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Retrospective investigation of non-traumatic small intestine perforations: Our single center 7-year clinical experiences

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Abstract

Non-traumatic small intestine perforations (NTSIP) constitute a rare cause of acute surgical pathologies and have a high mortality and morbidity if not treated in time. Since the clinical presentation of the disease is non-specific, there may be delays in its diagnosis. Despite medical improvements, the mortality of NTSIP is still high today. This study aimed to investigate non-traumatic small intestine perforation, an entity that continues to pose diagnostic and therapeutic challenges for clinicians, through a retrospective analysis of patients who underwent surgery for this condition. Patients, who were operated due to NTSIP in our general surgery clinic between June 2017 and June 2024, were retrospectively examined. Patients under the age of 18 were not included in the study. In addition, cases with colon and/or stomach perforation were excluded from the study. Fifty-nine patients with NTSIP were included in the study. The mean age of the patients was determined as 61.9 ± 18.4 (19–86 years). Male/female ratio was 1.1. The most common causes of perforation were found as non-specific causes (35.6%), tumor (27.1%) and herniation (16.9%), respectively. Mortality rates were 20% in perforations due to herniation, 50% mesenteric ischemia and 62.5% tumors. NTSIP is a condition whose preoperative final diagnosis is difficult, whose surgical treatment selection is still discussed and which is an acute abdomen cause with high mortality and morbidity in case of delayed diagnosis and treatment. It is an important cause of acute abdomen, which should be evaluated with the selection of patient-specific surgical technique and multidisciplinary approach when necessary. As more homogeneous and larger-population studies on the subject are added to the literature, the questions in the minds of clinicians will be answered.

Keywords: Non-traumatic small intestine perforation, Crohn's disease, acute abdomen, mesenteric ischemia

Introduction

Abdominal luminal organ perforations are among the most important emergency pathologies in general surgery practice [1]. Non-traumatic small intestine perforations (NTSIP), on the other hand, constitutes a rare cause of acute surgical pathologies and has a high mortality and morbidity if timely intervention is not provided. There have been many causes in the etiology of NTSIP. While small intestine perforations due to infectious causes such as typhoid enteritis and tuberculosis with intestinal involvement are mostly observed in developing countries, small intestine perforations due to mesenteric ischemia, Crohn's disease and malignant tumors are mostly seen in developed countries [2,3].

Since the clinical presentation of the disease is non-specific, there may be delays in its diagnosis. Disease-related symptoms and examination findings, laboratory and radiological examination results may not fully help clinicians in the diagnosis, and the definitive diagnosis of the disease can usually be established after laparotomy. Its treatment is planned according to the primary cause of the disease and the degree of peritoneal contamination. Primarily repairing small intestine by suturing, anastomosis of the remaining intestines after resection or ileostomy after resection are among the current treatments of the disease. However, despite medical improvements, the mortality of NTSIP is still very high today, and mortality rates up to 40% have been reported in certain studies [4-6].

In this study, it was aimed to investigate non-traumatic small intestine perforation, an entity that still has question marks in the minds of clinicians in terms of diagnosis and treatment, in company with the patients operated to due to this disease.

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Material and Methods

Patients who were operated due to NTSIP in our general surgery clinic between June 2017 and June 2024 were retrospectively examined. Patients under 18 years of age and patients operated due to duodenal perforation were excluded from the study. In addition to small intestine perforation, cases with colon and/or stomach perforation were also excluded from the study. A total of 59 patients were included in the study. Medical file records, laboratory parameters, histopathology result reports of the patients were retrospectively examined. Patients' demographic and clinicopathological characteristics were recorded. This study was approved by the local ethics committee with the decision no. 14/13, dated July 10, 2024. This study was conducted in accordance with the World Medical Association Declaration of Helsinki-Ethical Principles for Medical Research Involving Human Subjects.

Statistical Evaluation

In the statistical evaluation, categorical data were expressed as number and percentage. Continuous variables were expressed as mean and standard deviation in case of normal distribution, and median value and minimum-maximum value when they were not appropriate for normal distribution.

Results

Fifty-nine patients with NTSIP were included in the study. The mean age of the patients was determined as 61.9±18.4 (19–86 years). Male/female ratio was 1.1. The most common etiologies were non-specific causes (35.6%), tumor (27.1%) and herniation (16.9%), respectively (Table 1).

Table 1. Descriptive characteristics

	Number	Percentage
Gender		
Female	29	49.2
Male	30	50.8
ASA score		
II	18	30.5
III	23	39.0
IV	15	25.4
V	3	5.1
Etiology		
Non-specific	21	35.6
Tumor	16	27.1
Herniation	10	16.9
Mesenteric ischemia	8	13.6
Crohn's Disease	4	6.8

*ASA: American Society of Anesthesiologists

The most common causes for admission were abdominal pain (88.1%) and nausea/vomiting (47.5%). Peritoneal irritation was observed in approximately four of five of the patients during physical examination (81.4%). The most common laboratory findings were high levels of CRP (98.3%), LDH (61.0%) and lactate (49.2%). Perforation finding was observed on CT imaging in 71.2% of the patients. Other imaging findings were abscess/free air appearance on USG (28.8%), free air on direct radiography (20.3%) and air fluid level on direct radiography (20.3%) (Table 2).

Table 2. Symptoms and findings of patients

	Number	Percentage
Application complaint		
Stomach ache	52	88.1
Nausea/vomiting	28	47.5
Constipation	18	30.5
Abdominal distension	16	27.1
Signs of peritoneal irritation	48	81.4
Lab		
CRP height	58	98.3
LDH height	36	61.0
Lactate high	29	49.2
Leukocytosis	26	44.1
Leukopenia	2	3.4
Imaging findings		
Finding of perforation on CT	42	71.2
Abscess/free fluid on USG	17	28.8
Free air on plain radiograph	12	20.3
Air liquid level on direct graph	12	20.3

*CRP: C reactive protein, LDH: lactate dehydrogenase, CT: computed tomography, USG: ultrasonography

Perforation was ileal in 55.9%, jejunal in 35.6% and mixed in 8.5% of the patients. Multiple perforations were detected in 32.2% of the cases. Surgical resection and anastomosis were the most preferred treatment methods (57.6%). They were followed by resection & ostomy (28.8%) and primary suture (13.6%). 30.5% of patients with small intestine perforations were lost (Table 3).

Table 3. Perforation-related characteristics and mortality rates of patients

	Number	Percentage
Perforation type		
Ileal	33	55.9
Jejunal	21	35.6
Jejunal+ileal	5	8.5
Number of perforations		
Single	40	67.8
Multiple	19	32.2
Surgical technique		
Resection+anastomosis	34	57.6
Resection+ostomy	17	28.8
Primary suture	8	13.6
Mortality	18	30.5

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Patient characteristics were evaluated based on perforation etiologies. The mean age of those with small intestine perforation due to mesenteric ischemia was high. The male/female ratio was 1.6/1 in perforations due to non-specific causes, 0.6/1 tumor, 0.6/1 herniation and 1.6/1 mesenteric ischemia. The rate of ileal perforation was 12.5% in mesenteric ischemia, 43.8% tumor, 71.4% non-specific etiology and 100% herniation. The mortality rate was 0% in non-specific etiology, 20% herniation, 50% mesenteric ischemia and 62.5% tumors (Table 4).

Table 4. Evaluation of patient characteristics according to perforation etiology

	Non-specific (n= 21)	Tumor (n=16)	Herniation (n=10)	Mesenteric ischemia (n=8)
	n (%)	n (%)	n (%)	n (%)
Age	60.5±21.4	57.3±10.7	67.0±14.5	79.7±5.0
Gender				
Female	13 (61.9)	6 (37.5)	4 (40.0)	5 (62.5)
Male	8 (38.1)	10 (62.5)	6 (60.0)	3 (37.5)
Application complaint				
Stomach ache	21 (100.0)	15 (93.8)	6 (60.0)	6 (75.0)
Nausea/vomiting	11 (52.4)	5 (31.3)	3 (30.0)	5 (62.5)
Constipation	3 (14.3)	7 (43.8)	6 (60.0)	2 (25.0)
Abdominal distension	4 (19.0)	3 (18.8)	2 (20.0)	5 (62.5)
Signs of peritoneal irritation	19 (90.5)	14 (87.5)	8 (80.0)	5 (62.5)
Lab				
CRP height	21 (100)	16 (100)	10 (100)	7 (87.5)
LDH height	11 (52.4)	12 (75.0)	3 (30.0)	6 (75.0)
Lactate high	8 (38.1)	8 (50.0)	4 (40.0)	7 (87.5)
Leukocytosis	9 (42.9)	3 (18.8)	5 (50.0)	5 (62.5)
Leukopenia	0	2 (12.5)	0	0
Imaging findings				
Finding of perforation on CT	18 (85.7)	7 (43.8)	5 (50.0)	8 (100.0)
Abscess/free fluid on USG	6 (28.6)	5 (31.3)	3 (30.0)	3 (37.5)
Free air on plain radiograph	3 (14.3)	3 (18.8)	2 (20.0)	2 (25.0)
Air liquid level on direct graph	2 (9.5)	6 (37.5)	4 (40.0)	0
Perforation type				
Ileal	15 (71.4)	7 (43.8)	10 (100.0)	1 (12.5)
Jejunal	4 (19.0)	8 (50.0)	0	5 (62.5)
Jejunal+ileal	2 (9.5)	1 (6.3)	0	2 (25.0)
Number of perforations				
Single	14 (66.7)	11 (68.8)	9 (90.0)	6 (75.0)
Multiple	7 (33.3)	5 (31.3)	1 (10.0)	2 (25.0)
Surgical technique				
Resection+anastomosis	14 (66.7)	9 (56.3)	5 (50.0)	4 (50.0)
Resection+ostomy	7 (33.3)	5 (31.3)	3 (30.0)	2 (25.0)
Primary suture	0	2 (12.5)	2 (20.0)	2 (25.0)
Mortality	0	10 (62.5)	2 (20.0)	4 (50.0)

*CRP: C reactive protein, LDH: lactate dehydrogenase, CT: computed tomography, USG: ultrasonography

Discussion

Acute surgical pathologies constitute one of the most important topics in general surgical practice. Although NTSIP is one of the rare causes of acute abdomen, it is important due to its difficulties in the diagnosis process as well as its high mortality and morbidity [7-9].

When the data of our study are examined, it is observed that the female and male populations are almost equal. In the study

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conducted by Dal et al. in Kayseri, patients with NTSIP were divided into two groups as with and without mortality. While the female-male distribution of the patients in the non-mortality group was reported almost equally like in our study, the male population was reported to be almost twice the female population in the non-mortality group [10]. It is thought that the fact that the study population was not homogeneous and that the patients included in the study had comorbid diseases may be effective in obtaining these results. In our study, the mean age of the patients was found as 61.9. When the studies conducted on the subject are examined, it has been reported that NTSIP is observed more frequently in patients over 60 [10,11].

When the etiologies of NTSIP are examined, it is seen that approximately 35% of the patients constitute non-specific perforations. Other causes were determined as tumor, herniation, mesenteric ischemia and Crohn's disease. When a comprehensive study conducted on the subject in Canada is examined, Crohn's disease, infectious diseases, Meckel's diverticulum and tumoral lesions have been reported in the etiology of NTSIP [12]. When the study conducted by Brihier et al. was examined, Crohn's disease was reported to be an important risk factor for NTSIP [13]. In our study, perforations due to Crohn's disease account for approximately 7% of the patients and are important in the etiology of the disease.

When the admission complaints of the patients are examined, it is seen that the majority of the patients are admitted with the complaint of abdominal pain, and the symptoms may be accompanied by nausea-vomiting, constipation and abdominal distension. In the study conducted by Wani et al., the most common complaint during admission was abdominal pain [14]. Moreover, in the same study, nausea-vomiting, constipation, abdominal distension and high fever were among the symptoms. Bradycardia, palpable spleen and hematochezia were reported in a small number of patients during physical examination.

The contamination degree of the peritoneum, general condition of the patients and operator preference were effective in the surgical methods preferred by the patients. While small intestine resection and anastomosis were selected in more than half of the patients, resection and end ileostomy and primary small intestine repair were preferred as surgical techniques for the remaining patient group. A study conducted on 47 patients in Singapore reported that the most preferred surgical technique was small intestine resection and anastomosis, as in our study [15]. When the study conducted by Babu et al. on performing ileostomy on patients was examined, it was reported that ileostomy should be avoided to the extent possible due to its unique complications and that anastomosis should be performed in appropriate patients [16]. Discussions among clinicians are still ongoing in the selection of surgical method, and the selection of appropriate treatment for the patient is important.

In our study, the mortality rate was found to be approximately 30% in the patients. When various studies investigating mortality in NTSIP are examined, high mortality and morbidity rates take attention [17-19].

Conclusion

NTSIP emerges as a condition whose preoperative final diagnosis is difficult, whose surgical treatment selection is still discussed and which is an acute abdomen cause with high mortality and morbidity in case of delayed diagnosis and treatment. It is an important cause of acute abdomen, which should be evaluated with the selection of patient-specific surgical technique and multidisciplinary approach when necessary. As more homogeneous and large-population studies on the subject are added to the literature, the question in the minds of clinicians will be answered.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
University of Health Sciences, Gulhane Health Application and Research Center was approved by the Scientific Research Evaluation Board dated 10.07.2024 and decision number 14/13.

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