

Original Research Article

A study of non-traumatic gastrointestinal perforations in a tropical country

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ABSTRACT

Background: Gastrointestinal perforations constitute one of the commonest surgical emergencies encountered by surgeons all over the world. However, non traumatic gastrointestinal perforations are more commonly seen in tropical countries. They cause considerable mortality and usually require emergency surgery. This study was designed to study the clinical spectrum of non traumatic gastrointestinal perforation in a tropical country and thereby assessing the surgical outcome.

Methods: An observational study was conducted in the department of general surgery, Mamata medical college, Khammam to analyse the clinical spectrum and their management protocol with outcome of the patients presenting with non traumatic gastrointestinal perforation. A total number of 140 patients of various etiologies of non traumatizing gastrointestinal perforations were found to be treated over a period of six years. Detailed demographic profile, clinical presentations and etiological factors were studied along with various management protocols offered to them with the outcome.

Results: Most common age of presentation was 41-60 years with 72% being males. Most common site of perforation was duodenum (28.57%) followed by stomach (25%). Peptic ulcer (53.57%) was the predominant etiology followed by appendicular perforation (15.71%), enteric perforation (12.85%), tubercular (4.28%), malignancy (1.42%) and diverticula (0.71%). Most common post-operative complication was wound infection (37.14%) followed by dyselectrolytaemia (31.42%). Mortality was 7.14%.

Conclusions: Gastrointestinal perforations constitute one of the commonest surgical emergencies. Non traumatic gastrointestinal perforations are quite common in a tropical country like India. The high rates of mortality among those, who present late, prompt an early diagnosis and active management protocol in order to reduce mortality and morbidity in such patients.

Keywords: Gastrointestinal perforation, Peritonitis, Laparotomy, Peptic ulcer

INTRODUCTION

Gastrointestinal perforations constitute one of the commonest surgical emergencies encountered by surgeons.¹ In spite of advances in perioperative care, antimicrobial therapy, and intensive care support, perforation peritonitis still has high morbidity and mortality.² The spectrum of etiology of perforation in tropical countries is different from its western

counterpart. In contrast to western countries where lower gastro-intestinal tract perforations predominate, upper gastro intestinal tract perforations constitute the majority of cases in India.³ Majority of cases present late in the hospital with well established generalized peritonitis and varying degree of septicaemia.⁴ Non traumatic gastrointestinal perforations as an entity have not received that much of importance as compared to perforations due to trauma or even malignancy.

Perforation is defined as an abnormal opening in a hollow organ or viscus. It is derived from the Latin perforatus, meaning “to bore through”.⁵

Management of perforative peritonitis poses significant challenges to the treating surgeons with respect to surgical outcome thereby demanding thorough evaluation and appropriate management in such cases.⁶ Cases of non traumatic gastrointestinal perforations are very common in surgical practice in a tropical country like India. This study was aimed to analyze the clinical spectrum of non traumatic gastrointestinal perforations managed surgically in terms of clinical presentations, etiology, management and surgical outcome in terms of post-operative complications and mortality.

METHODS

The present study was an observational study conducted in the department of general surgery, Mamata medical college and Hospital, Khammam. The study was done after permission from the ethical committee and research review board of the institute. A total number of 140 patients were included in this study, who were admitted and treated for non traumatic gastrointestinal perforations of various etiologies over a period from April 2015 to March 2021. Patients were selected for the study with following inclusion and exclusion criteria.

Inclusion criteria

Inclusion criteria for current study were; patients above 12 years of age, patients presenting with non traumatic gastrointestinal perforation and undergoing emergency laparotomy.

Exclusion criteria

Exclusion criteria for current study were; patients with primary peritonitis, patients with tertiary peritonitis following anastomotic leak, patients presenting with esophagus, pancreatobiliary tree, or genitourinary tract perforation, perforation following trauma.

Procedure

All patients admitted in the surgical wards with acute pain abdomen without any trauma were evaluated with detailed history of their illness with onset and duration of presenting symptoms. Past illness particularly relating to dyspepsia and any history of NSAID abuse was noted. Personal history especially for addictions like smoking and alcohol were recorded. After a general and abdominal examination suggesting peritonitis patients were subjected to investigations to confirm the diagnosis of perforation and to rule out any other cause. An X-ray erect abdomen and chest X-ray were obtained. A diagnosis of gastrointestinal perforation was made on the basis of history, clinical examination, and radiological evidence of presence of free gas under the diaphragm.

Ultrasound abdomen was done in all cases to look for any possible cause of peritonitis. Computed tomography scan was done in selected cases. Routine laboratory investigations were performed. Widal test was done in cases suspicious of typhoid perforation. After adequate resuscitation, patient was posted for exploratory laparotomy. Based on the intra operative finding further management was decided by the operating surgeon. Peritoneal lavage was done using warm saline of about 5-6L. Intra operative findings were recorded and the peritoneal fluid was sent for culture sensitivity. Biopsy was taken in required cases and sent for histopathological examination. All the patients were managed postoperatively in surgical HDU or surgical intensive care unit and postoperative complications including mortality were recorded. Data was entered in Microsoft Excel sheet and analyzed using proportions

RESULTS

A total of 140 patients were studied and the recorded findings were analyzed. The most common age group in the study population was between 41-60 years of age, comprising 42.14% of total cases (Table 1). Among 140 patients 101 patients were males and 39 patients were females. Male:female ratio was 2.6:1 (Table 1).

Table 1: Age and sex distributions (n=140).

Parameters	N	%
Age group (years)		
<20	17	12.14
21-40	36	25.71
41-60	59	42.14
61-80	27	19.28
>80y	01	0.71
Sex distribution	Male-101 Female -39	F:M=2.6:1

The most common clinical presentation was abdominal distension, seen in 100 (71.42%) cases followed by pain abdomen in 94 (67.14%) cases; vomiting in 88 (62.88%) cases; constipation in 62 (44.28%) cases; and fever in 35 (25%) cases. It was also observed that 19 (13.57%) cases presented with shock (Table 2).

Table 2: Mode of clinical presentations (n=140).

Presentation	N	%
Abdominal distension	100	71.42
Pain abdomen	94	67.14
Vomiting	88	62.85
Constipation	62	44.28
Fever	35	25
Shock	19	13.57

The most common site of perforation was duodenum seen in 40 (28.57%) cases; stomach in 35 (25%) cases; small bowel (ileum and jejunum) in 33 (23.57%) cases; colon

in 10 (7.14%) cases, whereas appendicular perforation was noted in 22 (15.71%) cases (Table 3). Simple closure, repair of perforation with an omental patch, trimming of ulcer edge & closure, wedge excision and anastomosis, resection and anastomosis, and hemicolectomy were the various operative modalities performed for different pathology depending on the type and site of the perforations. Appendectomy was the procedure of choice in case of appendicular perforation. The details of operative procedures are depicted in (Table 4).

Table 3: Site of perforations (n=140).

Site of perforation	N	%
Duodenum	40	28.57
Stomach	35	25
Small bowel (ileum and jejunum)	33	23.57
Colon	10	7.14
Appendix	22	15.71

Table 4: Operative procedures (n=140).

Site of perforation	Procedure	N	%
Duodenum	Graham's omental patch closure	40	28.57
Stomach	Edge biopsy+omental patch closure	35	25
Small bowel (ileum and jejunum)	Resection and anastomosis	31	22.14
	Perforation closure	02	1.42
Appendix	Appendectomy	22	15.71
	Hemicolectomy	09	6.42
Colon	Hartmann's procedure	01	0.71

Peritoneal fluid was sent for Gram stain and culture sensitivity in all cases. Among 140 cases bacterial peritonitis was seen in 135 (96.4%) cases, whereas fungal growth was isolated in 05 (3.6%) cases. In all the 140 cases, histopathological study was done from the perforation. The most common etiology of perforation was peptic ulcer, seen in 75 (53.57%) cases; enteric perforation in 18 (12.85%) cases; tubercular in 06 (4.28%) cases; carcinoma colon in 02 (1.42%) cases; jejunal diverticulum in 01 (0.71%) case and appendicular perforation in 22 (15.71%) cases. Perforations due to non specific causes were found in 16 (11.42%) cases (Table 5). All the cases of enteric (Figure 1), as well as tubercular perforations (Figure 2) were found in ileum only.

Table 5: Etiology of perforations (n=140).

Etiology	N	%
Peptic ulcer	75	53.57
Enteric	18	12.85
Tubercular	06	4.28
Carcinoma colon	02	1.42
Jejunal diverticulum	01	0.71
Appendicitis	22	15.71
Non-specific	16	11.42

Post operatively all the enteric perforation cases were treated with Ceftriaxone 2 gm i.v. 12 hourly. Tubercular perforation cases were subjected to anti tubercular treatment (ATT) for 06 months with 2EHRZ+4 HR regime followed by review after 06 months. Peptic perforation cases were treated with H pylori kit for 14 days followed by proton pump inhibitors (PPI) for 06

weeks. All the 05 cases of fungal peritonitis were due to Candida infection and they were treated with fluconazole.

Other bacterial peritonitis cases were treated with culture specific antibiotics. In this study, postoperative complications were seen in 63 (45%) cases, among which surgical site infection (37.14%) was the most common complication followed by dyselectrolytemia (31.42%), lung infection (15.71%), acute renal failure (12.85%), septic shock (4.28%), anastomotic leak (1.42%) and burst abdomen (1.42%). Mortality was seen in 10 cases (7.14%) (Table 6). Among 10 cases mortality was attributed to septic shock in 05 (3.57%) cases, fungal peritonitis in 04 (2.86%) cases and renal failure in 01 (0.71%) of cases. Mortality was high in cases of fungal peritonitis, where 04 patients out of 05 succumbed to death.

Table 6: post-operative complications (n=140).

Postoperative complications	N	%
Surgical site infection (SSI)	52	37.14
Dyselectrolytemia	44	31.42
Lung infection	22	15.71
Acute renal failure	18	12.85
Septic shock	06	4.28
Anastomotic leak	02	1.42
Burst abdomen	02	1.42
Death	10	7.14

DISCUSSION

Generalized peritonitis is one of the most common surgical emergencies.⁷ Gastrointestinal perforations have been classified into those of the upper gastrointestinal

tract, comprising the stomach, duodenum and small intestine, and the lower gastrointestinal tract, comprising the appendix and large intestine.⁸ The spectrum of etiology of perforation in India continues to be different and there is paucity of data from India regarding etiology, prognostic indicators, and morbidity and mortality patterns at national level. Management of perforation peritonitis not only requires prompt resuscitation measures and improved surgical strategies but also intensive postoperative care including disease specific treatment and maintenance of proper electrolyte balance; only then an improved outcome will be achieved.



Figure 1: Enteric perforation in terminal ileum.



Figure 2: Tubercular Perforation in ileum showing multiple perforations and enlarged lymph nodes.

In the present study, the most common age of presentation was in 4th and 5th decades of life, this is in accordance with a similar study done by Jain et al.⁴ Males were predominant in this study, with the male to female ratio being 2.6:1, which was similar to a 10 yrs study done by Agarwal et al where the male to female ratio was 2:1.⁹ In this study, the most common presenting complaint was abdominal distension associated with abdominal pain and tenderness. Patients presenting with shock were 19 (13.57%) and these patients had poor outcome compared to others. The results were similar to a study done by Singla et al where the most common presenting complaint was acute abdominal pain and 14% of patients presented in shock.⁷

In the present study the most common site of perforation was duodenum (28.57%) followed by stomach (25%),

small bowel (23.57%), appendix (15.71%) and large bowel (7.14%). This was similar to a study by Meena et al. where gastroduodenal (46.4%) was the most common site of perforation followed by small bowel (41%), appendix (8.1%) and large bowel (4.5%).⁵ More commonly the perforations involve the proximal part of the gastrointestinal tract; this being in contrast to studies from the western countries, where perforations are common in the distal part.³ Generalized peritonitis due to perforation of the small bowel is seen more commonly in the developing countries, where it is usually secondary to perforation of typhoid ulcers as seen in enteric fever in the present series. Nonspecific or idiopathic ulcer perforation and tubercular ulcer perforations are the next common cause in most of the series.⁷⁻⁹ Perforation of the terminal ileum constitutes the fifth most common cause of abdominal emergencies in the tropical countries.¹⁰ In this study the most common etiology of gastrointestinal perforation was peptic ulcer disease (53.57%), followed by typhoid perforation (12.85%), tuberculosis (4.28%) and malignancy (1.42%). Appendicular perforations were seen in 15.71% cases. Interestingly, 11.42% cases had perforations due to nonspecific inflammation. This was similar to a study done by Yadav et al in which the most common cause of perforation was peptic ulcer disease followed by typhoid perforation.¹¹ The first clinical description of a perforated peptic ulcer was made in 1670 in princess Henrietta of England. Since then several notable people have succumbed to this illness over the years.¹² In the advent of proton pump inhibitors and recognition of *H. pylori* as the most common etiology of peptic ulcer and appropriate medical management the advent of peptic ulcer perforations have decreased compared to previous days.

Peptic ulcer disease is a problem of the gastrointestinal tract characterized by mucosal damage secondary to pepsin and gastric acid secretion. It usually occurs in the stomach and proximal duodenum; less commonly, it occurs in the lower esophagus, the distal duodenum, or the jejunum, as in unopposed hypersecretory states such as Zollinger-Ellison syndrome, in hiatal hernias (Cameron ulcers), in ectopic gastric mucosa (e.g., in Meckel's diverticulum).¹³

Typhoid intestinal perforation (TIP) is the most serious complication of typhoid fever. It has been reported in 0.8% to 39% of patients, with a striking difference between high-income and poor resources countries.¹⁴ An exhaustive study in India shows that enteric fever is responsible for nearly 87% of all non-traumatic small bowel perforations with mortality between 11% to 34%.¹⁵ In one of the Indian study the commonest cause of non-traumatic perforation of small intestine was found to be typhoid (46.4%), followed by non-specific inflammation (39.2%), tuberculosis (12.8%) and malignant neoplasm (1.6).¹⁶ Also studies from the west have shown that around 15-20% cases are due to malignancy.⁶ This being in contrast to the present study, where malignancy was ascertained to be the cause of perforation peritonitis in

only 1.42% of the cases. Tuberculosis was found to be the cause of perforation in 4.28% of cases in the present study. A diagnosis of tuberculosis was proven on histopathological examination of resected segments of intestine, edges of perforations, omentum and mesenteric lymph nodes showing epithelioid cell granulomas with Langhan's giant cells and caseation necrosis. The diagnosis of appendicitis and malignancy was confirmed by histopathological examination. In tropical countries like India majority of cases of perforation were also attributed to infections. However increase in sanitation and hygiene and measures such as screening and use of appropriate antibiotics in correct time frame has led to decrease in the complications associated with these infections like enteric fever and tuberculosis.

Bacterial peritonitis was seen in 96.42% of cases and fungal peritonitis in 3.6% of cases in this study. This data was similar to study done by Singla et al. where bacterial growth was isolated in 76.3% of cases.⁷ Mortality was seen in 4 out of 5 cases of fungal peritonitis due to Candida infection. Intra-abdominal candidiasis (IAC) is the second most common type of invasive candidiasis after blood infection. The fungal peritonitis may result in systemic infection, multiple organ dysfunction syndrome (MODS), and lethal outcome. Despite the progress in the diagnostics and treatment of patients with fungal peritonitis, the mortality remains high (ranging between 11% and 60%). The fungal peritonitis can be difficult to diagnose, as clinical manifestations (such as fever, abdominal pain, leucocytosis, cloudy exudates in the abdominal cavity, etc.) of mycotic and bacterial peritonitis are identical.¹⁷

The condition is ultimately diagnosed by: lack of effect of antibacterial therapy for three days; positive peritoneal fluid samples for yeasts by Gram staining; and positive samples for fungi. Timely initiated adequate treatment is crucial for the outcome of patients with fungal peritonitis.¹⁷ In this study among 140 cases postoperative complications were seen in 45% of cases with wound infection being the most common complication followed by dyselectrolytemia, lung infection, acute renal failure, burst abdomen, anastomotic leak and death. The results were similar to a study done by Memon et al and Mukherjee et al.^{1,18} Morbidity from other post-operative complications ranges from 8.8% to 71.3% cases.¹⁹ Delay in operative intervention adversely affects the survival rate after surgery. Increasing the time interval between perforation and operation significantly increases the mortality ($p < 0.05$).²⁰ In the present study among 140 cases, mortality was seen in 10 (7.14%) cases. This data was similar to a study done by Doklestic et al where the mortality was 8.82% and Jhobta et al where mortality was 10%.^{3,21}

CONCLUSION

The spectrum of perforation peritonitis in India continues to be different from its western counterpart with duodenal

ulcer perforation, appendicular perforation, typhoid and tuberculosis being the major causes of generalized peritonitis. Early surgical intervention along with broad spectrum antibiotics supported by adequate aggressive resuscitation and correction of electrolyte imbalances followed by definitive treatment for infections like tuberculosis and enteric fever in immediate postoperative period, is essential for good outcomes minimizing morbidity and mortality.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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