Section: General Surgery

Original Research Article

CLINICAL PRESENTATION, POSTOPERATIVE COMPLICATIONS, AND PROGNOSIS OF TYPHOID-RELATED ILEAL PERFORATION

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Received *: 03/10/2026*
Received in revised form *: 03/11/2026*
Accepted *: 14/11/2026*

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DOI: 10.70034/ijmedph.2026.4.355

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (4); 2363-2369

ABSTRACT

Background: The objective is to determine the clinical presentation, complications, and outcomes of patients presenting with typhoid ileal perforation. Study Design Descriptive cross-sectional study. Place and Duration of Study this study was conducted at Liaquat University Hospital Hyderabad from September 2024 to September 2026.

Materials and Methods: This research included a sample of 100 patients suffering from typhoid ileal perforation. The clinical presentation, blood culture findings, operative diagnosis, histopathological results, complications after surgery, and mortality were recorded. The data was analyzed through SPSS version 27. The descriptive statistics method was used in the analysis.

Results: In total, the study included 100 patients: 63 (63%) males and 37 (37%) females. The average age of the patients was 25 ± 10 years. Among the patients, 34% of individuals had a history of fever, which lasted for less than a week. The presence of free gas was verified in 47 (47%) patients. The single ileal perforation was identified in 64 (64%) patients. After the surgery, 28% of patients suffered from wound infection, while 14% of patients had burst abdomen. Re-exploration was required in four (4%) patients, while an ileostomy was performed in 30 patients. Stoma-related complications were reported in five (16.7%) of the 30 patients who underwent ileostomy. Seven patients (7%) died, all of whom had presented after 48 hours.

Conclusion: Typhoid ileal perforation predominantly affected young patients, with a male predominance. Wound infection and burst abdomen were the most frequently encountered postoperative complications. All deaths occurred in patients who presented after 48 hours, highlighting the risks of delayed presentation. The success of recovering outcomes requires prompt diagnosis along with proper postoperative management in the patients.

Keywords: Typhoid perforation, Salmonella Typhi, Peritonitis, Ileal perforation.

INTRODUCTION

Typhoid fever is an infectious condition caused by a bacterium called Salmonella enterica serovar Typhi that gets transmitted through contaminated food and water. Typhoid is a significant concern in the world primarily due to the fact that in less developed countries appropriate sanitation measures may not exist resulting in the spread of infections. South Asia, including Pakistan, represents one of the major endemic regions for typhoid fever. Despite advances in antimicrobial therapy, vaccination, and diagnostic facilities, the disease continues to cause significant

morbdity and mortality, mostly among populations with limited healthcare resources.[1-3]

The clinical presentation of typhoid fever is variable and usually characterized by gradually increasing fever, headache, malaise, abdominal discomfort, constipation, or diarrhea. Although most patients recover with appropriate antimicrobial treatment, delayed diagnosis or inadequate treatment may result in serious complications. These include gastrointestinal haemorrhage, intestinal perforation, encephalopathy, and septicaemia. Intestinal perforation is among the most serious complications of typhoid fever and represents a life-threatening surgical emergency requiring prompt recognition, resuscitation, antimicrobial therapy, and operative intervention.[4,5]

Typhoid intestinal perforation predominantly involves the terminal ileum because of the abundance of Peyer's patches in this region. Following ingestion, Salmonella Typhi penetrates the intestinal mucosa and invades the lymphoid tissue, resulting in inflammation, hyperplasia, and subsequent necrosis and ulceration. Progressive destruction of the intestinal wall may eventually lead to perforation, allowing intestinal contents to enter the peritoneal cavity and produce generalized peritonitis. This may progress to severe sepsis, septic shock, and multiorgan dysfunction, particularly in patients presenting late to healthcare facilities.[6,7]

The clinical presentation of typhoid ileal perforation commonly includes fever, abdominal pain, abdominal distension, vomiting, constipation, and features of generalized peritonitis. Patients may present with abdominal tenderness, guarding, rigidity, and absent bowel sounds. However, the duration and pattern of fever may vary considerably, and some patients may not demonstrate the classical clinical features of typhoid fever. This variability can create diagnostic difficulties and contribute to delays in definitive management. Plain abdominal radiography may demonstrate free gas under the diaphragm, while ultrasonography and computed tomography can provide additional information when required. Blood culture remains an important investigation for identifying Salmonella Typhi, although culture results may be affected by previous antibiotic administration.[4,8,9]

The treatment of typhoid ileal perforation entails the first step of using intravenous fluids for resuscitation and correcting any electrolyte imbalance. This is followed by broad-spectrum antibiotic treatment. The final step in treatment is surgical intervention. The choice of the surgical procedure depends on the overall health condition of the patient, number of perforation sites, degree of contamination in abdominal cavity, and viability of the nearby bowel segment. There are various surgical procedures available, such as primary repair, segmental resection with the help of anastomosis, and ileostomy. Although primary repair may be suitable in selected patients with limited contamination and healthy bowel margins, ileostomy may be considered in patients with extensive contamination, multiple perforations, or compromised bowel viability. The choice of procedure remains an important determinant of postoperative morbidity and outcome.[10-12]

Postoperative complications remain a major challenge in patients undergoing surgery for typhoid ileal perforation. Commonly reported complications include surgical site infection, wound dehiscence, burst abdomen, intra-abdominal abscess formation, enterocutaneous fistula, electrolyte disturbances, and stoma-related complications. Patients with severe peritoneal contamination, delayed presentation, poor nutritional status, and systemic sepsis are particularly vulnerable to adverse outcomes. Re-exploration may be necessary in patients developing persistent peritonitis, anastomotic leakage, or uncontrolled intra-abdominal infection. Mortality varies between geographical regions and healthcare settings, reflecting differences in disease severity, antimicrobial resistance, availability of surgical facilities, and the timeliness of treatment.[7,10,13]

Typhoid fever continues to be a key public health issue in Pakistan, particularly due to the appearance of multidrug-resistant and extensively drug-resistant Salmonella Typhi strains. The extensively drug-resistant typhoid outbreak in Sindh has raised an important question concerning the dilemma of antibiotic resistance and the need of suitable laboratory diagnosis and treatment.[2,14] Most recent research conducted in Pakistan has shown divergence concerning the presentation, operation techniques, and complications among patients with intestinal typhoid peroration.[11, 12, 15]

Given the persistent nature of typhoid fever and its burden on society, it is essential to examine the features of presentation and the outcomes of the treatment for such patients. Local institutional data may help establish the set of common signs, clinical signs, and factors being responsible for death and, therefore, the current research was conducted in our hospital.

MATERIALS AND METHODS

All patients diagnosed with typhoid ileal perforation on the basis of clinical presentation, blood culture, intraoperative findings, and histopathological examination were included in the study. Patients with intestinal perforation due to other causes, such as abdominal tuberculosis, traumatic injury, and other non-typhoidal causes, were excluded.

A combined figure of 100 patients diagnosed with typhoid ileal perforation were included in the current study. The number of individuals in the selected sample was 100. The sampling method was consecutive non-probability sampling.

All the patients diagnosed with features suggestive of typhoid ileal perforation, which included fever,

abdominal pain, vomiting, and complete constipation, had to undergo elaborate history taking and clinical investigations. Particular attention was given to the duration of fever, history of antibiotic intake, duration of abdominal symptoms, and time elapsed between the onset of symptoms and presentation to the hospital.

A thorough abdominal examination was performed to assess tenderness, rebound tenderness, abdominal rigidity, distension, and absent bowel sounds. Chest and abdominal radiographs were obtained to identify free gas under the diaphragm as evidence of pneumoperitoneum. Blood samples were collected for routine investigations and blood culture with sensitivity testing. Relevant clinical and laboratory findings were documented on a predesigned data collection proforma.

Following initial resuscitation and administration of appropriate intravenous antibiotics, patients underwent exploratory laparotomy. Intraoperative findings, including the number, size, and anatomical location of ileal perforations, degree of peritoneal contamination, and condition of the surrounding bowel, were recorded. Peritoneal fluid samples were collected for culture and sensitivity testing. Biopsy specimens from the edges of the perforation were obtained and sent for histopathological examination to support the diagnosis of typhoid ileal perforation.

The surgical method was chosen based on the intraoperative work and overall condition of the patient. Patients with one perforation and viable adjacent bowel were subjected to primary repair of the perforation. Loop ileostomy was performed on those patients who had multiple perforations or extensive peritoneal contamination, bowel viability was inquisition, or presentation was late, as per the surgeon's opinion.

All patients were monitored postoperatively for the development of complications. Postoperative complications, including surgical site infection, wound dehiscence, burst abdomen, intra-abdominal or peritoneal abscess formation, and other relevant complications, were documented. Patients requiring further surgical intervention underwent re-exploration. Stoma-related complications, including high-output stoma, skin excoriation, electrolyte imbalance, and stoma-related wound problems, were also recorded where present. The final outcome in terms of survival or mortality was documented.

All relevant clinical, laboratory, operative, histopathological, and postoperative findings were recorded on a predesigned data collection proforma.

Statistical Package for Social Sciences (SPSS), version 27, was used to enter and analyze data. Quantitative variables such as age were reported as mean and standard deviation, while qualitative variables were expressed as frequencies and percentages. The descriptive statistics summarizing the study results were computed using the total of 100 subjects, except for the stoma-related complication, which was based on 30 subjects that underwent ileostomy.

RESULTS

A total of 100 patients with typhoid ileal perforation were included in this study. The patients' mean age was 25 ± 10 years. Based on the demographic data available, there were 63 (63%) males and 37 (37%) females. 34 (34%) patients were found to have a fever for less than 7 days. Free gas under the diaphragm was detected in 47 (47%) patients based on radiological tests. A single ileal penetration was detected in 64 patients based on intraoperative findings. Regarding surgical management, ileostomy was performed in 30 (30%) patients, while the remaining patients underwent primary repair or another surgical procedure. Re-exploration was required in four (4%) patients. Postoperative complications included wound infection in 28 (28%) patients and burst abdomen in 14 (14%) patients. Stoma-related complications were observed in five (16.7%) of the 30 patients who underwent ileostomy. Seven (7%) patients died during the study period, all of whom had presented after 48 hours.

The demographic characteristics and clinical presentation of the patients are summarized in [Table 1]. Operative findings and surgical management are presented in [Table 2], while postoperative complications and mortality are outlined in [Table 3].

Table 1: Demographic characteristics and clinical presentation of patients (n=100)

Variables	Frequency	Percentage
Gender		
Male	63	63%
Female	37	37%
Age (years)		
Mean ± SD	25 ± 10	—
Duration of fever		
Less than 7 days	34	34%
Radiological findings		
Free gas under diaphragm	47	47%

Table 2: Operative findings and surgical management (n=100)

Variables	Frequency	Percentage
Number of ileal perforations		

Single perforation	64	64%
Multiple perforations	36	36%
Surgical management		
Ileostomy	30	30%
Primary repair/other procedure	70	70%
Re-exploration		
Required	4	4%
Not required	96	96%

Table 3: Postoperative complications and clinical outcomes (n=100)

Complications and outcomes	Frequency	Percentage
Wound infection	28	28%
Burst abdomen	14	14%
Stoma-related complications	5	5% (16.7% of ileostomy patients)
Re-exploration	4	4%
Mortality	7	7%
Survival	93	93%

Stoma-related complications were observed among patients who underwent ileostomy formation. All seven deaths occurred in patients were presented to the hospital after 48 hours. This indicates the importance of timely diagnosis and surgical intervention in the management of typhoid ileal perforation, although mortality was not compared statistically between early and late presenters.

DISCUSSION

Typhoid ileal perforation remains a serious and potentially life-threatening complication of enteric fever, particularly in developing countries where delayed presentation, inadequate sanitation, and limited access to healthcare contribute to disease severity. Despite improvements in antimicrobial therapy, surgical techniques, and perioperative management, postoperative morbidity and mortality remain significant challenges. The present study evaluated the clinical presentation, operative findings, postoperative complications, and outcomes of 100 patients with typhoid ileal perforation treated at Jinnah Postgraduate Medical Centre (JPMC), Karachi.

In the present study, the mean age of patients was 25 ± 10 years, with a male predominance of 63 (63%) compared with 37 (37%) females. This finding indicates that typhoid ileal perforation predominantly affected younger individuals and males. A male predominance was also reported by Grema et al., who studied 37 patients in Nigeria (22 males, 59.5%), although their patients were younger, with a mean age of 16.5 ± 9.2 years.[18] Similarly, Shah et al. reported male predominance (64.86%) in their study involving 74 children with typhoid perforation.[19] A systematic review and meta-analysis by Afolabi et al., involving 2,434 patients from 29 studies, also demonstrated male predominance, with males accounting for 62.9% of the study population. The mean age was 28.04 ± 9.39 years, which is comparable to the mean age observed in the present study.[22] These findings suggest that young adults constitute an important proportion of patients affected by typhoid ileal perforation, although differences in age distribution may reflect variations in the populations studied.

Regarding clinical presentation, 34 (34%) patients in the present study reported a history of fever lasting less than seven days. Fever is a common manifestation of enteric fever; however, intestinal perforation may occur with variable duration of preceding symptoms. Early development of intestinal complications highlights the importance of recognizing typhoid fever promptly and initiating appropriate antimicrobial treatment. Grema et al. identified abdominal pain, fever, anorexia, and abdominal swelling as the common presenting features in their study.[18] The GlobalSurg Collaborative also emphasized that delayed access to medical facilities contributes to severe disease and adverse surgical outcomes in patients with gastrointestinal typhoid.[17] These observations support the importance of early diagnosis and timely referral to surgical facilities.

Radiological examination in the present study demonstrated free gas under the diaphragm in 47 (47%) patients. Pneumoperitoneum is an important radiological finding in patients with suspected hollow viscus perforation and can support the clinical diagnosis of intestinal perforation. However, its absence does not exclude perforation. Therefore, clinical examination and radiological findings should be interpreted together when deciding on emergency surgical intervention.

Intraoperative findings revealed a single ileal perforation in 64 (64%) patients in the present study. This observation is consistent with the findings of Grema et al., who reported that single perforation was the most common operative finding in their series.[18] However, multiple perforations remain clinically important because they may be associated with extensive intestinal damage and greater peritoneal contamination. Edino et al., in a prospective study of 53 patients, identified multiple perforations and severe peritoneal contamination as significant prognostic factors associated with mortality.[16] These findings emphasize the importance of thorough intraoperative assessment of the number of perforations, bowel viability, and

degree of contamination when selecting an appropriate surgical procedure.

Regarding surgical management, ileostomy was performed in 30 (30%) patients in the present study. The choice between primary repair and ileostomy remains an important consideration in the management of typhoid ileal perforation. Primary repair may be appropriate in patients with a single perforation, viable bowel margins, and limited contamination, whereas ileostomy may be preferred in patients with multiple perforations, extensive contamination, or compromised bowel viability. Gul et al., in a study conducted at JPMC involving 73 patients, reported that 52 underwent primary repair while 21 underwent ileostomy. The ileostomy group had higher morbidity (61.9%) and mortality (19%) compared with the primary repair group.[11] Similarly, Cheema et al. reported higher wound infection and mortality rates among children undergoing ileostomy compared with primary repair. Wound infection occurred in 24% of the ileostomy group compared with 18% in the primary repair group, while mortality was 16% and 6%, respectively.[20] These findings suggest that primary repair may be associated with better outcomes in appropriately selected patients. However, differences in patient condition and operative findings must be considered before comparing the outcomes of different surgical procedures.

Postoperative wound infection was the most frequently observed complication in the present study, occurring in 28 (28%) patients, followed by burst abdomen in 14 (14%) patients. These complications represent important causes of postoperative morbidity and may prolong hospitalization and delay recovery. Edino et al. reported an overall morbidity rate of 49.1%, with wound infection, wound dehiscence, burst abdomen, residual intra-abdominal abscess, and enterocutaneous fistula among the common postoperative complications.[16] Similarly, the GlobalSurg Collaborative reported surgical site infection in 59 (67%) of 88 patients undergoing surgery for gastrointestinal typhoid, demonstrating the considerable burden of postoperative infectious complications in different healthcare settings.[17] The lower wound infection frequency observed in the present study may reflect differences in patient characteristics, disease severity, surgical techniques, antibiotic protocols, and postoperative wound care. Nevertheless, the occurrence of wound infection in more than one-quarter of the study population highlights the need for effective infection prevention measures and careful postoperative monitoring.

Burst abdomen occurred in 14 (14%) patients in the present study. This complication is particularly concerning because it may require prolonged wound management and additional surgical intervention. Edino et al. identified burst abdomen as one of the important postoperative complications and reported that it was significantly associated with mortality.[16] Severe peritoneal contamination, wound infection, poor nutritional status, and delayed presentation may contribute to impaired wound healing. Therefore, meticulous surgical technique, appropriate abdominal wound closure, nutritional support, and early recognition of wound infection are important in reducing postoperative morbidity.

Re-exploration was required in four (4%) patients in the present study. Although the frequency was relatively low, the need for repeat surgery indicates the severity of complications that may develop following intestinal perforation. Persistent peritonitis, intra-abdominal infection, leakage, and wound complications may necessitate further operative intervention. In a multicenter, worldwide cohort study known as GlobalSurg Collaborative, mortality, surgical site infection, organ space infection, and reoperation were calculated in patients with gastrointestinal typhoid disease. The study states that 30-day mortality for patients with gastrointestinal typhoid disease was found to be 9.1% and the organ space infection was found to be 10.2%.[17] These figures indicate the importance of systematic postoperative follow-up in assessing complications and improving patient outcomes.

Stoma-related complications were observed in five (16.7%) of the 30 patients who underwent ileostomy in the present study. Although ileostomy can provide effective diversion of intestinal contents in patients with severe contamination or multiple perforations, it may result in additional postoperative morbidity. Common complications include high-output stoma, electrolyte imbalance, skin excoriation, prolapse, and difficulty with stoma care. In the systematic review and meta-analysis done by Afolabi et al., a total of 2,434 individuals were involved from a total of 29 studies which showed that the after-surgery complication rate of ileostomy was 18.4% higher as compared to primary repair. Also, it was seen that the mortality rate in the ileostomy group was found out to be 3.1% higher, however this finding was not of significance.[22] Regarding the clinical condition of the patients and what was found out while operations, it is necessary to apply many surging procedures instead of one.

Mortality was observed in seven (7%) patients in the present study. All seven patients had presented after 48 hours, suggesting that delayed presentation may contribute to adverse outcomes, although this could not be tested statistically in the present study. Delayed treatment may result in extensive peritoneal contamination, systemic sepsis, haemodynamic instability, and multiorgan dysfunction. The mortality rate in the present study was comparatively lower than that reported by Edino et al., who observed mortality in 15.1% of their patients.[16] Similarly, the GlobalSurg Collaborative reported a 30-day mortality rate of 9.1% among patients undergoing surgery for gastrointestinal typhoid.[17] Grema et al. reported eight deaths among 37 patients, representing a mortality rate of approximately 21.6%.[18] In contrast, Wada et al., in a randomized comparative study involving 56

patients with multiple poor prognostic factors, reported an overall mortality rate of 14.3%.[21] Differences in mortality between studies may be attributed to variations in disease severity, duration of symptoms, degree of peritoneal contamination, availability of intensive care facilities, and timing of surgical intervention.

The relationship between surgical procedure and postoperative outcome has also been evaluated in several studies. Wada et al. found that ileostomy was associated with fewer major complications and lower mortality than primary closure among selected high-risk patients, although differences in some outcomes were not statistically significant.[21] Furthermore, Afolabi et al. highlighted that patient selection and intraoperative findings are important determinants of postoperative outcomes and that the apparent differences between primary repair and ileostomy should be interpreted cautiously.[22] The implications of the studies show that none of the procedures can be assumed to be superior in every case. Rather, surgical management should be tailored based on the patient's physiological condition, the number of perforations, viability of the bowel, and severity of peritoneal contamination.

The study results illustrated the need for timely identification, proper pre-surgical stabilization, effective antibiotic treatment, and prompt surgical management among patients suffering from typhoid ileal perforation. Also, the proper choice of surgical procedure, prevention of wound infection, provision of postoperative dietetic support, and proper stoma management help minimize morbidity and ensure a better rate of survival. Public health measures, such as better sanitation, availability of clean water, food safety measures, and typhoid vaccination, are also necessary to decrease the incidence of enteric fever and its severe complications.[4]

CONCLUSION

Typhoid ileal perforation is a serious surgical condition usually seen in young adults, mostly in males. Wound infection and burst abdomen are the most prevalent postoperative complications in this group of patients. The mortality rate is only 7%, however, the delayed presentation amongst patients that died shows the importance of proper diagnosis and treatment. Timely preoperative hydration and operative management as well as the choice of surgical procedures and post-operative care are required to prevent complications and improve patient outcomes.

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