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Clinical Presentation, Risk Factors, Surgical Management, and Outcome Analysis of Patients with Hollow Viscus Perforation Peritonitis Undergoing Emergency Exploratory Laparotomy - A Prospective Observational Study

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Abstract

Background: Hollow viscus perforation peritonitis is a common and serious surgical emergency associated with significant morbidity and mortality. Despite advances in diagnosis, antimicrobial therapy, and perioperative care, timely surgical intervention remains the cornerstone of management. This study was conducted to evaluate the clinical presentation, risk factors, surgical management, and postoperative outcomes of patients undergoing emergency exploratory laparotomy for hollow viscus perforation peritonitis.

Methods: A prospective observational study was conducted in the Department of General Surgery, Adichunchanagiri Institute of Medical Sciences, B.G. Nagara, Karnataka, over a period of 2 years and 1 month. A total of 84 patients diagnosed with hollow viscus perforation peritonitis and undergoing emergency exploratory laparotomy were included. Demographic details, clinical presentation, risk factors, Intraoperative findings, surgical procedures, postoperative complications, duration of hospital stay, and outcomes were recorded and analysed.

Results: Among 84 patients, males constituted the majority (81%), with the highest incidence observed in the 41–60 years age group (40.5%). Abdominal pain was the most common presenting symptom (100%), followed by abdominal distension (73.8%) and vomiting (57.1%). Smoking (45.2%) and alcohol consumption (40.5%) were the predominant risk factors. Duodenal perforation

was the most common intraoperative finding (45.2%), and peptic ulcer disease was the leading aetiology (57.1%). Omental patch repair was the most frequently performed surgical procedure (50%). Surgical site infection was the commonest postoperative complication (21.4%). The majorities of patients recovered and were discharged (88.1%), while mortality was observed in 2.4% of cases.

Conclusion: Hollow viscus perforation peritonitis requires early recognition, aggressive resuscitation, and timely surgical management to improve outcomes. Duodenal perforation secondary to peptic ulcer disease remains the predominant cause.

Appropriate perioperative optimisation and early intervention play a crucial role in reducing postoperative complications and mortality.

Keywords: Hollow Viscus Perforation, Peritonitis, Emergency Laparotomy, Peptic Ulcer Perforation, Surgical Outcomes, Prospective Observational Study.

Introduction

Hollow viscus perforation with generalized peritonitis remains one of the most common and challenging abdominal surgical emergencies encountered worldwide. It is associated with significant morbidity and mortality despite advances in diagnostic modalities, antimicrobial therapy, intensive care support, and surgical techniques. Perforation of a hollow abdominal organ results in contamination of the peritoneal cavity with gastrointestinal contents, leading to chemical peritonitis initially, followed by bacterial peritonitis, systemic inflammatory response syndrome, sepsis, and multiorgan dysfunction if not treated promptly [1].

The incidence and etiology of hollow viscus perforation vary geographically. In developing countries, peptic ulcer disease remains a predominant cause of upper gastrointestinal perforations, while ileal perforations secondary to enteric infections, inflammatory disorders, and other causes contribute significantly to lower gastrointestinal perforations[2]. Factors such as delayed presentation, advanced age, malnutrition, smoking, alcohol consumption, and associated comorbidities adversely influence the outcome of these patients [3].

Patients with hollow viscus perforation typically present with sudden onset abdominal pain, abdominal distension, vomiting, fever, and features of generalized peritonitis. Early diagnosis and timely surgical intervention are critical determinants of survival. Clinical examination, laboratory investigations, and radiological evaluation, particularly plain abdominal radiography and computed tomography, aid in establishing the diagnosis and planning appropriate management[4].

Emergency exploratory laparotomy continues to be the cornerstone of management for most patients with perforation peritonitis. The surgical approach depends on the site, size, and cause of perforation, degree of peritoneal contamination, and patient's physiological status. Procedures may range from simple closure with omental patch repair to bowel resection, anastomosis, or diversion procedures [5].

Despite improvements in perioperative care, postoperative complications such as wound infection, respiratory complications, intra-abdominal abscess, sepsis, and mortality remain significant concerns.

Several scoring systems and prognostic indicators have been developed to predict outcomes in patients with perforation peritonitis. Factors such as duration of symptoms, hemodynamic instability, organ dysfunction, and severity of peritoneal contamination are important predictors of postoperative morbidity and mortality[6].

Understanding the clinical profile, risk factors, operative findings, and outcomes helps in improving management strategies and reducing complications.

This prospective observational study was undertaken to analyze the clinical presentation, risk factors, surgical management, and postoperative outcomes among patients with hollow viscus perforation peritonitis undergoing emergency exploratory laparotomy at a tertiary care teaching hospital.

Materials and Methods

Study Design and Study Setting

This was a prospective observational study conducted to evaluate the clinical presentation, risk factors, surgical management, and postoperative outcomes of patients with hollow viscus perforation peritonitis undergoing emergency exploratory laparotomy. The study was carried out in the Department of General Surgery, Adichunchanagiri Institute of Medical Sciences, B.G. Nagara, Karnataka, India.

The study period extended over 2 years and 1 month. All eligible patients presenting with hollow viscus perforation peritonitis and requiring emergency exploratory laparotomy during the study period were included and followed prospectively from admission through the postoperative period.

Study Population and Sample Size

A total of 84 patients diagnosed with hollow viscus perforation peritonitis and managed by emergency exploratory laparotomy were included in the study.

Inclusion Criteria

Patients fulfilling the following criteria were included:

- Patients of either sex presenting with clinical and radiological features suggestive of hollow viscus perforation with peritonitis.
- Patients undergoing emergency exploratory laparotomy for confirmed or suspected hollow viscus perforation.
- Patients willing to participate in the study and providing informed consent.

Exclusion Criteria

Patients were excluded if they had:

- Perforation secondary to trauma.
- Iatrogenic hollow viscus perforation.
- Malignant perforations requiring elective oncological procedures.
- Patients unfit for surgery or managed conservatively.
- Patients who did not provide consent for participation.

Data Collection

After obtaining informed consent, detailed demographic and clinical data were collected prospectively using a structured proforma. The variables recorded included age, sex, presenting symptoms, duration of symptoms, associated comorbidities, risk factors, clinical examination findings, laboratory investigations, radiological findings, intraoperative findings, surgical procedures performed, postoperative complications, duration of hospital stay, and outcomes.

Clinical Assessment and Preoperative Evaluation

All patients underwent initial assessment following standard emergency surgical protocols. A detailed history was obtained, including the onset and progression of symptoms such as abdominal pain, vomiting, abdominal distension, and fever. Relevant risk factors and comorbid conditions, including smoking, alcohol consumption, previous history of peptic ulcer disease, diabetes mellitus, hypertension, and other systemic illnesses were documented.

Physical examination included assessment of vital parameters, abdominal tenderness, guarding, rigidity, abdominal distension, and signs of generalised peritonitis. Laboratory investigations included complete blood count, renal function tests, serum electrolytes, blood glucose levels, and other relevant investigations. Plain abdominal radiographs and/or ultrasonography or computed tomography scans were performed whenever indicated to support the diagnosis.

Surgical Management

All patients underwent emergency exploratory laparotomy after appropriate resuscitation with intravenous fluids, correction of electrolyte abnormalities, administration of broad-spectrum antibiotics, and optimization of associated medical conditions.

During surgery, the site and cause of perforation, amount and nature of peritoneal contamination, and associated intra-abdominal findings were documented. Surgical procedures were performed according to the location and pathology of perforation and included:

- Primary repair with or without omental patch closure.
- Resection and anastomosis.
- Diversion procedures where indicated.
- Other appropriate damage-control or definitive surgical procedures based on intraoperative findings.

Peritoneal lavage and placement of drains were performed according to the surgeon's discretion and intraoperative contamination status.

Postoperative Management and Outcome Assessment

Patients were monitored postoperatively for recovery, complications, and clinical outcomes. Postoperative parameters assessed included:

- Surgical site infection.
- Wound dehiscence.
- Intra-abdominal abscess.
- Respiratory complications.
- Sepsis and septic shock.
- Need for intensive care support.
- Duration of hospital stay.
- Mortality.

The outcome was assessed based on postoperative morbidity, mortality, and overall recovery.

Statistical Analysis

Data collected were entered into a database and analysed using appropriate statistical methods. Continuous variables were expressed as mean ± standard deviation or median with range, while categorical variables were presented as frequencies and percentages. Associations between clinical factors, surgical findings, and outcomes were analysed using suitable statistical tests. A p-value of <0.05 was considered statistically significant.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee of Adichunchanagiri Institute of Medical Sciences, B.G. Nagara, Karnataka. Written informed consent was obtained from all participants before enrollment. Patient confidentiality and privacy were maintained throughout the study.

Results and Observations

A total of 84 patients with hollow viscus perforation peritonitis undergoing emergency exploratory laparotomy were included in the study over a period of 2 years and 1 month. The observations obtained from the study population are presented below.

Table 1: Age Distribution of Study Population (n=84)

Age group (years)	Number of patients	Percentage (%)
<20	4	4.8

21–40	28	33.3
41–60	34	40.5
>60	18	21.4
Total	84	100

The majority of patients belonged to the 41–60 years age group (40.5%), followed by 21–40 years (33.3%).

Table 2: Gender Distribution of Patients

Gender	Number of patients	Percentage (%)
Male	68	81.0
Female	16	19.0
Total	84	100

There was a marked male predominance, with a male-to-female ratio of approximately 4.2:1.

Table 3: Clinical Presentation of Patients

Presenting symptom	Number of patients	Percentage (%)
Abdominal pain	84	100
Abdominal distension	62	73.8
Vomiting	48	57.1
Fever	36	42.9
Constipation/obstipation	29	34.5
Shock at presentation	12	14.3

Abdominal pain was the most common presenting symptom, observed in all patients.

Table 4: Duration of Symptoms Before Presentation

Duration	Number of patients	Percentage (%)
<24 hours	18	21.4
24–72 hours	46	54.8
>72 hours	20	23.8
Total	84	100

Most patients presented between 24–72 hours after onset of symptoms.

Table 5: Risk Factors and Associated Comorbidities

Risk factor/comorbidity	Number of patients	Percentage (%)
Smoking	38	45.2
Alcohol consumption	34	40.5
History of peptic ulcer disease	31	36.9
Diabetes mellitus	18	21.4
Hypertension	16	19.0
No significant risk factor	14	16.7

Smoking and alcohol consumption were the most frequently observed risk factors.

Table 6: Site of Hollow Viscus Perforation (Intraoperative Findings)

Site of perforation	Number of patients	Percentage (%)
Duodenum	38	45.2
Ileum	22	26.2
Stomach	10	11.9
Jejunum	6	7.1
Colon	5	6.0
Appendix	3	3.6
Total	84	100

Duodenal perforation was the most common intraoperative finding.

Table 7: Aetiology of Hollow Viscus Perforation

Etiology	Number of patients	Percentage (%)
Peptic ulcer perforation	48	57.1
Ileal perforation (infective/other causes)	22	26.2
Traumatic causes excluded	-	-
Malignant perforation	5	6.0
Other causes	9	10.7
Total	84	100

Peptic ulcer disease was the leading cause of hollow viscus perforation.

Table 8: Surgical Procedures Performed

Procedure	Number of patients	Percentage (%)
Omental patch repair	42	50.0
Primary repair	18	21.4
Resection and anastomosis	14	16.7
Ileostomy/diversion procedures	6	7.1
Other procedures	4	4.8
Total	84	100

Omental patch repair was the most commonly performed procedure.

Table 9: Postoperative Complications

Complication	Number of patients	Percentage (%)
Surgical site infection	18	21.4
Wound dehiscence	8	9.5
Respiratory complications	7	8.3
Sepsis/septic shock	10	11.9
Intra-abdominal collection	6	7.1
Acute kidney injury	4	4.8

Surgical site infection was the most frequent postoperative complication.

Table 10: Duration of Hospital Stay

Hospital stay	Number of patients	Percentage (%)
<7 days	20	23.8
7–14 days	46	54.8
>14 days	18	21.4
Total	84	100

The majority of patients required hospitalisation for 7–14 days.

Table 11: Outcome of Patients

Outcome	Number of patients	Percentage (%)
Recovered and discharged	74	88.1
Morbidity with complications	8	9.5
Mortality	2	2.4
Total	84	100

Overall, emergency exploratory laparotomy resulted in favourable outcomes in the majority of patients, with mortality observed mainly among patients presenting with delayed admission and severe peritonitis.

Discussion

Hollow viscus perforation peritonitis remains a major surgical emergency requiring prompt diagnosis, aggressive resuscitation, and timely operative intervention. In the present study, 84 patients undergoing emergency exploratory laparotomy for hollow viscus perforation peritonitis were evaluated prospectively over a period of 2 years and 1 month.

In the present study, the majority of patients belonged to the 41–60 years age group (40.5%), followed by 21–40 years (33.3%). Similar age distributions have been reported in previous studies, where middle-aged adults represented the largest proportion of patients presenting with perforation peritonitis[7]. Increasing age is associated with reduced physiological reserve and a higher incidence of comorbidities, contributing to increased postoperative complications.

A marked male predominance was observed in this study, with males accounting for 81% of cases and a male-to-female ratio of approximately 4.2:1. Similar male predominance has been reported in several studies

of perforation peritonitis, which may be related to higher exposure to risk factors such as smoking, alcohol consumption, and occupational stress among males[8].

Abdominal pain was the most common presenting symptom and was present in all patients. Abdominal distension (73.8%), vomiting (57.1%), and fever (42.9%) were other frequent symptoms. These findings are consistent with previous studies describing abdominal pain and features of peritonitis as the predominant clinical manifestations of hollow viscus perforation[9].

Delayed presentation is an important determinant of outcome in perforation peritonitis. In the present study, more than half of the patients (54.8%) presented within 24–72 hours of symptom onset. Delay in seeking medical attention results in increased bacterial contamination, severe peritoneal inflammation, septic complications, and prolonged hospital stay. Similar observations have been reported by studies emphasizing the impact of delayed admission on mortality and postoperative morbidity[10].

Among the risk factors assessed, smoking (45.2%), alcohol consumption (40.5%), and previous history of peptic ulcer disease (36.9%) were frequently observed. Smoking and alcohol are established risk factors for peptic ulcer disease and impaired mucosal healing, contributing to ulcer formation and perforation [11]. Associated comorbidities such as diabetes mellitus and hypertension were also observed, which may influence postoperative recovery and susceptibility to infection.

Intraoperative findings revealed that duodenal perforation was the most common site of perforation (45.2%), followed by ileal perforation (26.2%). Peptic ulcer perforation was the leading etiology (57.1%). Similar findings have been reported in Indian studies, where gastroduodenal perforations constitute a significant proportion of emergency laparotomies due to perforation peritonitis[12]. The relatively higher incidence of duodenal perforation may be attributed to the prevalence of Helicobacter pylori infection, NSAID use, smoking, and alcohol consumption.

Omental patch repair was the most frequently performed surgical procedure in the present study (50%), particularly for duodenal perforations. This procedure remains widely accepted due to its simplicity, effectiveness, and favorable outcomes in emergency settings[13]. Intestinal perforations requiring resection and anastomosis or diversion procedures were performed based on bowel viability, contamination, and patient condition.

Postoperative complications were observed in a proportion of patients, with surgical site infection being the most common complication (21.4%), followed by sepsis/septic shock (11.9%) and wound dehiscence (9.5%). Surgical site infection remains one of the major postoperative challenges after emergency laparotomy due to contamination of the peritoneal cavity and the emergency nature of surgery[14].

The majority of patients in the present study had a hospital stay of 7–14 days (54.8%). Duration of hospitalization was influenced by severity of contamination, postoperative complications, nutritional status, and associated medical conditions. Similar findings have been documented in previous studies evaluating outcomes following emergency laparotomy for perforation peritonitis[15].

The overall outcome in this study was favorable, with 88.1% of patients recovering and being discharged. Mortality was observed in 2.4% of cases. The mortality rate in perforation peritonitis depends on multiple factors

including age, delayed presentation, septic shock, organ dysfunction, and severity of intra-abdominal contamination. Early diagnosis, adequate resuscitation, appropriate antibiotic therapy, and timely surgical intervention remain essential for improving survival outcomes.

The findings of this study highlight the importance of early recognition of hollow viscus perforation, identification of risk factors, and appropriate surgical management to reduce morbidity and mortality. Prospective evaluation of clinical and operative parameters can assist in improving prognostic assessment and optimizing treatment strategies.

Conclusion

Hollow viscus perforation peritonitis remains a significant surgical emergency associated with considerable morbidity. In this study, peptic ulcer disease with duodenal perforation was the most common cause, with delayed presentation, smoking, alcohol consumption, and associated comorbidities influencing outcomes.

Early diagnosis, prompt resuscitation, appropriate antibiotic therapy, and timely emergency exploratory laparotomy with suitable surgical intervention resulted in favorable outcomes in the majority of patients. Identification of risk factors and optimization of perioperative care are essential to reduce postoperative complications and mortality.

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