



## Original Article

## Postoperative Outcomes and Surgical Complications in Typhoid Ileal Perforation

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## ABSTRACT

Surgical repair for typhoid ileal perforation is essential to prevent peritonitis and sepsis. Postoperative outcomes, which include survival rates and recovery times, underscore the importance of comprehending surgical complications to refine treatment strategies and enhance patient survival. **Objective:** To determine postoperative outcomes and surgical complications in typhoid ileal perforation. **Methods:** The prospective cohort was conducted at General Surgery Department of Liaquat University Hospital in Hyderabad & Jamshoro. 228 Patients of age 18 years or more and of any gender, who were operated for having single typhoid ileal perforation, were included in the study. While patients with multiple perforations, TB peritonitis or having traumatic perforations, were excluded from the study. **Results:** The most common age group was found to be 18-30 years (40.4%), followed by 31-40 years (28.1%), 41-50 years (19.3%), 51-60 years (7.9%), and >60 years (4.4%). Males comprised 57.9% of the population, while females made up 42.1%. The mean length of hospitalization was found to be 14 ± 5 days. The majority of patients experienced good outcomes, accounting for 158 individuals (69.3%), while 70 patients (30.7%) had adverse outcomes. Among the adverse outcomes, there was a mortality rate of 7.2% (16 patients) and 54 patients (23.7%) experienced complications, some experienced more than one complication. **Conclusions:** The study concluded that though the majority of patients recover well, a significant proportion (7.2%) still faced adverse postoperative outcomes in terms of mortality. 54 patients (23.7%) experienced complications, some experienced more than one complication.

## INTRODUCTION

Typhoid Ileal Perforation (TIP) is a significant complication of typhoid fever, especially in developing countries. It requires urgent surgical intervention and is a daunting task for surgeons, especially in resource limited region [1]. The high morbidity and mortality related to TIP have been mostly related to postoperative complications, persistent peritonitis and septicemia [2, 3]. Historically, typhoid fever caused by *Salmonella enterica serovar typhi* has been a major global public health problem, with 11 to 21 million cases and 128,000 to 161,000 deaths reported annually [1-3]. The frequency of TIP hospitalizations shows wide variation from place to place, reflecting differences in healthcare. Typhoid fever is highly endemic in South Asia with an annual incidence rate of about 493 cases per 100,000 people in Pakistan, for example [6, 7]. Surgical

treatment for TIP includes the following procedures, such as; primary repair, resection with anastomosis and stoma formation. The decision for surgical approach depends upon both the general status of the patient, the size of the perforation and any other concomitant morbidity e.g. peritonitis. For early presenting patients with minimal contamination, primary repair with suturing of the perforation is the general method of choice [8]. In more severe cases of typhoid ileal perforation involving large perforations, extensive fecal contamination and delayed presentation, surgical management may necessitate resection with anastomosis or stoma formation. The prone position is optimal for these procedures due to its unique advantages and risks, which are anticipated to impact recovery and the incidence of complications significantly

[9]. Postoperative outcomes in TIP patients are majorly determined based on type of surgery done as well as its corresponding complications. The research suggests that primary repair has significantly less postoperative complications and reduced hospital stay compared with resection with anastomosis or creation of an stoma [10]. However, there is a risk of perforation recurrence and postoperative peritonitis [10]. Closure of perforations and outlet resections are employed for abscess drainage and wound patching, albeit with higher complication rates. Stoma creation with anastomosis is preferred for severe perforations, but both options are associated with increased complication rates and prolonged hospitalization. Therefore, the surgical approach's biomechanical invasiveness plays a crucial role in long-term functional recovery and pain management following TIP treatment [11]. Complications that can occur post TIP differ and contain wound infections, intra-abdominal abscesses, enterocutaneous fistulas and respiratory problems. The most common complication are wound infection and intra-abdominal abscess developing ones can derail recovery [12, 13]. Even with advances in surgical techniques, TIP still causes significant illness and death, especially in developing countries, due to the high rate of postoperative complications.

This study was aimed to determine postoperative outcomes and surgical complications in typhoid ileal perforation to improve patient management and outcomes.

## METHODS

The prospective cohort was conducted at General Surgery Department of Liaquat University Hospital in Hyderabad & Jamshoro. Patients of age 18 years or more and of any gender, who were operated for having single typhoid ileal perforation, were included in the study, via consecutive sampling technique, from January 2022 to December 2022. While patients with multiple perforations, TB peritonitis or having traumatic perforations, were excluded from the study. All the patients were briefed about the research process and informed written consent was taken prior to enrollment in the study. Openepi sample size calculator was used to calculate sample size of 228 patients by taking prevalence of thyroid related perforations as 30% and a margin of error of 5% and a confidence level of 90% [14]. The study was approved by Institutional ERC vide letter no. LUMHS/REC/-84, dated; 03/05/2021. Postoperative outcomes were measured in terms of length of hospitalization, mortality and post-surgical complications. Patients with no post-surgical complications and successful recover were labelled as having good outcome. While patients encountering mortality, wound infections, wound insufficiency, pneumonia, intestinal obstruction, abdominal wound

dehiscence, enterocutaneous fistula, incisional hernia, and empyema of the pleural cavity were labelled as having adverse outcomes. Daily follow up were done as part of hospital protocol during the course of hospitalization while weekly follow up was done after discharge. Postoperative outcomes were assessed till 30th day. Wound insufficiency was defined as the failure of a surgical wound to heal properly, often marked by delayed or incomplete closure, leading to persistent drainage, infection, or wound edge breakdown while abdominal wound dehiscence was defined as partial or complete separation of the layers of a surgical wound, typically along the suture or staple line, after closure. The primary surgical interventions involved primary closure, resection with anastomosis, and stoma formation. Primary closure involves directly suturing the perforation site, often suitable for smaller perforations with minimal contamination. Resection with anastomosis entails removing the affected segment of the ileum and reconnecting the healthy ends of the intestine, which was preferred for larger perforations or cases with significant fecal contamination. Stoma formation, either temporary or permanent, was made to divert intestinal contents away from the site of the perforation to allow healing. The choice of technique depended on the size and location of the perforation, the presence of contamination, and the overall clinical condition of the patient. During all surgeries, the peritoneal cavity was thoroughly irrigated with a large volume of normal saline solution. Peritoneal drainage was utilized in 218 cases. All abdominal wall incisions, including those on the skin, were sutured closed. Postoperatively, all patients were managed as per hospital protocols. Data analysis was performed using SPSS version 24.0.

## RESULTS

The most common age group was found to be 18-30 years (40.4%), followed by 31-40 years (28.1%), 41-50 years (19.3%), 51-60 years (7.9%), and >60 years (4.4%). Males comprised 57.9% of the population, while females made up 42.1%. The BMI distribution showed that 62.3% had a normal BMI (18.5-24.9 kg/m<sup>2</sup>), 14.9% were underweight (<18.5), 16.7% were overweight (25-29.9), and 6.1% were obese (≥30) (Table 1).

**Table 1:** Descriptive Statistics

Variables	Statistics N (%)
<b>Age Distribution (Years)</b>	
18-30	92 (40.4%)
31-40	64 (28.1%)
41-50	44 (19.3%)
51-60	18 (7.9%)
>60	10 (4.4%)
<b>Gender</b>	
Male	132 (57.9%)
Female	96 (42.1%)

BMI (Kg/m <sup>2</sup> )	
<18.5	34 (14.9%)
18.5-24.9	142 (62.3%)
25-29.9	38 (16.7%)
≥30	14 (6.1%)

The mean length of hospitalization was found to be 14 ± 5 days. The majority of patients experienced good outcomes, accounting for 158 individuals (69.3%), while 70 patients (30.7%) had adverse outcomes. Among the adverse outcomes, there was a mortality rate of 7.2% (16 patients), and 54 patients (23.7%) experienced complications (Table 2).

**Table 2:** Postoperative Parameters and Adverse Outcomes in Typhoid Ileal Perforation

Variables	Frequency (%) / Mean ± SD
Mean Length of Hospitalization (days)	14 ± 5
Good Outcomes	158 (69.3%)
Adverse Outcomes	70 (30.7%)
Adverse Outcomes	
Mortality	16 (7.2%)
Patients with Complications	54 (23.7%)

In total, 54 patients (23.7%) experienced complications, some experienced more than one complication. The most common complication was wound infection, occurring in 24 patients (10.5%), followed by pneumonia in 18 patients (7.9%) and wound insufficiency in 14 patients (6.1%). Other complications included incisional hernia in 12 patients (5.3%), intestinal obstruction in 10 patients (4.4%), and abdominal wound dehiscence in 8 patients (3.5%). Less frequent complications were enterocutaneous fistula in 6 patients (2.6%) and empyema of the pleural cavity in 4 patients (1.8%) (Table 3).

**Table 3:** Postsurgical Complications In Typhoid Ileal Perforation

Complications	Frequency (%)
Wound Infection	24 (10.5%)
Wound Insufficiency	14 (6.1%)
Pneumonia	18 (7.9%)
Intestinal Obstruction	10 (4.4%)
Abdominal Wound Dehiscence	8 (3.5%)
Enterocutaneous Fistula	6 (2.6%)
Incisional Hernia	12 (5.3%)
Empyema of the Pleural Cavity	4 (1.8%)
Total Patients with Complications	54 (23.7%)

## DISCUSSION

Mortality rates associated with typhoid perforation remain significantly high, ranging from 20% to over 50% with surgical intervention and exceeding 40% with conservative management [1, 14, 15]. Contributing factors to these elevated mortality rates include persistent postoperative peritonitis, septicemia, and anemia along with early mechanical intestinal obstruction, and enterocutaneous

fistulae exacerbate patient outcomes and pose challenges for surgical management, further elevating mortality risks. Preoperatively, these patients often present in a debilitated, dehydrated, and anemic state [16]. In our study, the most prevalent postoperative complication was wound infection, observed in 10.5% of patients, corroborating previous findings that identify wound infection as a common postoperative issue [17]. Other significant complications included pneumonia (7.9%), wound insufficiency (6.1%), and incisional hernia (5.3%). Although suture failure is linked to high mortality rates, it was less common in our population [14]. These findings may reflect advancements in surgical techniques and patient management protocols. Our study's overall morbidity rate was 23.7%, which, though still substantial, is considerably lower than the previously reported rates exceeding 70% [18]. This reduction may be attributed to improved postoperative care, timely medical interventions, and a comprehensive antibiotic regimen. The mortality rate in our study was 7.2%, markedly lower than historical averages, indicating enhanced management of patients with typhoid ileal perforation [19]. In the early surgical intervention for Typhoid Ileal Perforation (TIP), it is crucial to select a procedure that allows rapid and easy access to the inner abdomen. This facilitates the identification and two-layer closure of all perforations, a technique employed in 99.1% of our patients [20]. Postoperative intestinal fistulae are significant contributors to morbidity and mortality among patients who survive the septicemic phase of typhoid perforation [21]. In this study, six patients developed postoperative enterocutaneous fistulae; all were managed conservatively and had an average hospital stay of 14 ± 5. Four of these fistulae closed spontaneously, while two cases resulted in fatalities. Each complication was addressed promptly and appropriately. Infected wounds were treated with suitable antibiotics following wound culture results. The majority of insufficient wounds (85%) were secondarily sutured once clean; the remainder healed by secondary intention. Patients who developed early postoperative mechanical intestinal obstruction had a second surgery (relaparotomy) and removal of adhesions right after the diagnosis was confirmed. Abdominal wound openings (dehiscences) that occurred within 5-7 days after the initial surgery were treated as emergencies. They were re-sutured immediately as per hospital protocol. The 4 (1.8%) patients with empyema were successfully treated with chest tube and passive drainage. Our study identified persistent postoperative peritonitis, septicemia, and anemia as primary contributors to mortality in TIP cases [16]. Despite a mortality rate of 7.2% in our series lower than previously reported ranges postoperative complications continue to extend hospital stays and increase patient suffering [1, 19]. The overall morbidity rate of 23.7% in our study underscores the need for ongoing refinement of surgical techniques and postoperative care

protocols to improve outcomes for TIP patients. The result from this series illustrate the challenges TIP presents to general surgeons. Prompt surgical intervention is essential, but the potential for multiple postoperative complications necessitates preparedness to manage these issues promptly to reduce morbidity and mortality.

## CONCLUSIONS

The study concluded that though the majority of patients recover well, a significant proportion (7.2%) still faced adverse postoperative outcomes in terms of mortality. 54 patients (23.7%) experienced complications, some experienced more than one complication. The most common complications were wound infection, followed by pneumonia and wound insufficiency.

## Authors Contribution

Conceptualization: IRK

Methodology: IRK, AR, KA, MBR, ZA

Formal analysis: IRK

Writing, review and editing: SNK, AR, KA, MBR, ZA

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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