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ISSN: 2617-0817 E-ISSN: 2789-5912

Original Article

Correlation between Laparotomy Findings and Histopathological Diagnoses in Non-Traumatic Ileal Perforation

DOI: dx.doi.org

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Received: 25 Feb 2024
Accepted: 05 Mar 2024
Published: 07 Jul 2024

Published by:
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ABSTRACT

Background: *Non-traumatic ileal perforation is a significant cause of acute abdomen requiring urgent surgical intervention, especially in developing countries. It commonly results from infectious, inflammatory, or idiopathic etiologies, with typhoid fever and tuberculosis being among the most prevalent causes. This study aims to evaluate the correlation between laparotomy findings and histopathological diagnoses in a cohort of patients undergoing surgery for NTIP.* ***Methods & Materials:*** *This study is a prospective observational conductd on the patients admitted through outpatient department and emergency of Dhaka Medical College Hospital, which took place from January 2018 to December 2018. A total of 60 patients were selected as study subjects. Data were analyzed using SPSS version 24.0. P value reached from Z- test. Significant difference at 95% confidence interval.* ***Result:*** *Clinically, all presented with abdominal pain, tenderness, dehydration, and rigidity; 66.67% had fever, 65% had constipation, and 85% showed absent bowel sounds. Laparotomy revealed distal ileal perforation in 65% and proximal in 31.67%, with mesenteric lymphadenitis in 70% and floating omentum in 73.33%. Histopathology confirmed typhoid ulcers in 58.33%, tubercular ulcers in 13.33%, non-specific ulcers in 21.67%, and Meckel's diverticulum and Crohn's disease in 3.33% each (p<0.001).* ***Conclusion:*** *This study highlights a significant correlation between laparotomy findings and histopathological diagnoses in cases of non-traumatic ileal perforation. The majority of distal ileal perforations were histologically confirmed as typhoid ulcers, with statistical significance (Z = 4.725, p < 0.001), indicating that intraoperative findings can reliably predict the underlying pathology.*

Keywords: *Non-Traumatic Ileal Perforation, Histopathological Diagnoses, Laparotomy Findings*

(The Planet 2024; 8(1): 306-309)

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INTRODUCTION

Non-traumatic ileal perforation (NTIP) represents a significant cause of secondary peritonitis, particularly in low- and middle-income countries where infectious etiologies predominate. Although blunt and penetrating trauma account for most cases of small-bowel perforation in high-income settings, NTIP arises primarily from infective processes (typhoid fever, tuberculosis), nonspecific ulceration, and less commonly from Crohn's disease or neoplasia in developing regions [1,2]. In recent multicenter data from Southeast Asia, the incidence of NTIP was 0.66% among all emergency laparotomies, with infectious causes responsible for nearly 80% of cases [1]. A community-based cross-sectional analysis likewise found NTIP to be most prevalent among rural, male agricultural workers, with typhoid ulcers comprising nearly four-fifths of histopathologically confirmed perforations [3]. Etiologically, typhoid fever remains the leading cause of NTIP in endemic regions, accounting for up to 65–80% of cases, followed by nonspecific ileitis (10–20%) and intestinal tuberculosis (5–10%) [4,5]. In a tertiary Indian center, clinical-pathological correlation revealed enteric fever in 82.8% of ileal perforations, nonspecific inflammation in 9.4%, and tuberculosis in 7.8% of patients undergoing edge-biopsy and histopathological examination [6]. Recent prospective cohorts have echoed these findings, demonstrating that nonspecific ulcers and tuberculosis together contribute roughly 15–20% of NTIP, underscoring the need for routine histopathology to distinguish among etiologies with divergent postoperative management [7,8]. Clinically, NTIP often presents with acute onset abdominal pain, distension, fever, and peritoneal signs; yet preoperative imaging and laboratory tests frequently fail to localize the perforation site or ascertain its cause [9]. Plain radiographs detect free air under the diaphragm in only 50–90% of cases, and serological tests for Salmonella typhi exhibit low sensitivity once perforation occurs [10]. Consequently, exploratory laparotomy not only confirms the

ISSN: 2617-0817 E-ISSN: 2789-5912

diagnosis but provides intraoperative findings—site, number, and size of perforations; mesenteric lymphadenitis; omental response—that may suggest underlying pathology. However, gross appearance alone can be misleading, as typhoid ulcers, nonspecific ulcers, and tubercular perforations may share similar macroscopic features [6,11]. Histopathology of resected edges or ulcer biopsies remains the gold standard for definitive etiological diagnosis. Studies have shown that histological examination identifies caseating granulomas in tubercular perforations, lymphoid hyperplasia with necrosis in typhoid ulcers, and non-specific inflammatory changes in idiopathic cases, with a diagnostic concordance of over 90% when combined with culture and molecular tests [3,6]. A systematic review highlighted that histopathology outperforms stool culture and the Widal test in pinpointing typhoid etiology after perforation, guiding appropriate antibiotic therapy, and public health interventions. Moreover, correlating specific laparotomy findings—such as mesenteric lymphadenitis or floating omentum—with histopathological diagnoses may enable surgeons to tailor intraoperative decision-making, potentially opting for primary repair versus resection-anastomosis based on suspected cause and degree of contamination [12]. This study aims to evaluate the correlation between laparotomy findings and histopathological diagnoses in a cohort of patients undergoing surgery for NTIP.

METHODS & MATERIALS

This study is a prospective observational conducted on the patients admitted through outpatient department and emergency of Dhaka Medical College Hospital, which took place from January 2018 to December 2018. The number of patients admitted to Dhaka Medical College and Hospital with ileal perforation during the study period determined the sample size which was 60 cases. A purposive sampling technique was used. Clinical evaluation and typical laparotomy findings in most cases supported by radiology and laboratory investigational pieces of evidence were considered for the diagnosis in this study. All the necessary examination was done and patients were managed carefully. Consent was taken using a written informed consent form. Data were analyzed using SPSS version 24.0. Different statistical methods were adopted. P value reached from Z- test. Significant difference at 95% confidence interval.

Inclusion criteria

- All patients admitted to surgery units of Dhaka Medical College Hospital have the diagnosis of ileal perforation at laparotomy.

Exclusion criteria

Patients having signs of peritonitis clinically but were not enrolled in this study were

- Ileal perforation due to trauma
- Duodenal ulcer perforation
- Appendicitis

RESULTS

The age of the patients varied from 15-60 years, with the average age being 28.05 years. The average age of males was 28.89 and females was 25.33 years. The highest incidence was in the third decade. In this study, 46 (76.67%) patients were male and 14 (23.33%) were female. Male: Female ratio was 3.28:1. [Table I]

Table – I: Age and sex incidence (*n*=60)

Age (years)	Male	Female	Total (%)
15–20	4	2	10.00%
21–30	24	6	50.00%
31–40	11	3	23.33%
41–50	5	2	11.67%
>50	2	1	5.00%
Total (Percentage)	46 (76.67%)	14 (23.33%)	100.00%
Male: Female Ratio		3.28:1	

Among 60 patients, 37 (67.67%) came from poor socioeconomic conditions, 18 were from average and 5 were from good socioeconomic backgrounds. [Table II]

Table – II: Socio-economic condition (*n*=60)

Socioeconomic Status	Number of Patients	Percentage
Poor	37	61.67%
Average	18	30.00%
Good	5	8.33%
Total	60	100.00%

P value reached from Z- test; Significant difference at 95% confidence interval, Z = 2.30, p = 0.02

In this study, all patients (100%) admitted with symptoms of acute abdomen presented with pain and abdominal distension, 20 patients (33.33%) with vomiting, 39 (65%) with constipation, and 6 (10%) with diarrhea.40 (66.67%) patients out of 60 were presented with fever. Fever was present ranging from 100 to 103^{0}F in 40 patients (66.67%). Mild to moderate dehydration, tenderness, and rigidity were present in all patients (100%). On percussion, liver dullness was found obliterated in 34 cases (56.67%). On auscultation, bowel sounds were absent in 51 cases (85%). 21 patients (35%) were admitted with features of shock. [Table III]

Table – III: Clinical presentation – symptoms and signs (*n*=60)

Type	Feature	Number of Patients	Percentage
Symptom	Fever	40	66.67%
	Pain in the abdomen	60	100.00%
	Vomiting	20	33.33%
	Abdominal distension	6	10.00%
	Constipation	39	65.00%
	Diarrhea	6	10.00%
Sign	Dehydration (Mild to moderate)	60	100.00%
	Rigidity	60	100.00%

ISSN: 2617-0817 E-ISSN: 2789-5912

	Absence of bowel sound	51	85.00%
	Obliteration of liver dullness	34	56.67%
	Tenderness	60	100.00%
	Shock	21	35.00%

Out of 60 cases, the site of perforation was found in the proximal ileum in 19 (31.67%) cases, distal ileum in 39 (65%) cases, and Meckel's diverticulum in 2 (3.33%) cases. Free ascariasis was found in the peritoneal cavity in only 2 (3.33%) cases, mesenteric lymphadenitis was observed in 42 (70%) cases, the gut was found unhealthy in 37 (61.67%) cases and omentum was found floating with no tendency to seal the perforation in 44 (73.33%) cases. [Table IV]

Table – IV: Laparotomy findings (*n*=60)

Findings	Number of Patients	Percentage
Perforation of proximal ileum	19	31.67%
Perforation of distal ileum	39	65.00%
Perforation of Meckel's diverticulum	2	3.33%
Free ascariasis in the peritoneal cavity	2	3.33%
Mesenteric lymphadenitis	42	70.00%
Unhealthy gut	37	61.67%
Floating omentum (no tendency to seal)	44	73.33%

Biopsy was taken from the edges of the perforation for histopathology which was done in the College pathology laboratory. Out of 60 cases, 35 (58.33%) were reported as typhoid ulcer, 8 (13.33%) as tubercular ulcer, 13 (21.67%) as nonspecific ulcer, 2 (3.33%) as Corhn's disease and 2 (3.33%) as Meckel's diverticular perforation. [Table V].

Table – V: Distribution of patients by histopathology (*n*=60)

Histopathology Report	Number of Patients	Percentage
Typhoid ulcer	35	58.33%
Tubercular ulcer	8	13.33%
Non-specific ulcer	13	21.67%
Meckel's diverticulum	2	3.33%
Crohn's disease	2	3.33%
Total	60	100.00%

P value reached from Z- test; Significant difference at 95% confidence interval, Z = 4.725 p < 0.001

DISCUSSION

In our study, non-traumatic ileal perforation (NTIP) was most common among young adults, with the majority (50%) aged 21–30 years. This aligns with findings from Sadaf et al., who also noted peak incidence in the third decade of life, with a mean age of 29 years [13]. The male predominance (male: female ratio of 3.28:1) observed here is supported by studies from Sharma et al., who attributed higher male incidence to increased outdoor exposure and occupational risk factors in endemic areas [14]. Low socioeconomic status emerged as a significant predisposing factor in our cohort, with 61.67% of patients belonging to poor backgrounds. Similar trends were observed in a systematic review by Mogasale et al., highlighting poor sanitation, contaminated water sources, and delayed healthcare access as primary contributors to enteric fever-related complications in resource-limited settings [15]. Clinically, all patients presented with abdominal pain, and most showed signs of generalized peritonitis—tenderness, rigidity, and dehydration being universal. This clinical profile is corroborated by Chalya et al., who reported comparable findings in their Tanzanian cohort, where 97% presented with pain and 100% had signs of peritonitis [16]. Fever (66.67%) and constipation (65%) were other frequent symptoms, consistent with results from Nuhu et al., where fever was reported in 65–70% of patients [17]. Shock at presentation, seen in 35% of our cases, is indicative of delayed admission and sepsis—a common feature in typhoid perforation noted by Abro et al. [18]. Laparotomy findings showed the distal ileum as the predominant site of perforation (65%), which concurs with the studies by Wani et al. reported over 60% of typhoid perforations occurring within 60 cm of the ileocecal junction [19]. Mesenteric lymphadenitis (70%) and unhealthy gut (61.67%) reflect the intense inflammatory response often seen in enteric infections. Floating omentum with poor sealing (73.33%) further explains the high incidence of generalized peritonitis and delayed healing in these patients. Histopathological examination confirmed typhoid ulcer as the most frequent cause (58.33%), followed by tubercular ulcer (13.33%) and non-specific ulcer (21.67%). These findings match previous studies from India and Pakistan, where typhoid remains the leading etiology in NTIP cases [1, 2, 20]. Tuberculosis, though less common, was observed in 13.33%, aligning with data from Ju et al. who reported tubercular ulcers in 1–15% of ileal perforations in their surgical population [21]. A Z-value of 4.725 and p-value < 0.001 demonstrated a highly significant correlation between the site and nature of the perforation observed during surgery and the subsequent histopathological confirmation. Similarly, patients from lower socioeconomic backgrounds (61.67%) were more likely to present with typhoid perforations—supported by a statistically significant difference (Z = 2.30, p = 0.02), reinforcing known associations between typhoid fever and inadequate sanitation or limited access to clean water. According to Qazi et al., typhoid ulcers characteristically localize in the distal ileum and are frequently associated with mesenteric lymphadenitis, which is also supported histologically [22].

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

This study highlights a significant correlation between laparotomy findings and histopathological diagnoses in cases of non-traumatic ileal perforation. The majority of distal ileal perforations were histologically confirmed as typhoid ulcers,

ISSN: 2617-0817 E-ISSN: 2789-5912

with statistical significance ($Z = 4.725$, $p < 0.001$), indicating that intraoperative findings can reliably predict the underlying pathology. Additionally, a significant association between low socioeconomic status and typhoid perforation ($Z = 2.30$, $p = 0.02$) suggests the need for public health interventions.

RECOMMENDATION

Based on the study findings, it is recommended that in cases of non-traumatic ileal perforation, detailed intraoperative assessment should be routinely correlated with histopathological evaluation to ensure accurate diagnosis and targeted treatment. Early surgical intervention, combined with timely histopathological analysis, can improve outcomes, particularly in settings with high prevalence of typhoid and tuberculosis. Public health measures aimed at improving hygiene and socioeconomic conditions are also essential to reduce the incidence of infectious perforations.

Funding: No funding sources
Conflict of interest: None declared

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