

Gastrointestinal Perforations: A Prospective Observational Study of Clinical Profile, Etiology, Management and Outcomes

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Abstract

Background: Gastrointestinal perforation is a potentially life-threatening surgical emergency associated with significant morbidity and mortality. Early diagnosis, prompt resuscitation, appropriate antimicrobial therapy and timely surgical intervention are essential for favorable outcomes.

Aim: To study the clinical profile, etiological spectrum, anatomical distribution, management and postoperative outcomes of patients presenting with gastrointestinal perforation.

Materials and Methods: A prospective observational study was conducted in the Department of General Surgery, Government Medical College, Srinagar, over two years from January 2024 to December 2025. Sixty adult patients aged >18 years with gastrointestinal perforation were included. Traumatic gastrointestinal perforations were excluded. Demographic, clinical, radiological, operative and postoperative data were recorded prospectively. The Mannheim Peritonitis Index (MPI) was incorporated as a prognostic assessment tool.

Results: out of 60 patients, 56 (93.3%) were male and 4 (6.7%) female. Gastric perforation was most common (29; 48.3%), followed by duodenal (22; 36.7%), small bowel (6; 10.0%) and sigmoid (3; 5.0%). Peptic ulcer disease accounted for 45 (75.0%) cases, typhoid for 8 (13.3%) and malignancy for 7 (11.7%). Abdominal pain was the most common presenting symptom. Forty-eight patients (80.0%) presented after 24 hours. X-ray was performed in all patients and demonstrated free subdiaphragmatic gas in 56 (93.3%); CT was performed in 40 (66.7%). Modified Cellan-Jones repair was performed in 42 (70.0%), primary repair in 14 (23.3%) and resection with anastomosis in 4 (6.7%). Wound infection occurred in 16 (26.7%), anastomotic leak in 2 (3.3%), ICU care was required in 9 (15.0%), and 3 (5.0%) patients died.

Conclusion: Gastrointestinal perforation remains an important surgical emergency. In this cohort, peptic ulcer disease was the predominant etiology and gastric perforation the most frequent site. Early resuscitation, appropriate antibiotics, timely imaging and definitive surgical management remain fundamental to improving outcomes.

Keywords: gastrointestinal perforation; perforation peritonitis; peptic ulcer; Cellan-Jones repair; Mannheim Peritonitis Index; postoperative complications.

1. Introduction

Gastrointestinal perforation is a serious surgical emergency resulting in spillage of gastrointestinal contents into the peritoneal cavity and subsequent development of localized or generalized peritonitis. The clinical course can rapidly progress to sepsis, septic shock, multiorgan dysfunction and death if diagnosis and definitive treatment are delayed.

The etiological spectrum varies according to geographical region and may include peptic ulcer disease, infective causes such as typhoid, malignancy and other non-traumatic causes. Gastroduodenal perforation remains an important cause of emergency surgical admission.

Clinical assessment remains central to diagnosis. Abdominal pain, tenderness, guarding, vomiting and fever are common findings. Plain radiography may demonstrate pneumoperitoneum, particularly free subdiaphragmatic air, while computed tomography provides more detailed information regarding the site of perforation, pneumoperitoneum and associated intra-abdominal collections.

Management consists of prompt resuscitation, gastrointestinal decompression, intravenous fluids, broad-spectrum antibiotics and definitive surgical treatment. The choice of operation depends on the site and etiology of perforation, tissue viability, degree of contamination and physiological status.

The Mannheim Peritonitis Index (MPI) is a validated prognostic scoring system incorporating demographic, clinical and intraoperative parameters and can be used to assess severity and risk of adverse outcomes in peritonitis.

2. Aim and Objectives

Aim: To evaluate the clinical profile, etiology, management and outcomes of patients with gastrointestinal perforation.

1. To study the demographic profile of patients presenting with gastrointestinal perforation.
2. To determine the anatomical distribution and etiological spectrum.
3. To evaluate clinical presentation and duration of symptoms before admission.
4. To assess the role of plain radiography and CT in diagnosis and localization.
5. To study operative findings and surgical procedures performed.
6. To assess postoperative morbidity, ICU requirement, hospital stay and mortality.
7. To incorporate the Mannheim Peritonitis Index as a prognostic assessment tool.

3. Materials and Methods

Study design: Prospective observational study.

Study setting: Department of General Surgery, Government Medical College, Srinagar, Jammu and Kashmir, India.

Study period: January 2024 to December 2025.

Study population: Sixty adult patients aged >18 years with gastrointestinal perforation requiring surgical management.

Exclusion criterion: Patients with traumatic gastrointestinal perforation were excluded.

Data collection: Demographic characteristics, clinical presentation, duration of symptoms, laboratory investigations, radiological findings, operative findings, operative procedures, postoperative complications, ICU requirement, duration of hospital stay and mortality were recorded prospectively.

Initial management: Patients were kept nil per oral on admission. A Ryle's tube was inserted for gastric decompression. Intravenous fluid resuscitation and intravenous broad-spectrum antibiotics were initiated. Analgesia was provided while avoiding NSAIDs, and proton-pump inhibitors were administered where indicated. Antibiotics were generally continued for 2–4 days according to clinical condition.

Investigations: CBC, kidney function tests, liver function tests and coagulation profile were performed. Leucocytosis was a common finding.

Radiological evaluation: Plain X-ray examination was performed in all 60 patients. Chest radiographs including both diaphragmatic domes were obtained to assess for pneumoperitoneum. Free gas under the diaphragm was demonstrated in

56 patients (93.3%). CECT abdomen and pelvis was performed in 40 patients (66.7%) for further assessment of the site of perforation, pneumoperitoneum and intra-abdominal collections.

Operative management: All patients underwent surgical management. Procedure selection was based on site and cause of perforation, tissue condition, degree of contamination, extent of peritonitis and intraoperative findings.

Mannheim Peritonitis Index: MPI was incorporated as a prognostic scoring system to assess severity of peritonitis. It includes age, sex, organ failure, malignancy, duration of symptoms, extent of peritonitis and nature of peritoneal contamination.

4. Results

A total of 60 adult patients were included. Symptoms and comorbidities were overlapping; therefore, their frequencies were not treated as mutually exclusive.

4.1 Demographic Characteristics

Age group	Number	Percentage
18–<30 years	32	53.3%
30–50 years	25	41.7%
>50 years	3	5.0%
Total	60	100%

Sex	Number	Percentage
Male	56	93.3%
Female	4	6.7%
Total	60	100%

4.2 Duration of Symptoms

Duration	Number	Percentage
<24 hours	12	20.0%
24–48 hours	36	60.0%
>48 hours	12	20.0%
Total	60	100%

Overall, 48 patients (80.0%) presented after 24 hours of symptom onset.

4.3 Clinical Presentation

Abdominal pain was the most common presenting symptom. Other presenting features included vomiting, fever, abdominal tenderness, guarding, tachycardia and shock. These findings overlapped in individual patients.

4.4 Anatomical Site of Perforation

Site	Number	Percentage
Gastric	29	48.3%
Duodenal	22	36.7%
Small bowel	6	10.0%
Sigmoid	3	5.0%
Total	60	100%

4.5 Etiology

Etiology	Number	Percentage
Peptic ulcer disease	45	75.0%
Typhoid	8	13.3%
Malignancy	7	11.7%
Total	60	100%

4.6 Comorbidities

Comorbidity	Number	Percentage
Diabetes mellitus	12	20.0%
Hypertension	11	18.3%
COPD	5	8.3%
AKI	2	3.3%

Comorbidities were overlapping and therefore do not sum to the total study population.

4.7 Radiological Findings

Investigation/finding	Number	Percentage
X-ray performed	60	100%
Free gas under diaphragm	56	93.3%
CECT abdomen/pelvis	40	66.7%

4.8 Operative Findings

Finding	Number	Percentage
Pus present	12	20.0%
Localized peritonitis	33	55.0%
Diffuse peritonitis	27	45.0%
Single perforation	58	96.7%
Multiple perforations	2	3.3%

4.9 Operative Procedures

Procedure	Number	Percentage
Modified Cellan-Jones repair	42	70.0%
Primary repair	14	23.3%
Resection with anastomosis	4	6.7%
Total	60	100%

4.10 Postoperative Outcomes

Outcome	Number	Percentage
Wound infection	16	26.7%
Anastomotic leak	2	3.3%
ICU requirement	9	15.0%
Mortality	3	5.0%

The three deaths occurred in three different patients and were associated with severe complications including septic shock, disseminated intravascular coagulation and anastomotic leak. Average hospital stay was approximately 4–5 days.

5. Radiological Figures

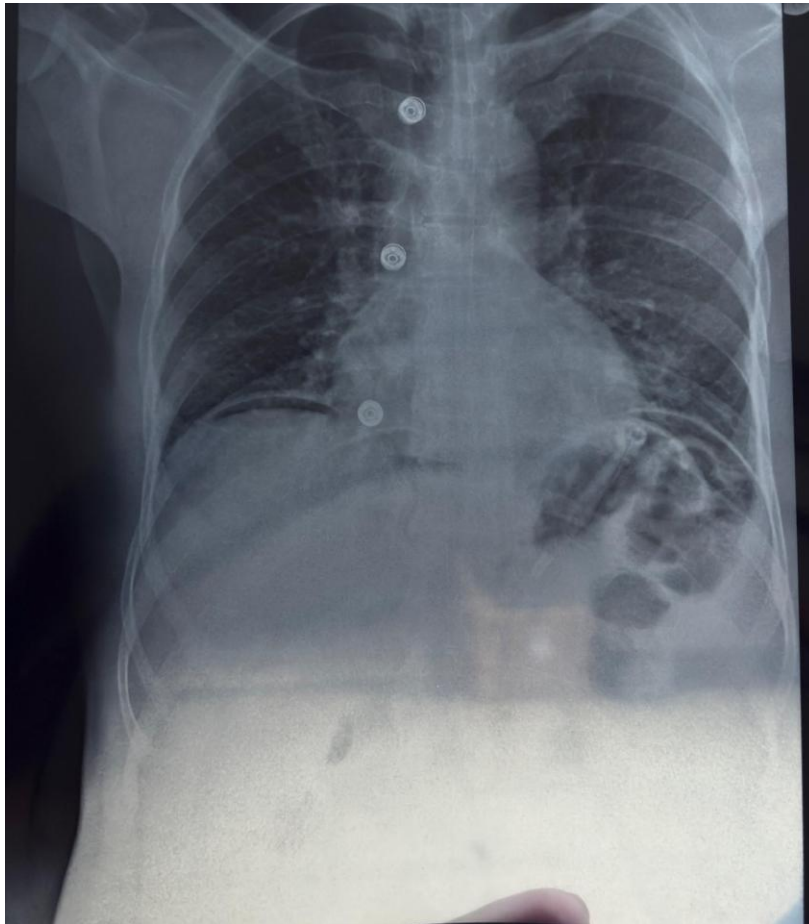


Figure 1. Representative radiograph demonstrating free subdiaphragmatic air (pneumoperitoneum).



Figure 2. Representative radiological image demonstrating features of gastrointestinal perforation.



Figure 3. Representative xray image demonstrating pneumoperitoneum

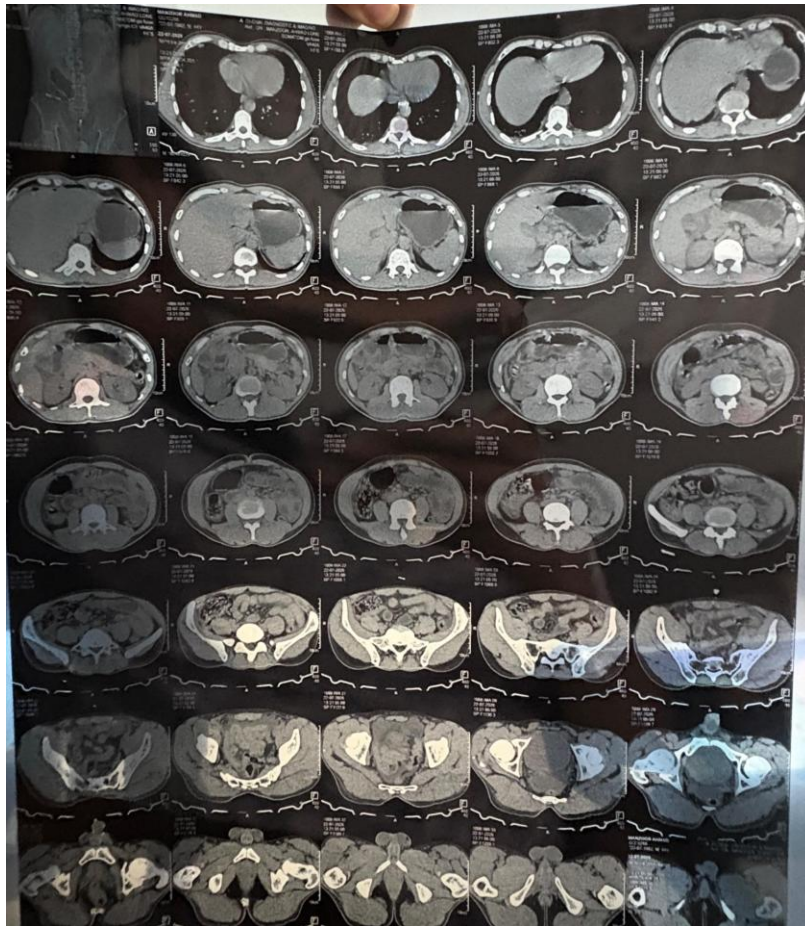


Figure 4. Representative CT image demonstrating the site of perforation and associated intra-abdominal changes.

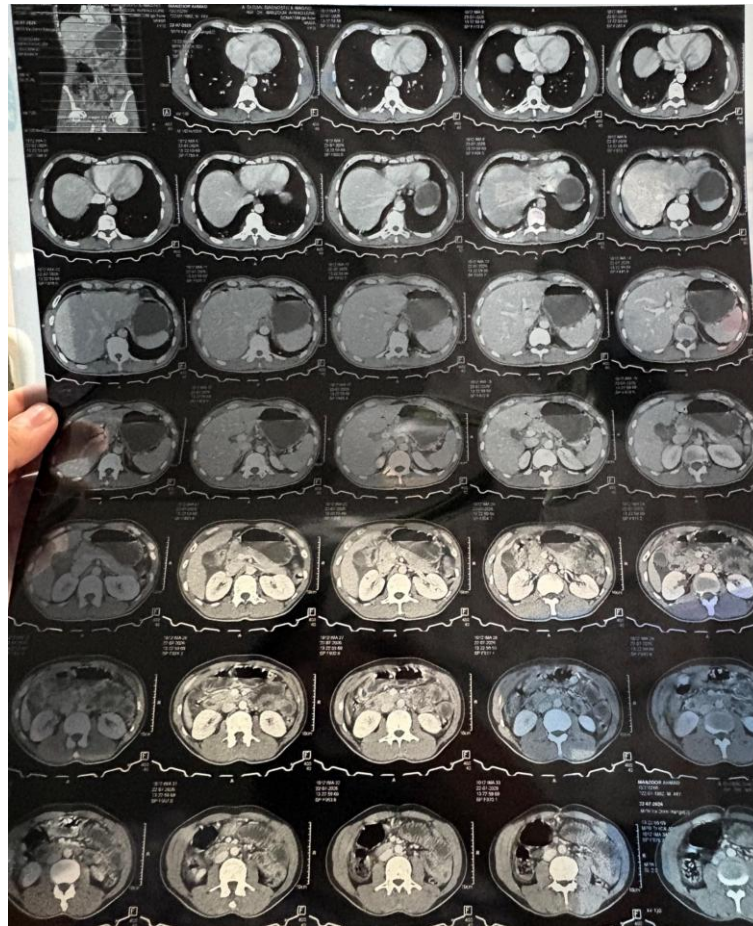


Figure 5. Representative CT image demonstrating free intraperitoneal air.

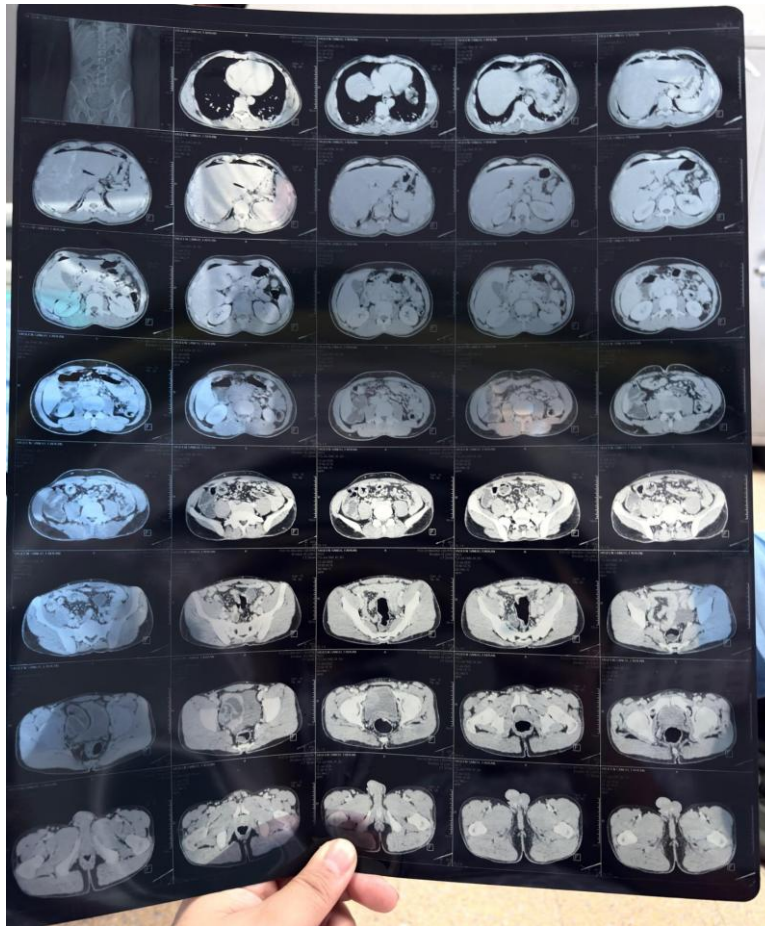


Figure 6. Representative CT image demonstrating intra-abdominal collection/inflammatory changes.



Figure 7. Additional representative radiological image from the study cohort.

6. Discussion

The present prospective study describes the clinical profile, etiological spectrum, anatomical distribution, operative management and early postoperative outcomes of gastrointestinal perforation at a tertiary-care surgical centre.

There was a marked male predominance, with 93.3% of patients being male. The majority were young adults, with 53.3% in the 18–<30-year group. Forty-eight patients (80%) presented after 24 hours, emphasizing delayed presentation as a common feature in this cohort.

Peptic ulcer disease was the predominant etiology, accounting for 75% of cases. Gastric and duodenal perforations together represented 85% of all cases. Typhoid accounted for 13.3% and malignancy for 11.7%.

Plain radiography demonstrated pneumoperitoneum in 93.3% of patients, supporting its continued utility as an initial investigation in suspected perforation. CT was used in 40 patients to provide additional information about the site of perforation and associated intra-abdominal pathology.

Localized peritonitis was present in 55% and diffuse peritonitis in 45%. The majority of perforations were single (96.7%). Modified Cellan-Jones repair was the most commonly performed procedure, reflecting the predominance of gastroduodenal perforation in this cohort.

Wound infection was the commonest postoperative complication, occurring in 26.7% of patients. Nine patients required ICU care and mortality was 5%. The three deaths occurred in separate patients and were associated with severe complications including septic shock, DIC and anastomotic leak.

Mannheim Peritonitis Index was included as a severity assessment tool. Future analysis of individual MPI scores against ICU requirement, postoperative complications and mortality may further clarify its prognostic value in this cohort.

7. Conclusion

Gastrointestinal perforation remains an important surgical emergency with substantial postoperative morbidity. In this study, peptic ulcer disease was the predominant etiology and gastric perforation was the most frequent anatomical site. Delayed presentation was common, while pneumoperitoneum was detected in most patients on plain radiography. Modified Cellan-Jones repair was the most frequently performed procedure. Wound infection was the commonest postoperative complication and overall mortality was 5%. Early resuscitation, appropriate antimicrobial therapy, timely imaging and definitive surgical management remain central to improving outcomes. MPI provides a useful framework for severity assessment and may be valuable for future prognostic analysis in this cohort.

9. References

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