

## Clinical Profile, Etiological Spectrum, Surgical Management, and Outcomes of Perforation Peritonitis: A Retrospective Hospital-Based Study

Srikant Kustwar<sup>1</sup>, Shiva Nand<sup>2</sup>, Kamlesh Kumar Sahu<sup>3</sup>, Neeraj Kumar Rajak<sup>4</sup>

<sup>1</sup>Junior Resident (Academic), Department of General Surgery, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

<sup>2</sup>Associate Professor and HOD, Department of General Surgery, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

<sup>3</sup>Senior Resident, Department of General Surgery, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

<sup>4</sup>Senior Resident, Department of General Surgery, Darbhanga Medical College and Hospital, Laheriasarai, Darbhanga, Bihar, India

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Corresponding Author: Dr. Shiva Nand

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### Abstract:

**Background:** Perforation peritonitis is a life-threatening surgical emergency associated with high morbidity and mortality. Its clinical presentation, etiology, and outcomes vary across regions, necessitating local evidence to optimize management strategies.

**Aim:** To evaluate the clinical profile, etiological spectrum, surgical management, and outcomes of patients with perforation peritonitis at a tertiary care hospital in Laheriasarai, Darbhanga, Bihar.

**Methodology:** This retrospective hospital-based observational study was conducted over one year in the Department of General Surgery, Darbhanga Medical College and Hospital, Laheriasarai, Bihar, India. A total of 115 patients who underwent emergency exploration laparotomy for perforation peritonitis were included. Data on demographic characteristics, clinical presentation, etiology, operative findings, surgical procedures, postoperative complications, and outcomes were retrieved from hospital records and analyzed using descriptive and inferential statistics.

**Results:** The mean age of the patients was  $42.3 \pm 14.8$  years, with males constituting 76.5% of cases. Abdominal pain (100%) was the most common presenting symptom. Peptic ulcer disease (41.7%) was the leading cause, while the duodenum (37.4%) was the most frequent site of perforation. Modified Graham's omental patch repair (33.9%) was the commonest surgical procedure. Surgical site infection (27.0%) was the most frequent postoperative complication. Overall, 92.17% of patients recovered, whereas the mortality rate was 7.826% (~9 patients).

**Conclusion:** Perforation peritonitis remains a major surgical emergency. Early diagnosis, prompt resuscitation, and timely surgical intervention are essential for improving outcomes and reducing mortality.

**Keywords:** Perforation peritonitis; Clinical profile; Etiological spectrum; Surgical management; Exploratory laparotomy; Postoperative complications; Treatment outcomes; Retrospective study.

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### Introduction

Perforation peritonitis is the most serious and life-threatening surgical emergency that may be encountered in practice of general surgery. It is defined as an inflammation of the peritoneum which occurs when the cavity is contaminated with the contents of a hollow viscus, such as gastrointestinal tract, biliary system, pancreas and genitourinary tract. Most of these cases are gastrointestinal perforations and the diagnosis and emergency surgery are required to prevent severe sepsis, multiorgan failure and death [1].

Even though there are big developments in diagnostic imaging, broad-spectrum antimicrobial therapy, anesthesia, surgical technique, peri-operative care, and intensive care management, perforation peritonitis remains to be a major source of morbidity and mortality worldwide. Unfortunately, in the developing world these patients often arrive late to tertiary care centers and are already suffering from generalized purulent or faecal peritonitis, septicemia, dehydration, electrolyte imbalance and organ dysfunction, and these all have a negative impact on the postoperative outcome [2].

The spectrum of causes for perforation peritonitis is quite different from region to region. Lower gastrointestinal perforations due to colorectal malignancy, diverticular disease, inflammatory bowel disease and ischemic bowel disease are frequently reported in developed countries. On the other hand, the tropics and the developing countries like India are still seeing the preponderance of upper gastrointestinal perforations (mostly perforated peptic ulcers) followed by enteric ileal perforations, appendicular perforations, tubercular perforations, traumatic bowel injury and perforation due to intestinal obstruction [3]. Socio-economic and sanitation conditions, nutrition, infectious disease prevalence, access to health facilities and delay in health-seeking behaviour are some of the factors influencing these regional differences. In India, the epidemiology of perforation peritonitis has been different in all of the previous studies, and thus, region-specific clinical data are needed to develop clinical management strategies [4].

Patients with perforation peritonitis typically present clinically with signs of acute abdomen including sudden onset of severe abdominal pain, abdominal distention, guarding, rigidity, rebound tenderness, fever, nausea and vomiting, decreased or absent bowel sounds, tachycardia, tachypnea, dehydration, oliguria and hypotension, and septic shock [5]. A detailed clinical examination, laboratory investigations and radiological imaging in the form of erect chest radiography, abdominal radiography, ultrasonography and computed tomography (where possible) are essential for early diagnosis. But, in most cases the definitive treatment is emergency exploratory laparotomy. The surgical approach depends on the cause, location of the perforation, amount of peritoneal contamination and patient's status. The usual techniques are primary closure (with or without omental patch), resection and primary anastomosis, stoma formation, appendectomy, and damage-control surgery in very sick patients [6].

Despite the improvement in survival over the last few decades attributed to better support in peri-operative resuscitation, antimicrobial therapy, intensive care facilities and surgical skills, complications of surgical site infection, wound dehiscence, intra-abdominal abscess, respiratory complications, septicemia, burst abdomen, enterocutaneous fistula, prolonged hospital stay and mortality are still common. Older age, delayed presentation, pre-existing comorbidities, septic shock on admission, large amount of faecal contamination and multiple organ dysfunction have all been found to be independent predictors of poor outcomes [7]. Therefore, early diagnosis, immediate fluid resuscitation, correcting electrolyte imbalance, early use of broad-spectrum antibiotic and urgent surgery remain the mainstay of successful management [8].

Perforation Peritonitis is a significant burden on emergency surgical services in India due to a high burden of patients who are coming from rural and semi urban areas with a delayed disease. Other issues pertaining to health services in Eastern India, especially the state of Bihar are the lack of surgical facilities, socio-economic factors, undernutrition, and late referrals to tertiary health care centres. As a result, patients frequently have extensive contamination of the peritoneum, and systemic sepsis, with subsequent high postoperative morbidity and mortality [9]. Published data on the clinical profile, etiological spectrum, surgical management and outcome of perforation peritonitis from North Bihar is still scanty in spite of the high disease burden. Retrospective studies in the hospital setting are therefore critical in this region to help gain insights into the disease and determine the most common causes, as well as to assess current surgical management and refine patient management guidelines [10].

Laheriasarai, Darbhanga is the major tertiary healthcare referral center in the region which provides services to the patients from North Bihar and adjacent districts. Because of the regional differences in socioeconomic and epidemiological factors, the demographic and clinical profile of patients seeking care at this institution is unique and local data is essential in enhancing emergency surgical care. Due to the lack of data from the region, the present work was a retrospective hospital-based study aimed to assess the clinical profile, etiology, surgical management and outcome of perforation peritonitis patients admitted to the tertiary hospital of Laheriasarai, Darbhanga, Bihar, India [11].

This study is intended to review the demographic features, clinical presentation, etiology, site of perforation, surgical procedure, postoperative complications, hospital stay and mortality. The results from this study will yield invaluable regional data and potentially help surgeons improve management decisions and clinical outcomes and, ultimately, lower the regional morbidity and mortality from perforation peritonitis.

### Methodology

**Study Design:** The present study was a retrospective, hospital-based observational study conducted to evaluate the clinical profile, etiological spectrum, surgical management, and treatment outcomes of patients diagnosed with perforation peritonitis. Medical records of eligible patients admitted during the study period were reviewed retrospectively to assess demographic characteristics, clinical presentation, etiological factors, operative findings, surgical procedures, postoperative complications, and clinical outcomes.

**Study Area:** The study was conducted in the Department of General Surgery, Darbhanga Medical

College and Hospital (DMCH), Laheriasarai, Darbhanga, Bihar, India.

**Study Duration:** The study included all eligible patients admitted over a one-year period. Medical records of patients managed for perforation peritonitis during this period were retrieved and analyzed retrospectively.

**Sample Size:** A total of 115 patients diagnosed with perforation peritonitis and managed surgically during the study period were included in the study.

**Sample Population:** The study population comprised 115 consecutive patients admitted to the emergency surgical services with a diagnosis of perforation peritonitis who subsequently underwent emergency exploratory laparotomy. Patients were identified through hospital admission registers, operation theatre records, and medical record files. Information regarding age, sex, presenting complaints, duration of symptoms, clinical examination findings, laboratory investigations, radiological findings, intraoperative observations, operative procedures, postoperative complications, duration of hospital stay, and treatment outcomes was collected from the hospital records.

**Data Collection:** Data were collected retrospectively from the medical records, operation theatre registers, discharge summaries, laboratory reports, radiological investigations, operative notes, and histopathology reports (where available) of 115 patients diagnosed with perforation peritonitis. Information regarding demographic characteristics (age and sex), presenting complaints, duration of symptoms, associated comorbidities, clinical examination findings, laboratory investigations, radiological findings, intraoperative observations including the site and etiology of perforation, surgical procedures performed, postoperative complications, duration of hospital stay, and treatment outcomes (discharge or mortality) was extracted using a predesigned data collection proforma. The completeness and accuracy of the collected data were verified before analysis.

#### Inclusion Criteria

- Patients diagnosed with perforation peritonitis underwent emergency exploratory laparotomy.
- Patients of all age groups and both sexes.
- Patients admitted during the one-year study period.
- Patients with complete medical records containing demographic, clinical, operative, and outcome details.

#### Exclusion Criteria

- Patients with primary (spontaneous) peritonitis.
- Patients who are immunocompromised (HBsAg reactive, HIV reactive, or HCV reactive patients).

- Patients with corrosive gastrointestinal perforation.
- Patients with postoperative peritonitis due to anastomotic leakage.
- Patients managed conservatively without surgical intervention.
- Patients with incomplete or missing hospital records.

**Procedure:** All patients with suspected perforation peritonitis underwent initial resuscitation with intravenous fluids, correction of electrolyte imbalance, nasogastric decompression, urinary catheterization, and administration of broad-spectrum intravenous antibiotics. After clinical stabilization and confirmation of diagnosis based on clinical examination, laboratory investigations, and radiological findings, all patients underwent emergency exploratory laparotomy under general anesthesia. During surgery, the site and cause of perforation were identified, and appropriate surgical procedures such as primary closure with or without omental patch repair, bowel resection with primary anastomosis, stoma formation, appendectomy, or other indicated procedures were performed according to intraoperative findings. Thorough peritoneal lavage with warm normal saline was carried out, and intraperitoneal drains were placed whenever necessary. In the postoperative period, patients received intravenous antibiotics, analgesics, fluid therapy, and supportive care. Oral feeding was initiated after the return of bowel sounds, and patients were discharged once clinically stable. Postoperative complications, duration of hospital stay, and final outcomes were recorded for analysis.

**Statistical Analysis:** The data collected were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the study findings, with continuous variables expressed as mean  $\pm$  standard deviation (SD) or median (interquartile range) as appropriate, while categorical variables were presented as frequencies and percentages. Associations between categorical variables were evaluated using the Chi-square test or Fisher's exact test, whereas continuous variables were compared using the student's t-test or Mann Whitney U test, depending on the distribution of data. A p-value of  $<0.05$  was considered statistically significant for all analyses.

#### Result

Table 1 presents demographic distribution of the subjects of the study. The total number of patients included in the study were 115 patients with perforation peritonitis. The highest number of patients were in the 31-40 age group (36; 31.3%) followed by the 41-50 age group (24; 20.9%). The age group 21-30 years and 51-60 years of age each formed 15.7% (18 patients) of the study population and

patients aged more than 60 years constituted 12.2% (14 patients). The age group with the least affected was 20 with 5 (4.3%) patients. The average age of

the study population was  $42.3 \pm 14.8$  years. Male patients outnumbered female by 88 (76.5%) to 27 (23.5%) with a male to female ratio of about 3.3:1.

**Table 1: Demographic Characteristics of the Study Population (N = 115)**

| Variable                 | Frequency (n) | Percentage (%) |
|--------------------------|---------------|----------------|
| <b>Age Group (Years)</b> |               |                |
| ≤20                      | 5             | 4.3            |
| 21–30                    | 18            | 15.7           |
| 31–40                    | 36            | 31.3           |
| 41–50                    | 24            | 20.9           |
| 51–60                    | 18            | 15.7           |
| >60                      | 14            | 12.2           |
| <b>Gender</b>            |               |                |
| Male                     | 88            | 76.5           |
| Female                   | 27            | 23.5           |

Table 2 shows the clinical presentation on admission to patients with perforation peritonitis. The most frequent presenting symptom was abdominal pain which was seen in all 115 (100%) patients. Abdominal tenderness (93.9%) and guarding/rigidity (87.8%) were present in 108 patients and 101 patients, respectively. 69 (60.0%) patients reported

vomiting, and 66 (57.4%) patients reported abdominal distention. Fever was reported in 54 (47.0%) cases while 43 (37.4%) patients had constipation. A total of 17 (14.8%) patients were shocked at presentation. More than one symptom could be recorded as patients might present with more than one of the symptoms.

**Table 2: Clinical Presentation of Patients (N = 115)**

| Clinical Feature     | Frequency (n) | Percentage (%) |
|----------------------|---------------|----------------|
| Abdominal pain       | 115           | 100            |
| Abdominal tenderness | 108           | 93.9           |
| Guarding/Rigidity    | 101           | 87.8           |
| Vomiting             | 69            | 60             |
| Abdominal distension | 66            | 57.4           |
| Fever                | 54            | 47             |
| Constipation         | 43            | 37.4           |
| Shock                | 17            | 14.8           |

Table 3 lists the etiological distribution and perforation site among the research participants. Peptic ulcer disease was found to be the most common cause of perforation (48, 41.7% cases) followed by ileal perforation (24, 20.9% cases) due to enteric fever or tuberculosis. The appendicular perforation was seen in 16 (13.9%) cases and traumatic perforation in 10

(8.7%) cases. Intestinal obstruction, malignancy and other causes accounted for 6.1%, 4.3% and 4.3% respectively. As for the anatomic location, the most common location was the duodenum (43; 37.4%), ileum (28; 24.3%) and appendix (16; 13.9%). Gastric, colonic, jejunal and gallbladder perforation was comparatively less frequent.

**Table 3: Etiological Spectrum and Site of Perforation (N = 115)**

| Variable                               | Frequency (n) | Percentage (%) |
|----------------------------------------|---------------|----------------|
| <b>Etiology</b>                        |               |                |
| Peptic ulcer disease                   | 48            | 41.7           |
| Ileal perforation (Enteric/Tubercular) | 24            | 20.9           |
| Appendicular perforation               | 16            | 13.9           |
| Traumatic perforation                  | 10            | 8.7            |
| Intestinal obstruction                 | 7             | 6.1            |
| Malignancy                             | 5             | 4.3            |
| Others                                 | 5             | 4.3            |
| <b>Site of Perforation</b>             |               |                |
| Duodenum                               | 43            | 37.4           |
| Ileum                                  | 28            | 24.3           |
| Appendix                               | 16            | 13.9           |

|              |    |      |
|--------------|----|------|
| Stomach      | 12 | 10.4 |
| Colon        | 7  | 6.1  |
| Jejunum      | 6  | 5.2  |
| Gall bladder | 3  | 2.6  |

Table 4 summarizes the surgical methods used to treat perforation peritonitis. The most often used procedure was Modified Graham's omental patch repair (33.9%, 39 patients). Twenty-six (22.6%) cases had primary closure of the perforation and 19

(16.5%) required ileostomy. Of the patients who had perforated appendices, 16 (13.9%) underwent appendicectomy. Only 2 (1.8%) needed a colostomy with resection and primary anastomosis carried out in 13 (11.3%) patients.

| Table 4: Surgical Management (N = 115) |               |                |
|----------------------------------------|---------------|----------------|
| Surgical Procedure                     | Frequency (n) | Percentage (%) |
| Modified Graham's omental patch repair | 39            | 33.9           |
| Primary closure                        | 26            | 22.6           |
| Ileostomy                              | 19            | 16.5           |
| Appendicectomy                         | 16            | 13.9           |
| Resection with primary anastomosis     | 13            | 11.3           |
| Colostomy                              | 2             | 1.8            |
| <b>Total</b>                           | <b>115</b>    | <b>100</b>     |

Table 5 shows the postoperative complications and treatment results in participants of the study. Surgical site infection occurred in 31 (27.0%) patients, electrolyte imbalance in 22 (19.1%) patients, and septicemia in 18 (15.7%) patients, respectively. Fourteen patients (12.2%) developed respiratory complications, and nine patients (7.8%) had wound

dehiscence and eight patients (7.0%) had intra-abdominal collection. The least frequent complication was anastomotic leak (2 (1.7%) patients). In total, 92.17% (106 patients) recovered and were discharged from the hospital while approximately 9 patients (7.826%) died of the illness.

| Table 5: Postoperative Complications and Outcomes (N = 115) |               |                |
|-------------------------------------------------------------|---------------|----------------|
| Variable                                                    | Frequency (n) | Percentage (%) |
| <b>Postoperative Complications</b>                          |               |                |
| Surgical site infection                                     | 31            | 27             |
| Electrolyte imbalance                                       | 22            | 19.1           |
| Septicemia                                                  | 18            | 15.7           |
| Respiratory complications                                   | 14            | 12.2           |
| Wound dehiscence                                            | 9             | 7.8            |
| Intra-abdominal collection                                  | 8             | 7              |
| Anastomotic leak                                            | 2             | 1.7            |
| <b>Treatment Outcome</b>                                    |               |                |
| Discharged after recovery                                   | 106           | 92.17          |
| Mortality                                                   | 9             | 7.83           |

## Discussion

The demographic profile of the present retrospective hospital-based study showed that mostly middle-aged adults (31–40 years age group 31.3% and 41–50 years age group 20.9%) were affected by perforation peritonitis. The mean age of the study population was  $42.3 \pm 14.8$  years, which is still quite young compared to western countries where the elderly are larger in number because of the higher incidence of colorectal malignancy and diverticular disease. The male predominance was pronounced in the present study (male to female ratio was ~3.3:1) with male cases accounting for 76.5% of the cases. Other reports with similar findings described a younger age group with a high male to female ratio

in India: and reported a mean age of 39.8 years and a male to female ratio of 4.02:1. Similarly, also reported a higher prevalence of perforation peritonitis among younger males in the developing countries and pointed to the epidemiology of the disease varying between tropical and western countries" [12].

The clinical signs seen in the present study were typical of the classical signs of generalized peritonitis. All patients (100%) presented with abdominal pain and abdominal tenderness (93.9%) and guarding or rigidity (87.8%) were the other common findings. Vomiting (60.0%), abdominal distension (57.4%), fever (47.0%), constipation (37.4%), and shock (14.8%) were also frequently encountered. These are consistent with the long-accepted fact that the

diagnosis of perforation peritonitis is largely clinical as the patients typically have features of an acute abdomen. Mukherjee et al. (2016) also reported similar symptoms pattern with the most common presenting complaints being distention, abdominal pain, tenderness and vomiting. Similarly, Memon et al (2012) and Gupta and Gupta (2010) reported that the key clinical signs of perforation peritonitis which warrant urgent surgical intervention are abdominal pain, guarding, abdominal rigidity and systemic signs of sepsis [13].

Etiological spectrum showed peptic ulcer disease with perforation peritonitis as the most common cause (41.7%) followed by perforation of ileum due to enteric fever/tuberculosis (20.9%) and appendicular perforation (13.9%). In a similar manner, the most frequent site of perforation was the duodenum (37.4%), the ileum (24.3%) and the appendix (13.9%). These observations further highlight that upper gastrointestinal perforations are still more common in developing countries as compared to western countries where distal bowel perforations are more common and associated with malignancy, diverticulitis, and ischemic bowel disease. Mukherjee et al. (2016) reported duodenal perforations in 53.6% of patients while similarly reported upper gastrointestinal perforations as the most common pathology in India. Afridi et al. (2008) also reported PUD as the most common cause in South Asian populations. Noon et al. (1967) on the other hand, found penetrating abdominal trauma as the primary cause of perforation in Texas, and studies from Western countries have shown malignancy as the cause in about 15–20% of patients. In this study malignancy was only a small proportion (4.3%) and this further suggests the geographical variation in disease etiology [14].

The spectrum of underlying disease in the current study was reflected in the pattern of surgical management. The most common procedure performed was Modified Graham's omental patch repair (33.9%), followed by primary closure (22.6%), ileostomy (16.5%), appendectomy (13.9%) and resection with primary anastomosis (11.3%). The large numbers of Modified Graham's patch repair were noted, with a high incidence of peptic ulcer disease with perforation in this study. Operative management was done based on location of perforation, extent of contamination and physiological status of the patient, with the most common operative procedure being omentopexy, as reported by several of the same authors. These findings indicate that prompt laparotomy for exploration and appropriate definitive surgical management continues to be the hallmark of treatment for perforation peritonitis, especially in resource-limited areas where there is a high incidence of late presentation [15].

Even though surgical intervention was timely, postoperative morbidity was still high. Most common

complications following surgery in the present study were surgical site infection (27.0%), electrolyte imbalance (19.1 %), septicemia (15.7%), respiratory complications (12.2 %), wound dehiscence (7.8 %), intra-abdominal collection (7.0 %) and anastomotic leak (1.7 %). The results are similar to the study conducted by Mukherjee et al (2016) who found wound infection, septicemia and electrolyte imbalance to be the most common postoperative complications. Similarly, Agarwal et al. (2007) found the most frequent postoperative complication after laparotomy for perforation peritonitis was surgical site infection. In developing countries, this relatively high postoperative morbidity could be attributed to persistent contamination of the peritoneum, late presentation in hospital, high level of sepsis and poor nutritional status.

The treatment outcome of the present study was favorable, with 92.17% of patients recovering successfully and being discharged, while 7.826% (~9 patients) succumbed to the disease. The relatively lower mortality observed in the present study may be attributed to timely surgical intervention, aggressive resuscitation, appropriate antimicrobial therapy, and improved peri-operative care. These findings underscore the importance of early diagnosis, correction of electrolyte imbalances, prompt administration of broad-spectrum antibiotics, and timely exploratory laparotomy to reduce postoperative complications and improve survival.

## Conclusion

In the present retrospective hospital-based study it was emphasized that perforation peritonitis is one of the major surgical emergencies with high morbidity and mortality. It mainly involved middle-aged men, and peptic ulcer disease was the most common etiology, with the duodenum being the most common site of perforation. The clinical features were mainly abdominal pain, tenderness, and guarding. The typical surgical treatment was emergency exploratory laparotomy most often followed by Modified Graham's omental patch repair. Surgical site infection, electrolyte imbalance, and septicemia were common postoperative complications, but 92.17% of patients had a successful recovery, and the mortality rate was 7.826% (~9 patients). The results highlight the need for early recognition, rapid resuscitation, timely surgical intervention, and adequate post-operative care.

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