

Etiopathological Spectrum, Clinical Profile, and Outcomes of Gastrointestinal Perforations: A Cross-Sectional Observational Study at a Tertiary Care Institute

Jashandeep Singh¹, N. L. Vyas², Mayank³

¹3rd Year Resident, Department of Surgery, JNU Medical College, Jaipur, Rajasthan, India

²Professor and HOD, Department of Surgery, JNU Medical College, Jaipur, Rajasthan, India

³3rd Year Resident of General Surgery, JNU Hospital, Jaipur, Rajasthan, India

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Corresponding author: Dr. Jashandeep Singh

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Abstract

Background: Gastrointestinal (GI) perforation is a premier surgical emergency associated with substantial morbidity and mortality. Delayed diagnosis, generalized fecal peritonitis, and septic shock drive poor clinical outcomes.

Methods: A hospital-based cross-sectional study was conducted at JNUIMSRC, Jaipur over 18 months evaluating 45 consecutive adult patients with intraoperatively confirmed GI perforation. Full demographic, clinical, operative, etiopathological, and complication profiles were recorded and analyzed via IBM SPSS v26.0.

Results: Mean age was 43.20 ± 14.67 years (range 19–72 years) with 77.8% males (M:F 3.5:1). Abdominal pain was universal (100%), followed by anorexia (91.1%), fever (88.9%), and vomiting (80.0%). The ileum was the leading anatomical perforation site (37.8%), followed by prepyloric/antral (17.8%) and appendix (17.8%). Peptic ulcer disease (33.3%) and typhoid fever (22.2%) were primary causes. Graham's patch repair (33.3%) was the commonest procedure. Postoperative complications occurred in 40.0%, led by surgical site infection (33.3%). Overall mortality was 6.7%.

Conclusion: Peptic ulcer disease and enteric infections predominate. Delay >5 days ($p < 0.001$), fecal peritonitis ($p = 0.008$), age ≥ 60 years ($p = 0.002$), and complications ($p = 0.023$) significantly predicted mortality.

Keywords: Gastrointestinal Perforation, Perforation Peritonitis, Peptic Ulcer Disease, Ileal Perforation, Emergency Laparotomy.

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Introduction

Gastrointestinal perforation is one of the most critical surgical emergencies encountered in general surgery. Full-thickness disruption of the GI tract wall permits direct leakage of acid, bile, pancreatic juice, and fecal material into the peritoneal cavity, triggering immediate chemical or severe bacterial peritonitis.

Without rapid fluid resuscitation and definitive surgical source control, patients rapidly progress to systemic inflammatory response syndrome (SIRS), septicemia, multiorgan dysfunction syndrome (MODS), and mortality. Globally, the etiopathological spectrum exhibits profound geographic and socioeconomic variation.

High-income Western nations predominantly encounter perforations secondary to peptic ulcer disease, diverticulitis, colorectal malignancy, and endoscopic trauma. In sharp contrast, developing

nations like India bear a disproportionate burden of infectious perforations caused by enteric fever (typhoid) and intestinal tuberculosis, particularly affecting young, economically active individuals. Region-specific epidemiological profiling is therefore vital to guide diagnostic pathways and surgical decision-making.

Materials and Methods

Study Design & Setting: This hospital-based cross-sectional observational study complied with STROBE guidelines and was conducted in the Department of General Surgery, JNUIMSRC, Jaipur, and Rajasthan over an 18-month period following institutional ethics committee (IEC) approval.

Study Population & Eligibility: Inclusion criteria comprised adult patients (age ≥ 18 years) admitted with clinical/radiological signs of acute abdomen

who had intraoperatively confirmed GI perforation and provided written informed consent. Exclusion criteria were age <18 years, non-operative management, incomplete records, or refusal of consent.

Sample Size & Statistical Analysis: Calculated using Epi Info based on reported GI perforation incidence (2.86%), 95% confidence level, and 5%

error margin (minimum n=43; 45 enrolled). Data entered in Excel and analyzed via SPSS v26.0.

Continuous data expressed as mean $\pm$ SD; categorical variables as frequencies and percentages. Associations evaluated using Chi-square or Fisher's exact test ($p < 0.05$ considered statistically significant).

Table 1: Demographics (n=45)

Variable / Age Group	Frequency (n)	Percentage (%)
18–20 Years	1	2.2%
21–30 Years	10	22.2%
31–40 Years	10	22.2%
41–50 Years	9	20.0%
51–60 Years	8	17.8%
> 60 Years	7	15.6%
Sex: Male / Female	35 / 10	77.8% / 22.2%

Clinical Presentation & Risk Factors:

Abdominal pain was the universal cardinal presentation (100%). Systemic toxicity manifestations included anorexia (91.1%), fever (88.9%), and vomiting (80.0%). Constipation was present in 44.4%, abdominal distension in 31.1%, breathlessness in 31.1%, and diarrhea in 15.6%. Mean symptom duration before presentation was 3.02 ± 1.90 days (range: 1–7 days). While 51.1%

presented within 2 days, 11.1% presented after 5 days.

Associated comorbidities included diabetes mellitus (31.1%), hypertension (31.1%), previous peptic ulcer disease (26.7%), tuberculosis (17.8%), and prior abdominal surgery (11.1%). Modifiable lifestyle risk factors were highly prevalent: alcohol consumption (62.2%), chronic smoking (55.6%), and unmonitored NSAID use (48.9%).

Table 2: Clinical Presentation

Clinical Presentation	n	%
Abdominal Pain	45	100.0%
Anorexia	41	91.1%
Fever	40	88.9%
Vomiting	36	80.0%
Nausea	24	53.3%
Constipation	20	44.4%
Abdominal Distension	14	31.1%
Breathlessness	14	31.1%
Diarrhea	7	15.6%

Table 3: Duration of Symptoms

Duration	n	%
≤ 2 Days	23	51.1%
3 – 5 Days	17	37.8%
> 5 Days	5	11.1%

Table 4 & 5: Comorbidities & Risk Factors

Comorbidities & Risk Factors	n	%
Diabetes Mellitus / Hypertension	14 / 14	31.1% / 31.1%
Previous Peptic Ulcer Disease	12	26.7%
Tuberculosis / Previous Surgery	8 / 5	17.8% / 11.1%
Alcohol Consumption	28	62.2%
Smoking History	25	55.6%
NSAID Abuse / Regular Use	22	48.9%

Anatomical Site & Etiology: The ileum was the commonest anatomical site of perforation (37.8%), followed by prepyloric/gastric antrum (17.8%) and appendix (17.8%). Duodenal perforations accounted for 8.9%, gastric

body 6.7%, and colon 6.7%, and jejunum 4.4%. Peptic ulcer disease was the primary etiology (33.3%), followed by typhoid fever (22.2%), appendicitis (17.8%), tuberculosis (15.6%), malignancy (6.7%), ischemia (2.2%), and obstruction (2.2%).

Table 6: Anatomical Site

Anatomical Site	n	%
Ileum	17	37.8%
Prepyloric / Antrum	8	17.8%
Appendix	8	17.8%
Duodenum	4	8.9%
Gastric Body	3	6.7%
Colon	3	6.7%
Jejunum	2	4.4%

Table 7: Etiological Distribution

Etiology	n	%
Peptic Ulcer Disease	15	33.3%
Typhoid Fever	10	22.2%
Appendicitis	8	17.8%
Tuberculosis	7	15.6%
Malignancy	3	6.7%
Ischemia / Obstruction	1 / 1	2.2% / 2.2%

Operative Findings & Procedures

Single perforations occurred in 88.9%, two in 8.9%, and three in 2.2%.

Intraperitoneal contamination was bilious in 42.2%, purulent in 37.8%, fecal in 31.1%, feculent in 13.3%, and serous in 6.7%. Mean perforation size

was 1.17 ± 0.61 cm (53.3% were 1–2 cm). Surgical procedures performed: Graham's omental patch repair (33.3%), primary closure (22.2%), appendectomy (17.8%), resection with anastomosis (11.1%), primary closure + ileostomy (4.4%), resection + ileostomy (4.4%), hemicolectomy + stoma (4.4%), and Hartmann's procedure (2.2%).

Table 8: Surgery & Procedures

Procedure / Operative Finding	n	%
Single Perforation / Fecal Peritonitis	40 / 14	88.9% / 31.1%
Graham's Omental Patch Repair	15	33.3%
Primary Closure / Repair	10	22.2%
Appendectomy	8	17.8%
Resection & Primary Anastomosis	5	11.1%
Primary Closure + Ileostomy / Resection + Ileostomy	2 / 2	4.4% / 4.4%
Hemicolectomy / Hartmann's Procedure	2 / 1	4.4% / 2.2%

Postoperative Morbidity & Mortality: Eighteen patients (40.0%) developed postoperative complications. Surgical site infection (SSI) was predominant (33.3%), followed by sepsis (20.0%), respiratory compromise (20.0%), burst abdomen

(8.9%), anastomotic leak (4.4%), and fecal fistula (2.2%). Overall, 42 patients (93.3%) were discharged successfully, while 3 patients (6.7%) died during hospitalization. Mean hospital stay was 17.36 ± 8.39 days.

Table 9: Complications & Outcomes

Complication / Outcome	n	%
Overall Postoperative Complications	18	40.0%
Surgical Site Infection (SSI)	15	33.3%
Sepsis / Respiratory Compromise	9 / 9	20.0% / 20.0%
Burst Abdomen / Anastomotic Leak	4 / 2	8.9% / 4.4%
Successfully Discharged	42	93.3%
In-Hospital Mortality	3	6.7%
Mean Hospital Stay	17.36 ± 8.39 Days	-

Table 10: Predictors of Mortality

Predictor Variable	P-Value	Significance
Duration of Symptoms (> 5 Days)	$p < 0.001$	Statistically Significant
Age Group (≥ 60 Years)	$p = 0.002$	Statistically Significant
Presence of Fecal Peritonitis	$p = 0.008$	Statistically Significant
Postoperative Complications	$p = 0.023$	Statistically Significant

Discussion

This cross-sectional study offers important epidemiological insights into GI perforations in Rajasthan, India. The mean age of 43.2 years and male predominance of 77.8% (M:F 3.5:1) mirror findings by Sandu et al. (21–30 peak age, 61% males) and Nagori et al. Male vulnerability is strongly linked to lifestyle factors: alcohol abuse (62.2%), smoking (55.6%), and over-the-counter NSAID consumption (48.9%). NSAIDs inhibit gastric mucosal prostaglandin synthesis, impairing defense barriers. In developing countries, infectious diseases remain a dominant cause of small bowel perforation. Ileal perforations comprised 37.8% of cases, driven by typhoid fever (22.2%) and tuberculosis (15.6%). This contrasts with Western studies where colonic diverticular and malignant perforations predominate. Peptic ulcer disease was the single leading cause (33.3%), reflecting the dual burden of acid-peptic and infectious pathologies. Delayed hospital presentation was strongly predictive of mortality ($p < 0.001$). Delay permits continued contamination, progressive bacteremia, septic shock, and multi-organ failure. All deaths (6.7%) occurred in patients presenting after 5 days, suffering fecal peritonitis ($p = 0.008$), and aged ≥ 60 years ($p = 0.002$). Graham's patch repair remains ideal for peptic ulcers, whereas resection or stoma creation is required for friable infectious bowel lesions.

Conclusion & Declarations

GI perforation carries substantial morbidity in developing nations. Early diagnosis, aggressive fluid resuscitation, rapid surgical source control,

and public health sanitation measures targeting enteric fever are essential to improve clinical survival.

Ethics & Consent: Approved by IEC JNUIMSRC, Jaipur. Written informed consent obtained.

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