



Nontraumatic Small Bowel Perforation: A Review of Demographics, Aetiological Factors, Clinical Presentation, Radiological Findings Along with Hematological and Histopathological Evaluation

Siddharth Singh¹, Amitabh Satsang², Sai Divya Yadavalli³, Biswajit Singh^{3*} and Gajanan Patil¹

¹Department of General Surgery, G.S.V.M Medical College and Associated Hospital, Kanpur, India

²Department of CTVS, AIIMS, New Delhi, India

³Department of Surgical Disciplines, AIIMS, New Delhi, India

Abstract

Introduction: Small bowel perforation stands out as a significant entity in an emergency setting. Despite improvement in diagnosis, antibiotics, surgical treatment and intensive care treatment, it remains an important cause of mortality in surgical patients and thus warrants robust and meticulous management by the treating surgeon.

Material and Methods: Study was conducted on patients of different types of non-traumatic small bowel perforation, admitted in surgical emergency, LLR Hospital Kanpur. A total 90 patients of non-traumatic perforations of the small intestine operated in emergency surgery from December 2014 to July 2016 were studied.

Observation: Most patients were of the ages 31 to 40 years (39 cases, 43.33%). Most common histopathological finding is non-specific ileitis (44%). In present study most common site of small bowel perforation is ileum (62.22%), followed by duodenum (27.66%) and jejunum (10.00%).

Conclusion: Non-traumatic bowel perforations in third world countries are attributable to infective pathology and are a major burden, especially in emergency settings. They inflict a younger population in eastern world and result in immense morbidity. If meticulously and robustly managed, both mortality and morbidity can be decreased.

OPEN ACCESS

*Correspondence:

Biswajit Singh, Department of Surgical Disciplines, All India Institute of Medical Sciences (AIIMS), New Delhi, India, E-mail: biswajitsingh0905@gmail.com

Received Date: 01 Jul 2020

Accepted Date: 12 Aug 2020

Published Date: 18 Aug 2020

Citation:

Singh S, Satsangi A, Yadavalli SD, Singh B, Patil G. Nontraumatic Small Bowel Perforation: A Review of Demographics, Aetiological Factors, Clinical Presentation, Radiological Findings Along with Hematological and Histopathological Evaluation. *World J Surg Surgical Res.* 2020; 3: 1244.

Copyright © 2020 Biswajit Singh. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction

Small bowel perforation is a significant entity in the emergency setting [1]. Despite improvement in diagnosis, antibiotics, surgical treatment and intensive care support, it continues to be an important cause of mortality in surgical patients and thus warrants robust and meticulous management by the treating surgeon. Therefore, thorough knowledge of exact aetiology is a necessity for better outcome in these patients.

The aetiologies of non-traumatic small bowel perforation in third world countries differ from the ones handled by the western counterparts due to predominance of infective pathology in the former.

The main objective of our study is to know the demographics, spectrum of various etiological factors responsible for non-traumatic small bowel perforation, their clinical presentation, and various findings on clinical, radiological, hematological and histopathological examination.

Material and Methods

This study has been conducted on the patients of different types of non-traumatic small bowel perforation admitted in the surgical emergency, LLR Hospital, GSVM Medical College, Kanpur. A total 90 patients of non-traumatic perforations of the small intestine operated between December 2014 and July 2016 were included in the study as per the following criteria.

Inclusion criteria

1. Patients of age 15 to 70 years.

2. Cases of non-traumatic small bowel perforation.

Exclusion criteria

1. Cases of esophageal, gastric and colonic perforation.
2. Cases of traumatic small bowel perforation.
3. Cases of delayed presentation with shock and septicemia whose general condition did not warrant any operative management even after resuscitative measures.
4. All cases of primary peritonitis, corrosive peritonitis, and postoperative peritonitis due to anastomosis leakage are excluded from the study.

After establishing the clinical diagnosis of perforation peritonitis, the patients were prepared for exploratory laparotomy. During the procedure, operative findings were noted, and the source of peritonitis was found and managed accordingly. The data recorded using a detailed working proforma encompassing relevant demographic details, clinical history and examination, laboratory parameters, and radiological and pathological data.

Observation and Results

A total of 90 patients who under-went emergency exploratory laparotomy for peritonitis period from December 2014 to July 2016 were included in the study.

Most common age group involved is 31 to 40 years with 39 cases (43.33%). Next in frequency is the age group 21 to 30 years with 17 cases (18.88%). Overall small bowel perforation is more prevalent in males (70 out of 90 cases) with a male to female ratio of 3.5:1 (Table 1).

All patients included in our study, presented with abdominal pain. Abdominal distention and obstipation were present in 88% each, fever was seen in 66% cases and vomiting 55% (Table 2).

The most common clinical sign was generalized tenderness and absence of bowel sounds (100%) followed by guarding and rigidity (88% each), masking of liver dullness in (66%), and shock (35.55%) and dehydration (28.88%) (Table 3).

Duration of symptoms was 7 days (82.22%) in most of the patients, while 12.22% presented between 8 to 15 days and 5.5% after 15 days of developing symptoms (Figure 4).

77% of patients showed gas under diaphragm on X-ray chest. Most patients had leukocytosis (66.6%), electrolyte imbalance and elevated serum creatinine was noted in 16.6% each, leukopenia and thrombocytopenia in 11.1% each, Widal and Mantoux were positive in 34.4% and 4.4% respectively (Table 4).

Most common histopathological finding was non-specific ileitis in 44% patients. Peptic ulcer disease was suspected in 25 out of 90 patients, which was confirmed by histopathology. 20 out of 51 patients who were thought to be suffering from typhoid ileitis showed histopathological features of the same. Tubercular perforation was found in 5 out of 10 suspected cases (Figure 1).

In present study most common site of small bowel perforation is ileum (62.22%), followed by duodenum (27.66%) and jejunum (10.00%) (Figure 2).

Size of small bowel perforation was < 1 cm in 88% patients, followed by size of 1 cm to 2 cm in 8.8% and >2 cm in 2.2% patients.

Table 1: Age and sex distribution.

Age	Male	Female
15-20	0	0
21-30	13	4
31-40	30	9
41-50	7	3
51-60	9	3
61-70	8	1
Total:	70	20

Table 2: Clinical presentation (symptoms).

Symptoms	No. Of Patients (n=90)	Percentage
Pain	90	100.00%
Distention	80	88.88%
Absolute constipation	80	88.88%
Vomiting	50	55.55%
Fever	60	66.66%

Table 3: Clinical presentation (signs).

Signs	No. Of Patients (n=90)	Percentage
Generalized tenderness	90	100.00%
Absent bowel sound	90	100.00%
Guarding	80	88.88%
Rigidity	80	88.88%
Masking of liver dullness	60	66.66%
Shock	32	35.55%
Dehydration	26	28.88%

Table 4: Hematological investigations.

Variables	No. Of Patients	Percentage
↑ WBC	60	66.6
↓ WBC	10	11.1
↓ Platelet	10	11.1
Ele. Imbalance	15	16.6
↑ S. Creat	15	16.6
Gas ↓ diaphragm	70	77.77
Widal +	31	34.44
Montoux +	4	4.44

In this study most patients presented with single perforation (91.11%) while multiple perforations are found in about 8.88% patients.

In present study, based on various investigations and intra-operative findings, most common etiology of non-traumatic small bowel perforation was found to be typhoid perforation (56.66%), followed by peptic ulcer disease (27.77%), intestinal tuberculosis (11%), nonspecific causes (5.5%) (Figure 3). Overall, the burden of non-traumatic small bowel perforations in the emergency setting was found to be due to infective pathology.

Discussion

Non-traumatic small bowel perforation is an uncommon but serious complication leading to severe morbidity and mortality [1]. Effective management of the condition is necessary, and the key lies

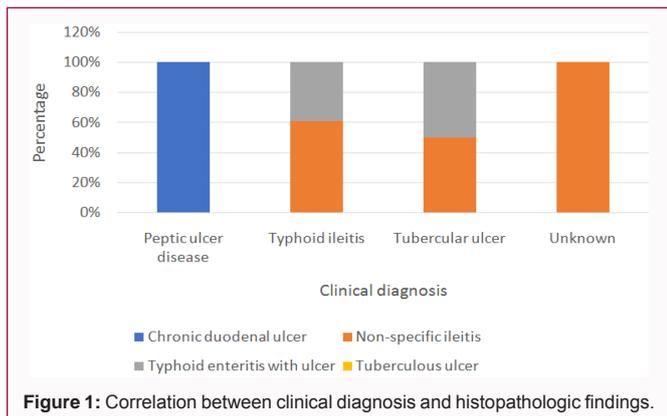


Figure 1: Correlation between clinical diagnosis and histopathologic findings.

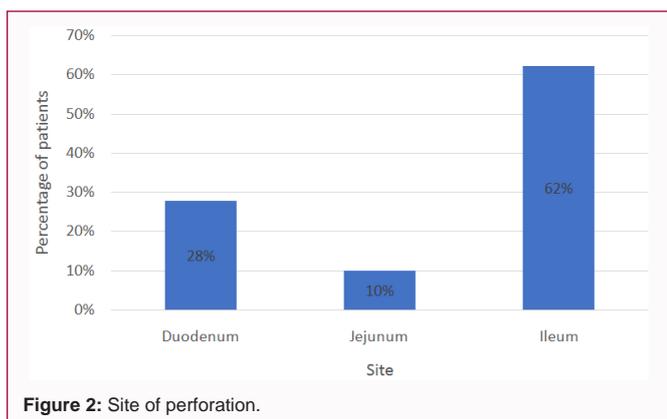


Figure 2: Site of perforation.

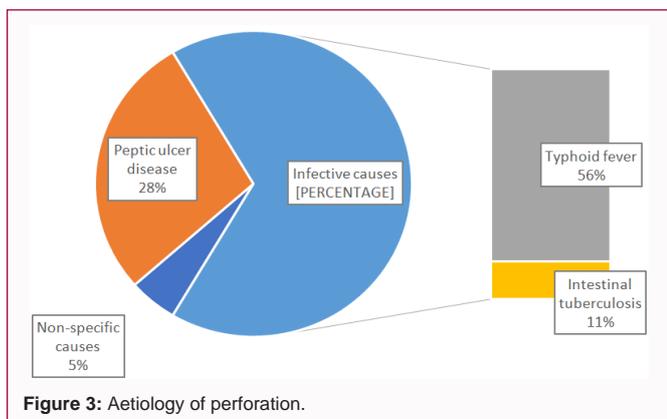


Figure 3: Aetiology of perforation.

in knowing the exact etiology of the condition.

Our study revealed that the most common etiology of non-traumatic small bowel perforation in our center was of infective origin and targeted younger patients, when compared to western population. We also studied the epidemiology of non-traumatic small bowel perforation.

Age and Sex

In the present study, incidence of small bowel perforation peaked in the age group 31 to 40 years. Overall small bowel perforation was more common in males (70 out of 90 cases) with male to female ratio of 3.5:1 (Table 1). Our findings are concurrent with previous studies that showed a higher incidence the condition males compared to females, but the age of incidence in was found to be varied preceding studies.

Talwars et al. noted that most patients (42.7%) were in the 21 year to 30 year age group [2]. Eggleston et al. [3] analyzed 78 patients treated for typhoid perforation of the bowel. According to them the male to female ratio was 3.5:1. Adesunkanmi et al. [4] conducted a study including 50 patients with typhoid ileal perforation and found the male to female ratio to be 4:1 and mean age of patients to be 19.5 years. Chatterjee et al. [5] in their study of non-typhoid ileal perforations found male-to-female ratio to be 2.2:1 and maximum patients (40%) were in the second and third decades. Rajender Singh Jhobta et al. in their study of perforation peritonitis found a male-to-female ratio of 5:1 and maximum patients were in the 31 years to 40 year age group [6].

In a more recent study by Ahmet Turkoglu et al. the mean age of patients diagnosed with non-traumatic small bowel perforation was 51 years. Male to female ratio was 1.3:1.

Clinical Presentation

Symptoms

Abdominal pain was present in all patients included in our study. 88% of the patients presented with distention and inability to pass feces and flatus. Fever and vomiting were recorded in 66% and 55% cases respectively (Table 2). Most of the patients presented within 7 days (82.22%) of onset of symptoms while 12.22% presented between 8 to 15 days and 5.5% after 15 days of symptom onset.

Chatterjee et al. [5] in their study of ileal perforation observed that pain abdomen was the principal presenting features (92.3%), next in order were constipation (63.6%) and fever (44.3%). Ahmet Turkoglu et al. [7] and Hemkant Verma et al. [8] also found that pain abdomen was present in all patients of small bowel perforation included in their studies. The former also noted that the duration of symptoms was a significant factor associated with survival and was higher in non-survivors (median 11 h) than in survivors (median 4 h).

Signs

In the present study, the most common clinical signs were generalized tenderness and absence of bowel sounds (100% each) followed by guarding and rigidity (88% each), masking of liver dullness (66%), and shock (35.55%) and dehydration (28.88%) (Table 3). The most common clinical sign was also found to be generalized abdominal tenderness in earlier studies.

Chatterjee et al. [5] in their study observed that abdominal guarding and rigidity (89%) were the main physical signs. Ahmet türkoğlu et al. observed that the most common clinical sign was generalized tenderness (100%) followed by guarding and rigidity (73% each) [7]. Hemkantverma et al. also observed that the most common clinical sign was generalized tenderness (100%) and shock (100%) followed by guarding (95%) and dehydration (78%) [8].

Investigations

In the present study, the most common finding was the presence of gas under diaphragm (pneumoperitoneum) on X-ray chest (77%). Most patients had leukocytosis (66.6%) followed by electrolyte imbalance and elevated serum creatinine (16.6% each), leukopenia and thrombocytopenia (11.1% each) (Table 4). Similar results were obtained in previous studies with most patients having pneumoperitoneum on X-ray.

Chatterjee et al. [5] observed pneumoperitoneum in 66.8% of cases on plain X-ray abdomen. Ahmet Türkoğlu et al. observed that

only 30% had leukocytosis and 10% had neutropenia, and electrolyte imbalance was present in 36.6% of patients. Positive serologic test for typhoid fever was found in 2 (6.6%) patients. In the study conducted by Hemkant Verma, pneumoperitoneum was observed in 70% of patients [8]. Shahida Parveen Afridi et al. observed pneumoperitoneum in 70.6% patients; electrolyte imbalance was present in 52% of patients and elevated serum creatinine in 9% [9].

Role of Ulcer Edge Biopsy

In the present study, the most common histopathological finding was non-specific ileitis (44%). In cases of peptic ulcer disease, there was a 100% correlation with histopathology. The diagnosis of typhoid ileal perforation could be reached only in 20 out of 51 patients (39%) and tubercular perforation was found in 5 out of 10 cases (50%).

Sharma et al. reviewed pathology records of 165 patients operated for non-traumatic perforation of the small intestine. Perforation edge biopsy was diagnostic only in 53 cases, most common aetiology being typhoid. But most cases revealed only non-specific inflammatory granulation tissue. They concluded that perforation edge biopsy was useful only in 1/3rd of cases, but diagnostic rate could be improved by taking additional biopsy material (such as mesenteric lymph nodes, tubercles or omental nodules) [10]. Hemkantverma et al. in their study observed that histopathological examination of resected gut specimen revealed nonspecific inflammation (56%), typhoid perforation (24.4%), and tubercular inflammation (19.5%) in descending order of occurrence.

Intraoperative Finding

Site of perforation

In the present study, the most common site of small bowel perforation is ileum (62.22%), followed by duodenum (27.66%) and jejunum (10.00%). Shahida Parveen Afridi et al. found that the highest numbers of perforations were seen in the duodenum (43.6%) [9]. Ahmet Türkoğlu et al. observed 80% of small bowel perforation in ileum and 20% in jejunum [7].

Size of perforation

In the present study, most perforations were <1 cm in size (88%) followed by size of 1 cm to 2 cm in 8.8% and >2 cm in only 2.2% patients. Shyamkumargupta et al. observed about 73% patients had perforation of size <0.5 cm, 14% had between 0.5 cm to 1 cm, 8% were between 1 cm to 2 cm and 3% had perforation of size >2 cm [11].

Number of perforations

In this study, most patients presented with a single perforation (91.11%) while multiple perforations are found in about 8.88% patients. Ahmet Türkoğlu et al. observed that about 70% of patients presented with single perforation while multiple perforations were found in the rest [7].

Etiology of Perforation

In the present study, based on various investigations and intra-operative findings, most common etiology of non-traumatic small bowel perforation was found to be typhoid perforation (56.66%), followed by peptic ulcer disease (27.77%), intestinal tuberculosis (10%), non-specific causes (5.5%).

Huttunen et al. [1] carried a study to find out the etiology of non-traumatic small bowel perforations. The results were as follows: strangulation in 5, diverticulum in 4, foreign bodies in 4, idiopathic

in 3, Crohn's disease in 2, Malignant Atrophic Papulosis (MAP) in 2, and tuberculosis, carcinoid tumor, radiotherapy, and iatrogenic in one patient each [12]. Mehendale, Samsi [4] analyzed 32 consecutive cases of small bowel perforation. According to them most common etiology seems to be non-specific ulceration of the small bowel [13]. Orringer et al. [10] presented a review of patients in western cultures that the spontaneous free perforation of the small intestine in adults is rare. Causes of the perforations were malignancy (6 patients); inflammatory small bowel disease (4 patients); combinations of radiotherapy, chemotherapy, or steroids (4 patients); mechanical (3 patients); and iatrogenic (2 patients). Of the 19 patients, 15 had a history of previous abdominal surgery or recent steroid use, chemotherapy, or radiation therapy [14].

Chatterjee et al. [5] in their study found that most of the perforations (52.8%) were due to non-specific causes. Trauma (19.3%) and mechanical factors (12.7%) were the other principal etiologies. Shahida Parveen Afridi et al. in their study found that the most common cause of perforation peritonitis was acid peptic disease 45% (perforated duodenal ulcer (43.6%) and gastric ulcer (1.3%)), followed by small bowel tuberculosis (21%) and typhoid (17%) [9]. Shyam Kumar Gupta et al. according to them the most common cause of gastrointestinal perforation was duodenal ulcer perforation, followed by appendicitis, typhoid perforation, blunt/penetrating trauma, gastric perforation, obstruction, iatrogenic, malignancy, and recurrent perforation [11]. Ahmet Türkoğlu et al. revealed that a considerable number of cases had non-specific features on histological examination. Six of these had non-specific ulcers and eight had non-specific inflammation. Amongst the cases where a definitive diagnosis could be given, most were diagnosed with intestinal tuberculosis, typhoid, lymphoma, adenocarcinoma, Crohn's disease, and gangrene [7]. Bhupendra et al. conducted a study of non-traumatic small bowel perforation of the small intestine and found that the most common cause was typhoid (46.4%) followed by non-specific inflammation (39.2%), tuberculosis (12.8%) and malignant neoplasm (1.6%) [15].

Conclusion

The most common etiology of non-traumatic bowel perforation in third world countries is infective. They inflict a younger population compared to the western population and result in morbidity and mortality. Management of these patients should be tailored according to the demographic and etiologic factors.

References

- Huttunen R, Kairaluoma MI, Mokka RE, Larmi TK. Nontraumatic perforations of the small intestine. *Surgery*. 1977;81(2):184-8.
- Bhansali SK. Abdominal tuberculosis. Experiences with 300 cases. *Am J Gastroenterol*. 1977;67(4):324-37.
- Eggleston FC, Santoshi B, Singh CM. Typhoid perforation of the bowel. Experiences in 78 cases. *Ann Surg*. 1979;190(1):31-5.
- Adesunkanmi AR, Ajao OG. The prognostic factors in typhoid ileal perforation: A prospective study of 50 patients. *J R Coll Surg Edinb*. 1997;42(6):395-9.
- Chatterjee H, Pai D, Jagdish S, Satish N, Jayadev D, Srikanthreddy P. Pattern of nontyphoid ileal perforation over three decades in Pondicherry. *Trop Gastroenterol*. 2003;24(3):144-7.
- Mehendale VG, Samsi AB. Jejuno-Ileal perforations. *J Postgrad Med*. 1979;25(1):41-7.
- Nadkarni KM, Shetty SD, Kagzi RS, Pinto AC, Bhalariao RA. Small-bowel

- perforations. A study of 32 cases. Arch Surg. 1981;116(1):53-7.
8. Kakar A, Aranya RC, Nairc SK. Acute perforation of small intestine due to tuberculosis. Aust N Z J Surg. 1983;53(4):381-3.
 9. Eustache JM, Kreis DJ Jr. Typhoid perforation of the intestine. Arch Surg. 1983;118(11):1269-71.
 10. Orringer RD, Collier JA, Veidenheimer MC. Spontaneous free perforation of the small intestine. Dis Colon Rectum. 1983;26(5):323-6.
 11. Leijonmarck CE, Fenyö G, Räf L. Nontraumatic perforation of the small intestine. Acta Chir Scand. 1984;150(5):405-11.
 12. Marshall BJ, Warren JR. Unidentified curved *Bacilli* in the stomach of patients with gastritis and peptic ulceration. Lancet. 1984;1(8390):1311-5.
 13. Armstrong CP, Blower AL. Non-steroidal anti-inflammatory drugs and life threatening complications of peptic ulceration. Gut. 1987;28(5):527-32.
 14. Chaikof EL. Nontraumatic perforation of the small bowel. Am J Surg. 1987;153(4):355-8.
 15. Akinoğlu A, Bilgin I. Tuberculous enteritis and peritonitis. Can J Surg. 1988;31(1):55-8.