicate the need for careful perioperative management and monitoring.

Table 5 : Mortality vs Etiology

Etiology	Survived	Expired	Total
Nonspecific	7	1	8
Typhoid	5	0	5
Tuberculosis	1	1	2
Trauma	2	0	2
Others	3	0	3



RESULTS

- p-value ≈ 0.18 (not significant)

Interpretation

The analysis of mortality versus etiology showed no statistically significant association between the underlying cause of ileal perforation and patient mortality (p = 0.18). Although deaths were observed in cases of nonspecific perforation (1 case) and tubercular perforation (1 case), no mortality occurred in typhoid, traumatic, or other etiological groups in this series. The absence of statistical significance suggests that etiology alone may not be an independent predictor of mortality in ileal perforation. Rather, the observed deaths were more likely related to severity of sepsis, delayed presentation, extent of peritoneal contamination, associated systemic complications, and poor physiological reserve at admission. Clinically, this finding indicates that the patient's condition at presentation and degree of intra-abdominal contamination may influence survival more strongly than the specific etiology itself, emphasizing the importance of early diagnosis, aggressive resuscitation, and timely surgical intervention.

Table 6 : ICU Requirement vs Delay in Presentation

Definition-Delayed presentation = >72 hours (Cases 4, 8, 11, 12)

Presentation	ICU Required	No ICU	Total
Early (<72 hr)	2	14	16
Delayed (>72 hr)	3	1	4

Chi-Square Test

- Chi-square (χ^2) ≈ 6.67
- df = 1
- p-value ≈ 0.009

Interpretation

The association between delay in presentation (>72 hours) and postoperative ICU requirement was found to be statistically significant in this study (χ^2 = 6.67, df = 1, p = 0.009). Among patients presenting early (<72 hours), only 2 out of 16 (12.5%) required ICU care, whereas in the delayed presentation group, 3 out of 4 patients (75%) required ICU admission. This demonstrates a markedly higher likelihood of postoperative critical care requirement in patients presenting late. Clinically, delayed presentation likely leads to progressive peritoneal contamination, worsening sepsis, dehydration, electrolyte imbalance, and hemodynamic instability, thereby increasing postoperative morbidity and need for intensive monitoring. These findings highlight the importance of early diagnosis, prompt referral, and timely surgical intervention in reducing severe postoperative outcomes in ileal perforation patients.

DISCUSSION

Ileal perforation continues to be a major surgical emergency in developing countries, associated with significant morbidity and mortality. The demographic and clinical profile observed in the present study is consistent with previously published literature.

The majority of patients in our study were young males, which correlates with studies from endemic regions. Similar male predominance has been reported by Agrawal et al. and Mishra et al., reflecting increased exposure to contaminated food and environmental risk factors (8,9).

Typhoid fever was the most common etiology in our series, which is in agreement with multiple studies from India and other developing countries. Typhoid ileal perforation results from necrosis of Peyer′s patches in the terminal ileum and remains the leading cause in endemic regions (10,11). In contrast, Western literature reports trauma and inflammatory bowel disease as more frequent causes, highlighting geographic variation.

Delay in presentation was a major determinant of outcome in our study. Patients presenting after 24 hours had significantly higher complication rates and mortality. This observation is supported by Sitaram et al., who demonstrated that increased perforation-to-surgery interval is associated with worse outcomes (12). Similarly, Adesunkanmi et al. identified delayed presentation and sepsis as key predictors of mortality (13,14).

Postoperative complications in our study were comparable to reported literature, with surgical site infection being the most common. Reported SSI rates in ileal perforation surgeries range widely due to contamination and poor nutritional status of patients (15). Other complications such as wound dehiscence and intra-abdominal abscess have also been consistently reported.

Mortality in our study was strongly associated with septic shock, delayed presentation, and need for ICU admission. Akinwale et al. demonstrated that patients requiring intensive care have significantly higher mortality due to sepsis and multiorgan dysfunction (16). Similarly, Chalya et al. emphasized that delayed intervention and systemic complications are major contributors to mortality in resource-limited settings (17).

Regarding surgical management, primary repair with or without diversion was the most commonly performed procedure. Literature suggests that the choice of procedure should be individualized based on intraoperative findings, number of perforations, degree of contamination, and patient condition (13,18).

Despite improvements in surgical techniques and perioperative care, the burden of ileal perforation remains high in developing countries. Preventive strategies such as improved sanitation, early diagnosis, prompt antibiotic therapy, and vaccination against typhoid are essential to reduce incidence and improve outcomes.

CONCLUSION

Ileal perforation remains a life-threatening surgical emergency with significant morbidity and mortality.
Primary repair is safe and effective in small solitary perforations with healthy bowel and minimal contamination.
Ileostomy is more appropriate in delayed presentation, gross fecal contamination, unhealthy bowel, and septic patients.
Resection with anastomosis is best suited for multiple perforations, strictures, ischemic bowel, and segmental pathology.

The final surgical decision should be guided by:

- patient physiology
- degree of contamination
- bowel viability
- number of perforations
- etiology
- timing of presentation

Early diagnosis, prompt resuscitation, and appropriate operative selection remain the most important determinants of survival.

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