



TRENDS IN MANAGEMENT OF PERFORATION PERITONITIS IN TRIBAL BELT OF INDIA: A TERTIARY CARE EXPERIENCE

General Surgery

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ABSTRACT

Background: Perforation peritonitis remains a major surgical emergency in India, with high morbidity and mortality due to delayed presentation, limited resources, and varied etiologies. Despite advancements in surgical techniques, outcomes continue to depend largely on timely intervention and perioperative care. **Aim:** This study aimed to evaluate the demographic profile, clinical characteristics, operative strategies, and outcomes of patients with perforation peritonitis at a tertiary care center in India, and to assess prognostic trends using the Mannheim Peritonitis Index (MPI). **Methodology:** A prospective observational study was conducted on 104 consecutive patients presenting with perforation peritonitis. Diagnosis was established by clinical features and radiological investigations. All patients underwent emergency laparotomy after resuscitation. Surgical procedures were tailored according to site of perforation and intraoperative findings. Patients were categorized into risk groups based on MPI. Postoperative complications, mortality, and length of hospital stay were recorded. **Results:** The mean age of patients was 46.28 ± 15.75 years, with a male predominance (81.73%). Peptic ulcer perforation was the most common etiology (58.65%), followed by ileal perforation (22.12%). Graham's omental patch repair was the most frequently performed procedure (56.73%). The majority of patients (44.23%) belonged to the high-risk MPI group. Postoperative fever (47.12%) and wound infection (38.46%) were the most common complications. Overall mortality was 23.08%, with mortality correlating significantly with higher MPI scores. **Conclusion:** Perforation peritonitis predominantly affected younger males and was most commonly due to peptic ulcer perforation. Delayed presentation, organ failure and high MPI scores were key predictors of poor outcome. Early diagnosis, prompt surgical intervention, and improved perioperative care are essential to reduce morbidity and mortality.

KEYWORDS

Perforation peritonitis, peptic ulcer, emergency laparotomy, Mannheim Peritonitis Index, surgical outcomes.

INTRODUCTION:

Perforation peritonitis is a most common surgical emergency characterized by inflammation of the peritoneal cavity secondary to perforation of the gastrointestinal tract.[1] It continues to present a high burden worldwide, especially in developing countries, where delayed consultations, limited infrastructure and diagnostic challenges majorly contribute to rise morbidity and mortality.[2]

Globally, gastrointestinal perforations account for 44.2% to 62.8% of emergency abdominal surgeries.[3,4] Studies from developing regions report a higher incidence and poorer clinical outcomes, specifically due to delayed diagnosis and limited healthcare infrastructure.[5] In India, the burden of this disease is even high. According to Narayan ML, et al., [6] overall morbidity and mortality recorded in their study were 42.8% and 14.7%, respectively among presenting with gastrointestinal perforation and undergoing emergency laparotomy. Some other studies reported that, perforation peritonitis affects about 9.3 patients per 1000 hospital admissions and requires adequate preoperative resuscitation to avert high perioperative morbidity and mortality.[7,8] This condition is commonly caused by perforated peptic ulcers, appendicitis, typhoid ulcers, tuberculosis, and trauma, all of which are still prevalent in various regions of the country.[9,10] Despite advances in diagnostic modalities, antibiotic therapies and surgical techniques, the management of perforation peritonitis remains complex and difficult. In health care system, the prognosis of this condition is depending on institutional resources and patient profiles. [Urvashi Sakseena] In India, the diversity of etiologies, combined with delays in looking for medical care, lack of awareness, and lack of resources in tertiary and rural setups, frequently leads to unfavorable outcomes. These challenges are compounded by the lack of standardized protocols and wide inter-institutional variation in operative strategies, postoperative care, and infection control

practices. Moreover, socioeconomic factors and late-stage presentation in Indian patients add to the complexity of achieving favourable outcomes.

The need for this study arises from the growing necessity to document and analyse current trends in the management of perforation peritonitis in the Indian setting, particularly from tertiary care centers that cater to a heterogeneous patient population. Although international guidelines exist, they often do not fully address the unique challenges faced in Indian clinical settings. There remains a notable gap in literature that thoroughly assesses region-specific practices, treatment outcomes, and the impact of evolving surgical techniques and supportive care in Indian hospitals.

This study aims to fill this gap by evaluating the current trends in the diagnosis, surgical management and outcomes of perforation peritonitis at a tertiary health care centre in tribal belt of India and to analyse evolving treatment protocols in the settings of regional and global practices.

METHODOLOGY:

This was a prospective observational study that included 104 consecutive patients who presented with clinical features of perforation peritonitis to a tertiary care hospital in India. The diagnosis was established on the basis of history, clinical examination and supportive investigations. Plain radiographs of the abdomen in erect posture were routinely obtained to identify pneumoperitoneum, while ultrasonography and contrast-enhanced computed tomography were used in selected patients to localize the site of perforation and to assess intra-abdominal contamination.

All patients underwent initial resuscitation, which consisted of

intravenous fluid administration, correction of electrolyte imbalances, nasogastric aspiration, urinary catheterisation, and initiation of broad-spectrum antibiotics covering gram-positive, gram-negative, and anaerobic organisms. Patients with evidence of shock or organ dysfunction received intensive monitoring and supportive care prior to operative intervention.

Emergency laparotomy through a midline incision was performed in all cases. The operative strategy was tailored to the site of perforation and intraoperative findings. Peptic ulcer perforations were primarily treated with Graham's omental patch repair, whereas small bowel perforations were managed either with primary closure or resection with ileostomy, depending on bowel viability and the degree of contamination. Appendiceal perforations were treated with appendectomy, while colonic or malignant perforations required resection with or without exteriorisation. In cases of traumatic perforation, direct closure was attempted for small defects, while larger or destructive injuries necessitated resection and anastomosis. Peritoneal lavage with warm saline was routinely carried out, and drains were placed selectively according to the severity of contamination.

The severity of peritonitis was graded intraoperatively using the Mannheim Peritonitis Index, and patients were categorised into low, moderate, or high-risk groups. Postoperatively, all patients received continued fluid resuscitation, culture-directed antibiotics, analgesia, and physiotherapy to minimise respiratory complications. Complications such as wound infection, intra-abdominal abscess, or enterocutaneous fistula were recorded and treated with either conservative measures or re-intervention when required. Mortality was defined as death during the same hospital admission. Length of hospital stay was noted for all survivors.

Statistical analysis: All statistical data were analysed using statistical package for the social sciences (SPSS) version 22.

RESULTS:

In the present study, a total of 104 patients with perforation peritonitis were included. The mean age of the study participants was 46.28 ± 15.75 years. We found male predominance 85 (81.73%) was high as compare to female participants 19 (18.27%) in this study, as shown in Table 1.

Table No. 1: Demographic and clinical profile of patients with perforation peritonitis.

Age	Mean ± SD	46.28 ± 15.75
Gender	Female	19 (18.27)
	Male	85 (81.73)
Comorbid Condition	Malignancy-Related Perforation	8(7.69%)
	Organ failure	54(51.92%)

Table No. 2: Distribution of cases according to anatomical site of perforation.

According to Table 2, peptic perforation was the most common, seen in 61 cases (58.65%), followed by ileal perforation in 23 cases (22.12%). Other sites such as appendiceal, jejunal, large bowel, caecal, duodenal, and gallbladder perforations were less frequently observed.

Anatomical Site of Perforation	No. of cases	%
Appendiceal Perforation	9	8.65%
Caecal Perforation	2	1.92%
Duodenal Perforation	1	0.96%
Gallbladder Perforation	1	0.96%
Ileal Perforation	23	22.12%
Jejunal Perforation	4	3.85%
Large Bowel Perforation	3	2.88%
Peptic Perforation	61	58.65%
Total	104	100.00%

Table No. 3: Distribution of surgical procedures performed in patients with perforation peritonitis.

In this study, the most common procedure was Graham's omental patch repair for peptic ulcer perforation, which was performed in 59 cases

(56.73%). Ileostomy with or without resection was carried out in 14 cases (13.46%), while appendectomy was performed in 12 cases (11.54%), as shown in the Table 3.

Surgical Procedure	No. of cases	%
Graham's Omental Patch Repair (PUD)	59	56.73%
Appendectomy	12	11.54%
Ileostomy with/without Resection	14	13.46%
Primary Closure (Trauma)	6	5.77%
Right Hemicolectomy (Malignancy)	1	0.96%
Peritoneal Lavage and Drainage Only	3	2.88%
Other Procedures (Gastrectomy, Cholecystectomy, Sigmoidostomy, Colostomy, and Specific Resection/Anastomosis)	9	8.65%
Total	104	100.00%

Table No. 4: Distribution of patients according to Mannheim Peritonitis Index (MPI) score.

A total of 34 (32.69%) patients were in the low-risk group (≤ 20), 25 (24.03%) patients were in the moderate-risk group (21–29), and 45 (43.26%) patients were in the high-risk group (≥ 30), according to Table 4. Mortality was lowest in the low-risk group (2.94%), slightly higher in the moderate-risk group (8%), and markedly increased in the high-risk group (44.44%). This clearly shows that the Mannheim Peritonitis Index (MPI) score correlates well with patient outcomes, as higher scores were associated with significantly increased mortality. The overall mortality in the study was 22.11%.

MPI SCORE	No. of cases	%	Overall Mortality	Mortality (%)
low-risk (≤ 20), and	34	32.69%	1	2.94%
moderate-risk (21-29)	25	24.03%	2	8%
high-risk (≥ 30) groups	45	43.26%	20	44.44%
Total	104	100.00%	23	22.11%

Table No. 5: Characteristics of peritonitis in study patients.

We found colonic origin and other sources were noted in 10 (9.62%) and 94 (90.38%) respectively. Whereas, exudates including clear, cloudy and fecal peritonitis characteristics were reported in 6 (5.77%), 75 (72.12%) and 23 (22.12%) as reported in the Table 5.

Peritonitis Characteristics		No. of cases	%
Origin	Colonic origin	10	9.62%
	Other sources	94	90.38%
Exudates	Clear	6	5.77%
	Cloudy/ Purulent	75	72.12%
	Fecal	23	22.12%

Table No. 6: Post-operative outcomes and complications.

We noted that, the most common complication was post-operative fever in 49 cases (47.12%), followed by wound infection in 40 cases (38.46%). Respiratory complications were noted in 21 cases (21.19%). Wound dehiscence and intra-abdominal abscess occurred in 11 cases each (10.58%), as noted in the Table 6.

Outcome / Complication	Number of Cases	%
Post-Op Fever	49	47.11%
Wound Infection	40	38.46%
Wound Dehiscence	11	10.57%
Intra-Abdominal Abscess	11	10.57%
Respiratory Complications	21	20.19%
Urinary Tract Infection	4	3.84%
Entero-Cutaneous Fistula	6	5.76%
In-hospital Mortality	23	22.11%
Mean Hospital Stay (Days)	13.36 ± 6.47	

Table No. 7: Pre-operative and Post-operative respiratory complications.

A total of 5 patients (4.81%) presented with pre-operative respiratory complications, whereas 21 patients (20.19%) developed post-operative respiratory complications. This indicates that respiratory

complications were more frequently observed in the post-operative period compared to the pre-operative phase, highlighting the importance of vigilant post-operative monitoring and management (Table 7).

Complication	Number of Cases	%
Preoperative Respiratory complication	5	4.81%
Postoperative Respiratory complication	21	20.19%

DISCUSSION:

In this study, 104 cases of perforation peritonitis were examined, with a mean age of 46.28 ± 15.75 years, which was notably younger than that reported in many Western series (often 55–65 years). Similar observations were reported by Singh M, et al. (2021), who found a mean age of 38.32 years (range 15–80 years). [2] Also, Faraz RM, et al., [11] (2025) examined 115 patients with perforation peritonitis, among whom the age ranged from 20 to 70 years, with a mean of 44.6 ± 12.03 years and a median of 45 years. Sengupta TK, et al., [12] (2020) also supported these findings. Collectively, these results suggested that, perforation peritonitis predominantly affected younger populations.

In this study, a male predominance was observed, with 85 (81.73%) males compared to 19 (18.27%) females. These findings were consistent with Singh M, et al., [2] (2021), Faraz RM, et al., [11] (2025), Sengupta TK, et al., [12] (2020), and Gaurav K, et al., [13] (2024). In contrast, Neupane S, et al., [14] (2022) reported a female predominance; among their 60 cases, 31 were female and 29 were male, with a female-to-male ratio of 1.06:1.

Our study shows that, organ failure was identified as the most common comorbid condition, reported in nearly half of the cases, i.e., 54 (51.92%). Malignancy-related perforation was observed in 8 (7.69%) cases. Faraz RM, et al., [11] (2025) similarly reported multi-organ dysfunction in 54 cases. Gaurav K, et al., [13] (2024) further noted that multi-organ failure (7/111; 6%) at presentation carried very high mortality. These observations highlighted delayed healthcare access and late presentation in the studied region, emphasizing the need for improved health-system responsiveness and effective triage protocols. We found that, peptic perforation was the most common site in this study, accounting for 61 (58.65%) cases, followed by ileal perforation in 23 (22.12%) cases. Sengupta TK, et al., [12] (2020) supported these findings, having reported a series of 121 patients with peptic perforation. However, Bhatia S, et al., [15] (2017) found terminal ileal perforation (up to 30 cm proximal to the ileocecal junction on the antimesenteric border) in 68 cases, while gastric perforation was observed in 44 cases.

Regarding operative procedures, Graham's Omental Patch Repair was the most commonly performed surgery, undertaken in 59 (56.73%) cases. Ileostomy with or without resection was performed in 14 (13.46%) cases, and appendectomy in 12 (11.54%) cases. These patterns were consistent with the findings of Singh M, et al., [2] (2021) and Faraz RM, et al., [11] (2025).

The MPI score distribution showed 34 (32.69%) patients in the low-risk group (≤ 20), 25 (24.03%) in the moderate-risk group (21–29), and 45 (43.26%) in the high-risk group (≥ 30). Patients with MPI scores ≥ 30 revealed a significantly higher susceptibility to postoperative morbidity and mortality, thereby underscoring the prognostic importance of the index in clinical decision-making and perioperative management. These results concordance with earlier studies by Barrera et al., [16] Sharma et al., [17] and Ramteke et al., [18] all of whom reported a stepwise increase in mortality with rising MPI scores. Sharma R, et al., [19] (2015) concluded that MPI served as a reliable prognostic tool in perforation peritonitis, while Gupta S, et al., [20] (2025) further demonstrated that higher MPI scores were directly correlated with increased disease severity, postoperative complications, and adverse outcomes.

Postoperative fever was the most common complication, observed in 49 (47.12%) cases. Other complications included wound infection in 40 (38.46%), wound dehiscence in 11 (10.58%), intra-abdominal abscess in 11 (10.58%), and respiratory complications in 21 (21.19%) cases. These findings were consistent with the complications reported by Bhatia S, et al., [15] (2017), Singh M, et al., [2] (2021), Neupane S, et al., [14] (2022), and Faraz RM, et al., [11] (2025).

Our study demonstrated that, relatively young patients presented with perforation peritonitis, often accompanied by high rates of organ

failure, delayed presentation, and heavy contamination. The findings suggested that the key challenge in this population lay not in surgical technique, but rather in timeliness of presentation and optimization of perioperative care.

CONCLUSION:

The present study demonstrated that perforation peritonitis in this region predominantly affected a relatively younger population with a marked male predominance. Peptic ulcer perforation emerged as the most common site, with Graham's Omental Patch Repair most common preferred surgical approach. A significant proportion of patients presented late with associated organ failure and heavy peritoneal contamination, which contributed to higher morbidity and mortality. The MPI was found to be a reliable predictor of outcome, with mortality increasing consistently with higher scores. Postoperative fever and wound-related complications were the most frequently encountered morbidities. These findings highlighted that, the major challenge in managing perforation peritonitis was not surgical expertise but rather delays in presentation and inadequate preoperative optimization. Furthermore, we stated that, public awareness, improving early referral systems, and improving health-system responsiveness are essential to reduce mortality and improve outcomes in such patients.

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