

A STUDY OF NON TRAUMATIC SMALL BOWEL PERFORATION

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ABSTRACT

Objective: Non-traumatic small bowel perforation is a rare but potentially life-threatening condition. It is important to understand the causes, clinical features, surgical procedures, complications, and outcomes associated with this condition. This study aims to investigate these aspects within a specific hospital setting.

Methods: A retrospective analysis of medical records was conducted to identify cases of non-traumatic small bowel perforation. Data on patient demographics, etiological factors, clinical presentations, surgical procedures, complications, and outcomes were collected and analyzed. Statistical methods were employed to examine the relationships between variables.

Results: Small bowel perforation causes vary based on development status, with typhoid and tuberculosis more common in developing countries, and Crohn's disease and malignancies prevalent in developed countries. Patients present with symptoms like abdominal pain, vomiting, and fever. Diagnosis is challenging, with laparotomy being the primary method, and mortality rates remain high, reaching up to 42%.

Conclusion: Non-traumatic small bowel perforation is a serious condition with potentially life-threatening complications. Prompt diagnosis and aggressive surgical intervention are crucial for improving patient outcomes. Understanding the causes, clinical features, and surgical management of this condition can guide effective treatment strategies and reduce morbidity and mortality rates.

Keywords: Non-traumatic small bowel perforation, Etiological factors, Clinical features

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INTRODUCTION

Non-traumatic small bowel perforation is a rare but serious condition that can lead to life-threatening complications if not promptly treated. The causes of this condition vary depending on the country's development status. Infectious causes such as typhoid and tuberculosis are more common in developing countries, while Crohn's disease and malignancies are more prevalent in developed countries [1].

In India, small bowel perforation resulting in perforation peritonitis is a common emergency faced by general surgeons. It is an acute surgical emergency that can lead to multi-organ failure, sepsis, and death if not treated aggressively within a limited timeframe. Perforation of the small bowel leads to chemical and bacterial contamination, which can cause diffuse acute peritonitis. Patients with perforation typically present with symptoms such as abdominal pain, vomiting, fever, and obstipation [2]. In developing countries, typhoid and tuberculosis are common causes of small bowel perforation, often attributed to factors such as low socio-economic conditions, poor sanitation, and inadequate personal hygiene. Typhoid perforation, occurring in the second or third week of the illness, is one of the most frequent causes of ileal perforation. The complications associated with typhoid fever, namely ileal perforation and intestinal bleeding, arise from necrosis of Peyer's patches in the terminal ileum. While typhoid ulcers can develop anywhere in the gastrointestinal tract, the terminal ileum is the most commonly affected site due to the higher density of Peyer's patches [3].

Diagnosing small bowel perforation can be challenging, as patients may experience recurrent abdominal pain episodes with nonspecific clinical and laboratory findings. While radiological imaging can aid in the diagnosis, the majority of cases are identified during laparotomy. The surgical procedures employed depend on the cause of the disease and the extent of peritoneal contamination, including primary repair, resection-anastomosis with or without ileostomy. Despite advancements in surgical techniques and improvements in intensive care conditions, the mortality rate for non-traumatic small

bowel perforation remains high, reaching up to 42%. Conservative treatment of typhoid perforation, once widely advocated, has shown increased mortality compared to surgery [4]. The overall survival rate for patients undergoing surgery is approximately 70-75%, but it can be as high as 97% in specialized services. The choice of treatment depends on the underlying cause, duration of symptoms before treatment, and the patient's general health [5].

Despite aggressive management and access to advanced critical care facilities, morbidity and mortality rates for small bowel perforation remain high. Laparotomy, supported by improved antibiotics and anesthesia techniques, remains the primary treatment option [6]. The mortality rate for diffuse suppurative peritonitis currently ranges from 10% to 20%, which is still considered unacceptably high. This study was conducted to investigate the age and sex incidence, etiological factors, clinical features, surgical procedures, complications, and outcomes associated with small bowel perforation in a specific hospital setting [7].

MATERIALS AND METHODS

Materials

Study participants: Humans

Study design: Prospective observational-cohort study

Population: All age group with main focus to 18 y and older.

Sampling method: Data was obtained from hospital record, radiology department, microbiology department.

Sample size: 50 patients admitted in general surgery department during my study period with the mentioned inclusion and exclusion criteria.

Inclusion criteria

- Patient of all ages, both males and females
- Patient diagnosed with small bowel of perforation

- Admitted in ICU or any other department with diagnosis of Small bowel perforation

Exclusion criteria

- Cases of esophageal, gastric and colonic perforation
- Cases of traumatic small bowel perforation.
- Cases of delayed Presentation with shock and septicaemia whose general condition did not warrant any operative management even after resuscitate measures.
- All cases of primary peritonitis, corrosive peritonitis and post operative peritonitis due to anastomosisleakage are excluded from the study.

Selection of participants

Total patients admitted in hospital with small bowel perforation symptoms like severe abdomen pain, nausea and vomiting, fever, chill and abdomen distension. Already diagnosed with small bowel perforation.

Method

This prospective study was conducted in the Department of General Surgery, Pacific medical college hospital, Udaipur, Rajasthan among 50 patients who come to hospital with complaints of pain abdomen, vomiting, fever, constipation, abdominal distension, rigidity, tenderness etc was considered.

- A thorough history and detailed examination was done as per proforma.
- Investigations of study included hemogram, Kidney function test, Chest and abdominal Radiograph, CT Abdomen and Ultrasonography

RESULTS

Table 1: Etiology among the study subjects

Etiology	N=50	%
Peptic Ulcer	20	40
Tuberculosis	12	24
Typhoid	8	16
Ischaemic bowel disease	6	12
Malignancy	1	2
Intussusception	2	4
Worm infestation	1	4

The table shows, etiology of a certain disease was investigated and the results are shown. Out of the 50 cases, 40% were caused by peptic ulcer, 24% by tuberculosis, 16% by typhoid, 12% by ischemic bowel disease, 2% by malignancy, 4% by intussusception, and 4% by worm infestation. The p-value cannot be determined from this table alone as it only provides the frequency distribution of the etiology of the disease.

- Widal test was done pre operatively only when there is high index of suspicion of typhoid fever otherwise it was done post operatively after typical findings.

- After thorough resuscitation the patient was subjected to exploratory laporotomy under general Anaesthesia.

- Operation findings were recorded and edge biopsy at the perforation site or the resected specimen was sent for histopathological examination.

- Post operatively the patients were followed up for any complication.

Data was collected and subjected to statistical analysis.

Statistical analysis

Data so collected was tabulated in an excel sheet, under the guidance of statistician. The means and standard deviations of the measurements per group were used for statistical analysis (SPSS 22.00 for windows; SPSS inc, Chicago, USA). Difference between two groups was determined using chi square test and the level of significance was set at $p < 0.05$.

The statistical analysis for the present study was done by applying the following formulae:

Chi-square test

A chi-squared test, also written as χ^2 test, is any statistical hypothesis test where the sampling distribution of the test statistic is a chisquared distribution when the null hypothesis is true. The chi-squared test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories.

The table shows, surgical procedures performed in cases of a certain condition are shown. Out of the total of 50 cases, 66% underwent primary repair, 12% underwent resection with primary anastomosis, 10% underwent resection with exteriorization of the bowel, another 10% underwent resection with anastomosis and proximal stoma, and 2% received palliative drainage.

Table 2: Types of surgical procedure performed among the study subjects

Procedure	N	%
Primary repair	33	66
Resection and primary anastomosis	6	12
Resection and exteriorisation of bowel	5	10
Resection and anastomosis with proximal stoma	5	10
Palliative drainage	1	2
Total	50	100

Table 3: No. of perforation among the study subjects

No. of perforation	N=50	%
Single	42	84
Multiple	8	16

The table provided indicates the number of perforations observed in a group of 50 patients. Out of the total cases, 84% had a single perforation, while 16% had multiple perforations.

Table 4: Widal outcome among the study subjects

Widal	N	%
Positive	19	38
Negative	31	62

The table displays the results of the Widal test conducted on the study participants. Out of the total of 50 patients, 38% tested positive for the Widal test, while 62% tested negative.

DISCUSSION

Small bowel perforation is a critical condition in emergency medicine, leading to significant mortality rates despite advancements in diagnosis, treatment, and care. It requires careful and thorough management by surgeons. The causes of non-traumatic small bowel perforation differ between developing and developed countries, with infectious factors being more prevalent in the former. This study aimed to analyze the spectrum of non-traumatic small bowel perforation in a group of 50 patients presenting with abdominal pain, vomiting, fever, constipation, abdominal distension, rigidity, and tenderness [8].

The study found that 82% of the subjects were male, and 18% were female. The majority of patients (44%) fell within the 31-40 age group, followed by 18-30 and 41-50 age groups (16% each). Older patients (>60 y) constituted the smallest group (10%), with the 51-60 age group comprising 14% of the subjects. Similar studies have reported a peak incidence of small bowel perforation in the 31-40 age group and a higher prevalence among males, which aligns with the findings of this study [9]. Abdominal pain was reported in all subjects, while abdominal distension and obstipation were present in 86% and 72% of the cases, respectively. Vomiting and fever were observed in 58% and 46% of the subjects, respectively. Other studies have also noted abdominal pain as the predominant symptom, followed by constipation and fever [10].

Clinical signs included an increased heart rate in 100% of the subjects, absent bowel sounds in 92%, guarding/rigidity in 58%, tenderness in 32%, and obliteration of liver dullness in 28% of the cases. Previous studies have reported similar signs, with generalized tenderness and absent bowel sounds being common findings [11]. The study identified the following etiologies: peptic ulcer (40%), tuberculosis (24%), typhoid (16%), ischemic bowel disease (12%), and malignancy (1%). Typhoid was the most common cause of non-traumatic small bowel perforation in some studies, while others reported peptic ulcer disease and non-specific causes as the primary etiologies. The variation in etiology could be attributed to geographical and demographic differences [12].

The most common anatomical sites of perforation were the duodenum (50%), followed by the ileum (42%) and jejunum (8%). Previous studies have reported similar findings, with the ileum being the most frequently affected site. Single perforation was more common (84%) than multiple perforations (16%). Most studies have also reported a higher incidence of single perforations compared to multiple ones [13]. Regarding investigative profiles, leukocytosis (>11,000 white blood cells), leukopenia (<4,000 white blood cells), thrombocytopenia (<150,000 platelets), and elevated creatinine (>1.5) were observed in 72%, 10%, 8%, and 18% of the subjects, respectively. These findings were consistent with previous studies. In terms of outcomes, only 8% of the subjects stayed in the hospital for up to 10 d. The majority (58%) stayed for 11-15 d, and 34% stayed for more than 15 d. Complications such as surgical site infection, wound dehiscence, sepsis, chest infection, and entero-fecal fistula occurred in 42%, 6%, 10%, 12%, and 6% of the subjects, respectively [14]. The mortality rate was 8%, which is consistent with the reported mortality rates ranging from 16.6% to 45% in patients with non-traumatic small bowel perforation. Factors associated with higher mortality include Small bowel perforation is a significant condition in the emergency setting and continues to be a leading cause of mortality in surgical patients. In third world countries, the etiology of non-traumatic small bowel perforation differs from that of Western counterparts due to the predominance of infective pathology. This prospective study aimed to analyze the spectrum of non-traumatic small bowel perforation in 50 patients

presenting with symptoms such as abdominal pain, vomiting, fever, constipation, abdominal distension, rigidity, and tenderness [15].

Gender and Age

Out of the 50 subjects, 82% were males and 18% were females, indicating a male predominance in this study. The majority of the subjects belonged to the age group of 31-40 y (44%), followed by 18-30 and 41-50 y (16% each). The least represented age group was >60 y (10%), followed by 51-60 y (14%). Similar studies have also reported a peak incidence of small bowel perforation in the age group of 31-40 y and a higher prevalence in males [16].

Symptoms

Abdominal pain was reported in all subjects, followed by abdominal distension (86%), obstipation (72%), vomiting (58%), and fever (46%). These findings are consistent with previous studies where abdominal pain was the most common symptom, often accompanied by distention, constipation, and fever [17].

Signs

The most common signs observed were increased heart rate (100%), absent bowel sounds (92%), guarding/rigidity (58%), tenderness (32%), and obliteration of liver dullness (28%). Similar studies have also reported generalized tenderness, guarding, and rigidity as the main physical signs associated with small bowel perforation [18].

Etiology

The etiology of non-traumatic small bowel perforation in this study revealed peptic ulcer (40%), tuberculosis (24%), typhoid (16%), ischemic bowel disease (12%), and malignancy (2%). Other studies have shown variation in etiology, including typhoid perforation, peptic ulcer disease, intestinal tuberculosis, non-specific causes, and trauma. The specific causes may vary depending on the study area and design [19].

Anatomical site

The most common anatomical site of perforation in this study was the duodenum (50%), followed by the ileum (42%) and jejunum (8%). Consistent with previous studies, the ileum was the most common site of small bowel perforation, followed by the duodenum and jejunum [20].

Site

Single perforation was more common (84%) than multiple perforations (16%). Similar findings have been reported in previous studies, where the majority of patients presented with a single perforation [21].

Investigative profile

The investigative profile showed leukocytosis (WBC>11000) in 72% of the subjects, leukopenia (WBC<4000) in 10%, thrombocytopenia (Platelet<1.5 Lakh) in 8%, and elevated creatinine (>1.5) in 18%. Other studies have also reported leukocytosis, electrolyte imbalances, and elevated serum creatinine in patients with small bowel perforation.

Outcome

The length of hospital stay varied, with only 8% of subjects staying for up to 10 d, 58% staying for 11-15 d, and 34% staying for more than 15 d. Complications such as surgical site infection (42%), wound dehiscence (6%), sepsis (10%), chest infection (12%), and

entero-fecal fistula (6%) were observed. The overall mortality rate in this study was 8%, which is consistent with previous studies reporting an overall mortality rate ranging from 2% to 25% in patients with non-traumatic small bowel perforation [22].

Treatment

The primary treatment modality for small bowel perforation in this study was surgical intervention. Exploratory laparotomy was performed in all patients, and the site of perforation was identified and repaired. The choice of surgical technique depended on the location and size of the perforation, with primary closure being the most common approach. In cases of extensive bowel involvement or contamination, bowel resection with anastomosis or stoma creation was performed. In some instances, additional procedures such as peritoneal lavage or omental patching were required [23].

Complications and mortality

Complications associated with small bowel perforation can have a significant impact on patient outcomes. The most common complications observed in this study were surgical site infection, wound dehiscence, sepsis, chest infection, and entero-fecal fistula. These complications can lead to prolonged hospital stays and increased morbidity. The overall mortality rate of 8% in this study is consistent with previous reports, emphasizing the importance of early diagnosis and prompt surgical intervention to improve outcomes.

CONCLUSION

Non-traumatic small bowel perforation is a serious condition associated with significant morbidity and mortality. The etiology, clinical presentation, and outcomes can vary depending on geographical location and patient population. Prompt recognition, appropriate investigations, and early surgical intervention remain crucial in managing this condition effectively. Further studies are needed to explore preventive strategies and optimize treatment approaches for better patient outcomes.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INTERESTS

Declared none

REFERENCES

- Gupta S, Kaushik R, Sharma R. Small bowel perforation-a diagnostic dilemma. *J Clin Diagn Res.* 2014;8(8):NC05-8. doi: 10.7860/JCDR/2014/8431.4701.
- Coccolini F. Time and pattern of death for patients with solid organ injuries: improvements for the management of trauma patients. *World J Surg.* 2016;40(6):1291-7. doi: 10.1007/s00268-016-3464-9.
- Ahmad N. Small bowel perforation in patients with typhoid fever: a surgical experience of 24 cases in an endemic setting. *East Cent Afr J Surg.* 2014;19(1):69-74. doi: 10.4314/ecajs.v19i1.8.
- Shrestha S, Sharma UK, Bhandari RS, Shrestha P. Management of typhoid intestinal perforation and ileal perforation in typhoid fever. *J Nepal Health Res Counc.* 2012;10(21):159-62. doi: 10.3126/jnhrc.v10i1.7407.
- Rajagopal A, Martin J, Guru V. Small bowel perforation in Crohn's disease: a preventable complication? *World J Gastrointest Surg.* 2010;2(9):289-92. doi: 10.4240/wjgs.2.i9.289.
- Nogueira C, Nunes T, Ferreira S. Colorectal cancer and small bowel perforation: a case report. *GE Port J Gastroenterol.* 2015;22(4):174-8. doi: 10.1016/j.jpge.2015.04.008.
- Khan MA, Saeed S, Akhtar S. Typhoid ileal perforation: a comprehensive review. *J Surg Res.* 2022;275:35-43. doi: 10.1016/j.jss.2021.12.012.
- Sørdeide K, Thorsen K, Harrison EM, Bingener J, Møller MH, Ohene Yeboah M. Perforated peptic ulcer. *Lancet.* 2015;386(10000):1288-98. doi: 10.1016/S0140-6736(15)00276-7, PMID 26460663.
- Sørdeide JA, Viste A. Esophagus, stomach, and duodenum. In: Brunicaardi FC, Andersen DK, Billiar TR, editors. *Schwartz's principles of surgery.* 11th ed. McGraw-Hill Education; 2019. p. 1101-46.
- Zafar SN, Obirieze A, Adesibikan B. Surgical outcomes of peptic ulcer perforation in a national database. *Am J Surg.* 2014;207(5):721-6.
- Mishra A, Mishra SK. Typhoid perforation of the small intestine. *Trop Gastroenterol.* 2006;27(2):76-8.
- Sørdeide K, Thorsen K, Harrison EM, Bingener J, Møller MH, Ohene Yeboah M. Perforated peptic ulcer. *Lancet.* 2015;386(10000):1288-98. doi: 10.1016/S0140-6736(15)00276-7, PMID 26460663.
- Bhangu A, Sørdeide K, Di Saverio S, Assarsson JH, Drake FT. Acute appendicitis: modern understanding of pathogenesis, diagnosis, and management. *Lancet.* 2015;386(10000):1278-87. doi: 10.1016/S0140-6736(15)00275-5, PMID 26460662.
- Sørdeide K, Thorsen K, Sørdeide JA. Strategies to improve the outcome of emergency surgery for perforated peptic ulcer. *Br J Surg.* 2014;101(1):e51-64. doi: 10.1002/bjs.9368, PMID 24338777.
- Kong V, Al-Habbal Y, Green B. A 12 y review of small bowel perforations: an insight into surgical management, risk factors, and outcomes. *Int J Surg.* 2018;60:138-43.
- Yousaf M, Ullah K, Muhammad D. Aetiological spectrum of non-traumatic perforation of small intestine. *J Ayub Med Coll Abbottabad.* 2015;27(3):586-9.
- Lohsiriwat V. Tuberculous enteritis: a clinical and endoscopic analysis in 30 patients. *Indian J Gastroenterol.* 2006;25(6):284-8.
- Athanassiadi K, Kalavrouziotis G, Efstathiou A. Duodenal perforation due to blunt abdominal trauma: case report and review of the literature. *J Med Case Rep.* 2009;3:106.
- Hua J, Gong J, Yao L. A multicenter study on etiology of nontraumatic small bowel perforation. *Zhonghua Wei Chang Wai Ke Za Zhi.* 2015;18(1):40-3.
- Rameshbabu CS, Gurumurthy S, Prabhakar M. Non-traumatic perforation of the small intestine in adults: clinical profile, etiology, and management. *Al Ameen J Med Sci.* 2011;4(4):317-22.
- Balani A, Kumar A, Bansal VK. Nontraumatic small bowel perforation: a clinical study and analysis of factors affecting mortality in 60 cases. *J Gastrointest Surg.* 2008;12(5):909-13.
- Shrestha R, Sharma UK, Shrestha HG. Non-traumatic perforation of small intestine: a clinical study. *J Nepal Health Res Counc.* 2014;12(27):38-41.
- Khanna AK, Tiwary SK, Kumar P. Non-traumatic perforation of the small intestine: clinical profile and surgical experience from a tertiary care center. *Indian J Surg.* 2010;72(6):434-8.