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# Challenges And Outcomes In The Surgical Management Of Typhoid Ileal Perforation: Insights From A Prospective Study In A High-Burden Setting

<sup>1</sup>Dr. Kamal Kumar, <sup>2</sup>Dr. Manoj Kumar Gupta, <sup>3</sup>Dr. Komal Singh Meena, <sup>4</sup>Dr. Manish Khandelwal, <sup>5</sup>Dr. Radheyshyam Meena,

<sup>1,2,3,4,</sup>Assistant Professor, <sup>5</sup>Senior Professor, <sup>1,3,4,5</sup>Department of General Surgery, <sup>2</sup>Department of Surgery, Govt Medical College Kota

## \*Corresponding Author: Dr. Kamal Kumar

MS, Assistant Professor, Department of General Surgery, Govt Medical College Kota

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### Abstract

**Background:** Typhoid fever remains a significant health burden in developing countries, attributed to contaminated water and poor sanitation. Despite advancements, severe complications like ileal perforation demand surgical intervention, highlighting a challenge in global health. This study examines the multifaceted aspects of diagnosing and managing typhoid ileal perforation, emphasizing the socio-economic impact in developing regions.

**Methods:** A prospective study was conducted at Maharao Bhim Singh Hospital, Govt. Medical College Kota, over two years, involving 50 patients undergoing surgery for typhoid ileal perforation. The study focused on demographic data, surgical interventions, and postoperative outcomes, utilizing various diagnostic tools, including X-ray, WIDAL test, and Typhidot assays.

**Results:** The majority of cases were in the third decade of life, with a significant peak in incidence during summer months. Diagnostic investigations revealed free air under the diaphragm in 82% of cases. Surgical findings showed a predominance of single perforations, primarily located within 30 cm of the ileo-caecal junction. The study highlighted the critical role of timely surgical intervention and the challenges faced due to delayed presentation and diagnosis.

**Conclusion:** Typhoid ileal perforation presents a considerable challenge in endemic regions, with significant morbidity and mortality. Early diagnosis and prompt surgical intervention are crucial for improving outcomes. The study underscores the need for improved diagnostic approaches, surgical management, and preventive measures in tackling this condition.

Keywords: Typhoid fever, Ileal perforation, Surgical intervention, Diagnostic challenges, Developing countries.

## Introduction

Typhoid fever continues to be a pressing health concern in less developed nations, primarily fueled by contaminated water sources and insufficient sanitation practices. While advancements in public health have curtailed its prevalence in more developed countries, the United States still reports about 500 cases annually. The treatment of uncomplicated cases involves antibiotics, but severe complications like hemorrhage and ileal perforation may necessitate surgical intervention.<sup>1</sup>

Ileal perforation due to typhoid, a grave complication, poses a significant challenge in the global health landscape, particularly impacting the

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socio-economic fabric of developing countries. This condition, stemming from the perforation of a typhoid ulcer, is alarmingly prevalent in regions where Salmonella infection is nearly endemic. The third week of illness is a critical period, with ileal perforation being a common yet severe outcome, often leading to high rates of mortality and morbidity due to limited access to healthcare facilities.<sup>2</sup>

Despite surgical advancements and interdisciplinary efforts, the management of typhoid ileal perforation is fraught with significant patient morbidity and mortality. Early diagnosis and prompt treatment are crucial. However, preoperative diagnosis can be elusive due to nonspecific symptoms and sometimes inconclusive investigations, which can delay surgical intervention and worsen outcomes.<sup>3</sup> Typhoid ileal perforation is marked by a singular or multiple perforations in the terminal ileum, attributed to the abundance of Peyer's patches in this region. The condition demands urgent surgical treatment to prevent the severe consequences of peritoneal contamination and endotoxemia. However, the approach to surgical management remains a topic of debate, with options ranging from primary closure to more complex resection and anastomosis techniques.<sup>4</sup>

The management outcomes of typhoid ileal perforation are influenced significantly by the patient's general health, the virulence of the infecting strain, and the timeliness of surgical intervention. In our country, this condition presents with a high burden of morbidity and mortality, exacerbated by factors like delayed presentation and inadequate preoperative care. The common surgical procedures adopted face challenges due to the condition's complexity, often leading to severe postoperative complications such as wound infections, enterocutaneous fistulae, and mechanical intestinal obstruction.<sup>5</sup>

This article aims to dissect the multifaceted challenges of diagnosing and managing typhoid ileal perforation, drawing on a prospective study conducted at Maharao Bhim Singh Hospital attached to Govt. Medical College Kota. This study endeavors to shed light on the factors influencing outcomes in patients suffering from this perilous condition, frequently encountered in rural areas plagued by poverty, traditional health practices, and a scarcity of medical facilities.<sup>6</sup>

## Materials And Methods

**Study Design and Participants** This study was conducted over a two-year period from March 2015 to March 2017 at the Maharao Bhim Singh Hospital, affiliated with Govt. Medical College, Kota. It included 50 participants aged above 10 years who underwent surgical intervention for typhoid ileal perforation. The selection criteria were designed to include patients who provided written consent and met the age requirement, ensuring a focused examination of the surgical outcomes in a specific demographic.

### **Inclusion Criteria**

- 1. Patients aged above 10 years.
- 2. Underwent surgery for typhoid ileal perforation.
- 3. Provided written consent for participation.

## **Exclusion Criteria**

- 1. Patients younger than 10 years.
- 2. Cases where perforation was accompanied by other pathological conditions.
- 3. Instances of double perforation (peptic and ileal).

Data Collection Detailed clinical histories, physical examinations, diagnostic, and therapeutic interventions were meticulously recorded for each patient. This included demographic data, surgical intervention details, hospital course, and follow-up outcomes. Investigations before surgery involved erect abdominal and chest X-rays to detect air under the diaphragm, blood cultures, WIDAL tests, and Typhidot IgM/IgG assays to confirm typhoid fever. Key biochemical markers such as packed cell volume, serum electrolytes, urea, and creatinine levels were evaluated. Selected cases also underwent histopathological examination of biopsy samples from the perforation margins and resected gut, alongside peritoneal fluid culture and sensitivity testing for pyogenic organisms.

**Pre-operative Management** Patients received preoperative resuscitation, including anemia correction and electrolyte balancing to ensure adequate urinary output and normal urea levels. Intravenous fluids, primarily Ringer's lactate solution, were administered alongside broad-spectrum antibiotics. Nasogastric aspiration was initiated, and preparations were made for exploratory laparotomy. Dr. Kamal Kumar et al International Journal of Medical Science and Current Research (IJMSCR)

**Surgical Procedure** All participants underwent exploratory laparotomy through suitable incisions. The surgery involved locating the perforation site, assessing the number of perforations, and evaluating the distance from the ileo-caecal junction. Single perforations were primarily closed in two layers, while cases with multiple perforations or severely damaged ileum underwent resection and possibly ileostomy. End-to-side ileotransverse and ileo-ileal end-to-end anastomoses were performed in selected cases. Peritoneal lavage with saline and diluted povidone solution, abdominal drain placement, and wound closure followed, with histopathological examination of ulcer biopsies.

**Post-operative Care** The post-operative period involved close monitoring of patient progress, recording any complications, and addressing issues such as wound infection, dehiscence, intraabdominal abscess, fecal fistula, or mortality. Discharge timing was based on patient recovery, with follow-up appointments scheduled for further evaluation.

**Investigations** Routine and specialized tests were conducted, including complete blood count, erythrocyte sedimentation rate, coagulation profile, liver function tests, hepatitis markers, HIV status, and electrocardiogram. Specialized tests included WIDAL, Typhidot IgM & IgG, blood and peritoneal fluid cultures, imaging studies, and histopathological examination of excised ileum tissue.

#### Results

Age Distribution: Analysis of 50 cases revealed a predominant incidence in the 3rd decade (21-30

years) with 38% of cases, followed by the 5th decade (41-50 years) accounting for 20%. The median age was 32 years, showcasing a broad age range (10-70 years) affected by enteric perforation. This suggests that while enteric perforation can occur across various age groups, it is most prevalent in younger adults.

**Seasonal Incidence**: The seasonal pattern indicated a significant peak during the summer months (April to June), accounting for 44% of cases, followed by the rainy season (July to September) with 26%. This pattern underscores the endemic nature of the disease, with a higher incidence in warmer, possibly more bacterially active, periods.

**Diagnostic Investigations**: Among the diagnostic tools, X-Ray Flat Plate abdomen revealed free air under the diaphragm in 82% of cases, making it a crucial preoperative investigation. Blood tests showed varied results, with leucocytosis in 26%, leucopenia in 32%, and normal counts in 42% of patients. The Widal test, specific for typhoid fever, was positive in nearly 24% of cases, highlighting its role in diagnosing enteric fever-related perforations.

**Per-Operative Findings**: The majority of patients (72%) had a single perforation, while multiple perforations were less common. Notably, 68% of perforations were located within 30 cm of the terminal ileum, indicating a common site for enteric perforations. This finding is crucial for surgical planning and anticipatory guidance during operations.

S. No.	Age groups	Male	Female	Total
1.	01-10	1	0	1(2%)
2.	11-20	3	2	5(10%)
3.	21-30	15	4	19(38%)
4.	31-40	6	1	7(14%)
5.	41-50	9	1	10(20%)
6.	51-60	1	2	3(6%)
7.	61-70	2	3	5(10%)

**TABLE 1: AGE DISTRIBUTION** 

Sl.no	Seasons	No of cases	Percentage
1	Winter (dec,jan,feb,mar)	10	20%
2	Summer (apr,may,jun)	22	44%
3	Rainy (jul,aug,sept)	13	26%
4	Autumn (oct,nov)	5	10%

## **TABLE 2: SEASONAL INCIDENCE**

## TABLE 3: VARIOUS DIAGNOSTIC INVESTIGATIONS & THEIR POSITIVITY (N=50)

S.No.	Investigations	Done in no. of patients	Positive in no. of patients	Percentage of positivity
1.	X-Ray Flat Plat abdomen (Free air under Diaphragm)	50	41	82%
2.	Total Leukocyte Count (Cells/Cu mm)	50	-	-
(a).	Leucocytosis( > 11000)	-	13	26%
(b).	Leucocytopenia (< 4000)	-	16	32%
(c).	Normal (4000 – 11000)	-	21	42%
3.	Widal Test	42	10	23.80%

### TABLE 4: PER-OPERATIVE FINDINGS (N=50)

S. No.	Per operative findings	No. of cases	Percentage %
1.	No. of Perforations		
	Single	36	72%
	Double	7	14%

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	Three	5	10%
	>4	2	4%
2.	Site of Perforation away from ICJ (in cms)		
	0-15	22	44%
	16-30	12	24%
	31-45	8	16%
	>45	8	16%

#### Discussion

The findings from our study conducted at Maharao Bhim Singh Hospital attached to Govt. Medical College, Kota, shed significant light on the demographic, seasonal, diagnostic, and surgical aspects of typhoid ileal perforation, a severe complication of typhoid fever. This discussion integrates our observations with existing literature to elucidate the patterns, challenges, and implications for managing this condition, especially in resourceconstrained settings.<sup>7</sup>

Demographic Insights: Our analysis revealed that typhoid ileal perforation predominantly affects young adults, with the highest incidence in the 21-30 year age group, followed by the 41-50 year age group. This age distribution mirrors patterns observed in other endemic regions, emphasizing the impact of typhoid fever on the working-age population and its socio-economic implications. The male predominance in our study, with a male-to-female ratio of approximately 2.85:1, aligns with previous suggesting potential behavioral reports, or occupational factors that might increase exposure risk among males.<sup>8</sup>

**Seasonal Variation and Its Implications:** The peak incidence during the summer and rainy seasons underscores the relationship between environmental factors and the transmission of typhoid fever. These findings highlight the critical need for improved water quality and sanitation practices, especially in monsoon-prone areas where the risk of waterborne diseases escalates. Public health initiatives focusing on water safety and hygiene education could significantly reduce the burden of typhoid fever and its complications.

**Diagnostic Challenges:** Our study underscores the crucial role of radiological and hematological investigations in diagnosing typhoid ileal perforation. The presence of free air under the diaphragm in 82% of cases emphasizes the value of X-ray examinations. However, the variability in leukocyte counts and the relatively low sensitivity of the Widal test in our cohort reflect the diagnostic challenges in typhoid fever, necessitating a combination of clinical judgment and diagnostic tools for effective management.<sup>9</sup>

Surgical Management and **Outcomes:** The predominance of single perforations and their location within 30 cm of the ileo-caecal junction in our study provides valuable insights for surgical planning. The diversity in surgical approaches, including primary repair and resection with anastomosis, highlights the need for individualized treatment strategies based on the patient's condition and the extent of peritoneal contamination. Despite advancements in surgical techniques, the high rates postoperative complications and mortality of underscore the critical importance of timely surgical intervention and comprehensive pre- and postoperative care.<sup>10</sup>

**Limitations and Future Directions:** While our study provides significant insights, it is limited by its single-center design and the absence of a control group for comparing conservative versus surgical management outcomes. Future research should focus on multicenter studies to validate our findings across different populations and explore the impact of early

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diagnostic interventions and surgical techniques on patient outcomes.<sup>11</sup>

Overall, typhoid ileal perforation remains a endemic formidable challenge in regions, necessitating a multidisciplinary approach to improve diagnosis, treatment, and prevention strategies. Our findings highlight the need for ongoing surveillance, public health initiatives to improve sanitation, and targeted research to refine surgical management and reduce the burden of this life-threatening complication.12

## Conclusion

In conclusion, our study underscores the critical nature of typhoid ileal perforation, a dire complication of typhoid fever, predominantly affecting young adults and peaking during warmer months. Despite advancements in surgical management, challenges persist, highlighted by the varied success of treatment modalities. Early diagnosis and timely surgical intervention remain pivotal in improving outcomes. The high incidence of single perforations near the terminal ileum calls for refined surgical strategies and underscores the importance of preventive measures, including improved sanitation and vaccination, to mitigate the impact of this condition in endemic regions.

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