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ORIGINAL RESEARCH ARTICLE



Clinical Evaluation and Management Outcomes in Acute Peritonitis: A Prospective Study

Bidyapati Acharya¹ | Sonali Tripathy² | Yagnadatta Ratha^{3*} | Salman Raghib⁴

Abstract

Introduction: Acute peritonitis is a significant surgery-related medical emergency, which ranges from simple localized peritonitis to systemic peritonitis and sepsis. Perforation of the gastrointestinal tract is a frequent cause of this complication, with the final outcome being affected by the level of severity of the condition, comorbidity, delay in its detection, and ineffective source control.

Method: The observational study was conducted among 90 patients with acute peritonitis as a complication of hollow viscus perforation was performed. The patients whose age was more than 12 years were subjected to clinical, radiological, and intraoperative analysis. Data from the patients were collected and SPSS software version 27 was used for statistical analysis.

Result: Out of 90 cases, more male patients were observed (82.22%), along with the maximum number of patients older than 50 years (35.56%). The most common anatomical location for perforation was the duodenum (55.56%), followed by the ileum (21.11%) and the appendix (14.44%). Vomiting (83.33%) and guarding/rigidity (94.44%) were frequently noted, with a high incidence of pneumoperitoneum (75.56%). Postoperative complications were 60.00% and patients were discharged (92.22%), whereas mortality was 7.78%.

Conclusion: The study concluded that the gastrointestinal perforation affected among old males, with the most common was the duodenal perforation. Apart from substantial morbidity, specific management of surgery is the most significant clinical outcome.

Key words: Gastrointestinal perforation, Acute peritonitis, Hollow viscus perforation, Omental patch repair, Postoperative complications.

1 | INTRODUCTION

Acute peritonitis is a spectrum of intra-abdominal infection, from localised contamination to generalised secondary peritonitis with sepsis, septic shock and multiple organ dysfunction. It is usually associated with gastrointestinal perforation, inflammation of the appendix,

bile or intestinal disease, disruption of the anterior abdominal wall after anastomosis, ischemic bowel or postoperative intra-abdominal infection. Even though progress has been made in all areas of diagnostic imaging, antimicrobial therapy, anaesthesia, intensive care and emergency surgery, complicated intra-abdominal infection remains a significant source of morbidity and mortality, especially when delayed diagnosis or delayed source control occurs.

¹ Associate Professor, Dept of Genral Surgery, IMS & SUM CAMPUS II IL,PHULNAKHARA, BBSR, ODISHA.

² Assistant Professor,Dept of Obstetrics and Gynaecology, IMS & SUM CAMPUS II ,PHULNAKHARA , BBSR ,ODISHA.

³ Assistant Professor ,Dept or GENERAL SURGERY, Laser & Minimal Invasive Laparoscopic surgery, FIAGES, eFIAGES,FALS(Hernia), FMAS(Colorectal), IMS and SUM campus II, PHULNAKHRA , BBSR , ODISHA.

⁴ Assistant Professor, Department of General Surgery ,IMS & SUM Hospital,Campus 2, Phulnakhara, Bhubaneswar.

Address correspondence to: Yagnadatta, Ratha, Assistant Professor ,Dept or General Surgery Laser & Minimal Invasive Laparoscopic surgery, FIAGES, eFIAGES,FALS(Hernia), FMAS(Colorectal), IMS and SUM campus II, PHULNAKHRA , BBSR , ODISHA,

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In the modern era, early recognition, physiological resuscitation, suitable antimicrobial therapy and definitive source control are the key factors in outcome [1,3].

The clinical picture of acute peritonitis depends on the source of the peritonitis, the number of microbes, the time of contamination, the degree of involvement of the peritoneum, host immunity, and pre-existing comorbidities. Patients may have abdominal tenderness in one location or generalised peritonitis, which is usually associated with an elevated serum lactate level, leukocytosis, metabolic acidosis, fever, tachycardia, hypotension, and/or organ dysfunction. Importantly, severe disease is not ruled out by the lack of classical inflammatory manifestations, and severe disease is a possibility in the elderly and immunocompromised patient. Thus, clinical evaluation demands a combination of physical examination and laboratory parameters and imaging, and rapid evaluation of operative or non-operative source control [1,4].

The timing and effectiveness of source control is especially significant because ongoing contamination perpetuates the inflammatory cascade and is likely to lead to septic shock and organ failure. The emphasis is now on source control, which can be undertaken through definitive surgical repair/resection, drainage of infected collections, debridement, decompression or a combination of these and other procedures, depending on the anatomical source and physiological status of the patient [2,4]. Antimicrobial therapy is always a key adjunct, but cannot replace source control [4,5]. Factors to consider when choosing antibiotics for the individual include community-associated infection versus healthcare-associated infection, severity of illness, potential pathogens, local antimicrobial resistance, and individual risk factors for multidrug-resistant organisms [3,6].

In acute peritonitis, risk stratification is also relevant – the outcome is not only determined by the underlying surgical pathology. Adverse outcome factors include age, co-morbid disease, renal dysfunction, haemodynamic instability, symptom duration, degree of peritoneal contamination and organ dysfunction. Prospective studies in India have shown that physiological and disease-severity scores such as Mannheim Peritonitis Index, APACHE II score

and serum lactate levels are independently predictive of mortality at 28 days in patients with peptic perforation peritonitis [7-9].

In this context, prospective analysis of clinical presentation, aetiological spectrum, diagnostic parameters, therapeutic interventions, postoperative complications and clinical outcome of acute peritonitis is clinically meaningful [9]. These data can help pinpoint factors that can be modified to improve outcomes, assess the success of existing resuscitation protocols, and aid in the early identification of patients who may have an increased risk of adverse outcomes and who need to be aggressively resuscitated, monitored, and source-controlled. For this reason, a prospective study of the clinical features and management of patients with acute peritonitis, and of the factors that influence postoperative morbidity, mortality, and recovery, was conducted in the present study.

2 | METHOD

Research design

The study was prospective observational study for the clinical evaluation and management of the Acute Peritonitis among patients. The study was conducted in the Tertiary Care Hospital among 90 patients those who were undergone with acute peritonitis secondary to the hollow viscus perforation. Patients of age more than 1 years of old were included. Along with that, all patients were evaluated with clinical, radiological, and intraoperative parameters. Also demographic characteristics, clinical presentation, anatomical site, diagnostic findings, surgical management, postoperative complications, and clinical outcomes were measured and recorded. Both verbal and written consent required for the study. Patients were selected on the basis of the predefined inclusion and exclusion criteria.

Inclusion criteria

- Patients of age more than 12 years of old were included.
- Clinically suspected patients and radiological evidence of peritonitis due to hollow viscus perforation
- Informed consent required for the study.

Exclusion criteria

- Patients with traumatic hollow viscus perforation were excluded.
- Those who were diagnosed with perforation secondary to obstructed or strangulated hernia were excluded

Procedure

The observation study was conducted among 90 patients with a diagnosis of hollow viscus perforation with acute peritonitis in a hospital setup. Each patient's history was taken and physical examination was conducted after admission, which included an assessment of pain in abdomen, vomiting, fever, distention of abdomen, dehydration, guarding and rigidity, presence of bowel sounds, and other signs of peritonitis. The relevant investigations were conducted for the diagnosis and to determine the possible site of perforation. The relevant investigations include chest X-rays and ultrasonography of abdomen. After initial stabilization of the patients with fluid and other medications, exploratory laparotomy was conducted among patients. During the surgery, the site, type of perforation, the extent of contamination, and the abdominal cavity condition was evaluated. The type of surgery was determined from the results of intraoperative findings, which were either the patch repair of the omentum, simple closure, resection, and anastomosis, loop ileostomy, or appendectomy. Postoperative management involved the administration of adequate intravenous fluids, antibiotics, analgesics, anti-ulcer treatment, nutrition, and wound care. The patients were observed during their hospital stay for recovery and postoperative complications such as wound infection, respiratory infection, abdominal abscess, fistula, and other complications. Clinical results

showed the distribution of the type of perforation among 80 patients, consisting of 66 males (82.5%) and 14 females (17.5%). The Duodenal ulcer perforation was more common among 46 cases (57.5%), consisting of 44 males (66.67% of males) and 2 females (14.29% of females). The most common type was the ileal perforation reported among 16 cases (20.0%) consisting of 9 males (13.64%) and 7 females (50.0%). 11 cases (13.75%) noted with

were noted as either discharge or death. Follow-up evaluation was conducted on the 10th postoperative day and one-month follow-up in the outpatient department. All data collected were fed into Microsoft Excel and then analyzed through SPSS version 27.

Statistical analysis

Data were entered in the Microsoft Excel and analysed by the use of the SPSS software version 27. Descriptive statistical analysis, which includes frequencies and percentages, was conducted for demographic variables, clinical findings, surgical procedure, complications, and outcomes. Appropriate graphs and tables were used to present results, while a p-value of less than 0.05 was considered statistically significant.

3 | RESULTS

howed that males were predominant (74; 82.22%) over females 16 (17.78%) among 90 patients. Patients of age more than 50 years of age were major age group which was followed by the 21–30 years (24; 26.67%). The age 31–40-year group was the lowest presentation and the most predominant site of anatomy was Duodenal perfora among 50 patients (55.56%), which was followed by the ileal perforation (19; 21.11%) and appendicular perforation (13; 14.44%). 4 patients (4.44%) showed the gastric perforation, while the jejunal and sigmoid perforations were frequently observed. Diffuse abdominal pain was commonly noted (56; 62.22%), which was followed by the epigastric pain (20; 22.22%) and RIF pain (11; 12.22%).

Appendicular perforation, and the stomach ulcer perforation and jejunal perforation presented among 4 (5.0%) and 3 (3.75%) cases. The duodenal ulcer perforation was predominant among males, and ileal perforation was commonly noted among females. The duodenal and ileal perforations combined reported among 62 cases, which indicated the contribution to the study population.

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Table 1. Demographic Characteristics, Anatomical Site of Perforation, and Site of Abdominal Pain among Study Participants

Variable	Category	No. of Cases (n=90)	Percentage (%)
Sex	Male	74	82.22
	Female	16	17.78
Age Group (Years)	12–20	13	14.44
	21–30	24	26.67
	31–40	7	7.78
	41–50	14	15.56
	>50	32	35.56
Anatomical Site of Perforation	Stomach	4	4.44
	Duodenum	50	55.56
	Jejunum	3	3.33
	Ileum	19	21.11
	Appendix	13	14.44
Site of Abdominal Pain	Sigmoid colon	1	1.11
	Diffuse	56	62.22
	Epigastric (E)	20	22.22
	Right iliac fossa (RIF)	11	12.22
	RIF and right lumbar (RL)	2	2.22
Total	Right hypochondrium (RH)	1	1.11
	—	90	100

Table 2. Distribution of Types of Perforation by Sex

Type of Perforation	Male, n (%)	Female, n (%)	Total, n (%)
Duodenal ulcer perforation (DU)	44 (66.67%)	2 (14.29%)	46 (57.50%)
Appendicular perforation (AP)	8 (12.12%)	3 (21.43%)	11 (13.75%)
Jejunal perforation (JP)	2 (3.03%)	1 (7.14%)	3 (3.75%)
Ileal perforation (IP)	9 (13.64%)	7 (50.00%)	16 (20.00%)
Stomach ulcer perforation (SU)	3 (4.55%)	1 (7.14%)	4 (5.00%)
Total	66 (100.00%)	14 (100.00%)	80 (100.00%)

showed the distribution of the signs and symptoms with highest rate of prevalence of gastrointestinal and peritoneal manifestations noted among 90 patients. 75 patients were indicated with vomiting, which was followed by the fever among 52 patients (57.78%) and pain noted among 33 patients (36.67%). 85 patients (94.44%) showed the guarding and rigidity. 69 patients (76.67%) showed the

obliterated liver dullness, while 61 patients (67.78%) showed the dehydration. About 55 patients (61.11%) were noted with abdominal distension and free fluid and 42 patients (46.67%) reported with bowel sounds. Overall findings showed the predominant signs for the intra-abdominal inflammation and peritoneal involvement.

Table 3. Distribution of Presenting Symptoms and Clinical Signs Among Study Participants

Category	Symptom/Sign	Frequency, n	Percent (%)
Symptoms	Vomiting	75	83.33
	Fever	52	57.78
	History of pain	33	36.67
	Abdominal distension (DA)	55	61.11
	Dehydration (DEHY)	61	67.78
Clinical Signs	Guarding and rigidity (G & R)	85	94.44
	Obliterated liver dullness (OLD)	69	76.67
	Free fluid (FF)	55	61.11
	Bowel sounds (BS)	42	46.67

Figure 1 showed the distribution of pneumoperitoneum noted among 75.56% of participants. While contrastingly, 24.44% of participants lacked with pneumoperitoneum. Thus patients with pneumoperitoneum showed high percentage with the 51.12 percentage points. These findings showed that pneu-

moperitoneum was predominant and the distribution indicated the positive condition of pneumoperitoneum, which suggested the high frequency of cases of pneumoperitoneum presence compared with its absence among the study participants within the analyzed study population.

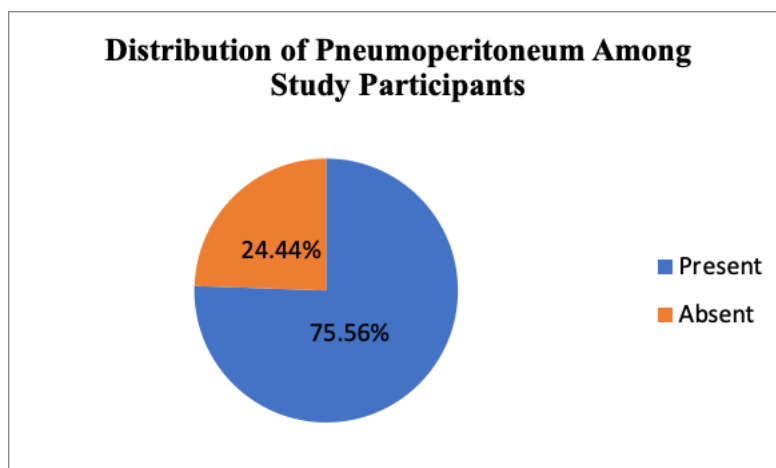


Fig. 1: Distribution of Pneumoperitoneum among study participants

Figure 2 demonstrated the surgical procedure among study participants and the Omental Patch Repair was predominant procedure accounted among 63.63% of cases which indicated that the perforation closure was most commonly employed surgical technique. Appendicectomy was the second leading procedure at 14.44%, and Simple Closure had 12.22%. The proportion for Resection and Anastomosis was 6.67%, and Loop Ileostomy was 3.33%. These pro-

cedures were conducted among patients with complicated or particular cases needing bowel diversion and bowel resection, respectively. There is high frequency towards doing less invasive and patchwork repairs rather than resection procedures, probably due to the pathophysiology (usually involving perforations) and a surgical approach that prefers minimal destructive surgery.

emonstrated that the incidence of complications in 90 patients after surgery evaluated that 36 patients (40.00%) had no complications. The most common single complication was lower respiratory tract infection (LRTI) that was recorded in 20 patients (22.22%). 11 patients (12.22%) suffered from wound infection, while both LRTI and wound infections were recorded in 9 patients (10.00%). Intra-abdominal abscess (IAA), wound infection with fis-

tula, fistula only, and acute respiratory distress syndrome were recorded in 2 patients (2.22%) each. 4 patients (4.44%) suffered from IAA and LRTI with wound infection, while 2 patients (2.22%) suffered from septicaemia with LRTI. Therefore, 54 patients (60.00%) had some complications after surgery. Respiratory and wound complications were the most common ones.

Figure 3 showed the outcome of the clinical course after surgery of participants of the research. The great majority of the patients, 92.22%, were discharged, which indicated the favourable progno-

sis and successful surgery and postoperative period among the participants. On the other hand, the remaining 7.78% died, indicating the mortality rate from the underlying disease and from the surgical

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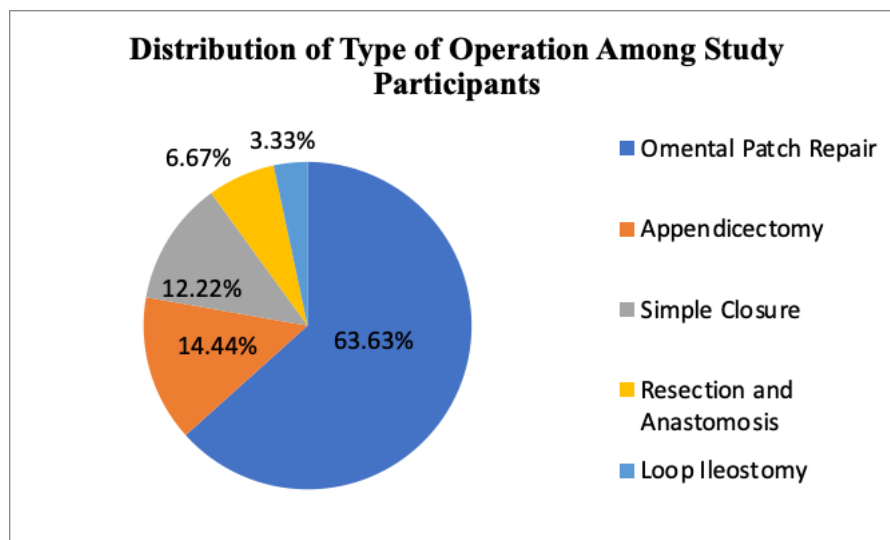


Fig. 2: Distribution of Type of Operation among Study Participants

Table 4. Distribution of Postoperative Complications Among Study Participants

Postoperative Complication	Frequency (n)	Percent (%)
Absent	36	40
Intra-Abdominal Abscess	2	2.22
Lower Respiratory Tract Infection, Wound Infection	9	10
Wound Infection	11	12.22
Wound Infection, Fistula	2	2.22
Lower Respiratory Tract Infection	20	22.22
IAA, LRTI, WI	4	4.44
Fistula	2	2.22
Acute Respiratory Distress Syndrome	2	2.22
Septicaemia, LRTI	2	2.22
Total	90	100

procedure itself. The relatively small mortality rate indicates the timely diagnose and the right surgical intervention in the majority of the patients. However, the fact that there is an expired part of the par-

ticipants means the clinical severity of the disease in some of them, which can be due to late diagnosing, advanced disease, postoperative complications or comorbid conditions.

4 | DISCUSSION

Acute peritonitis continues to be a very important emergency surgical problem as the localised intra-abdominal contamination can rapidly escalate to systemic inflammatory response, sepsis and organ dysfunction. This prospective study aimed to determine the clinical profile, underlying aetiology, management, postoperative complications and outcomes of patients with acute peritonitis with emphasis. The results have to be considered in the context of current evidence that the prognosis depends on the interaction between host factors, severity of physiological derangement, duration of intra-abdominal contami-

nation, anatomical source and the adequacy and timing of the source control [1-4].

The aetiological distribution seen in the current population is of clinical significance as the underlying cause of peritonitis will impact both operative management and prognosis. Though many surgical populations may suffer from secondary peritonitis due to gastrointestinal perforation, other sources of secondary peritonitis include appendicular, ileal, gastroduodenal, colonic, biliary, postoperative, and other causes. In the studies conducted in India, there's also been a significant amount of variability in the anatomic sites of perforation peritonitis.

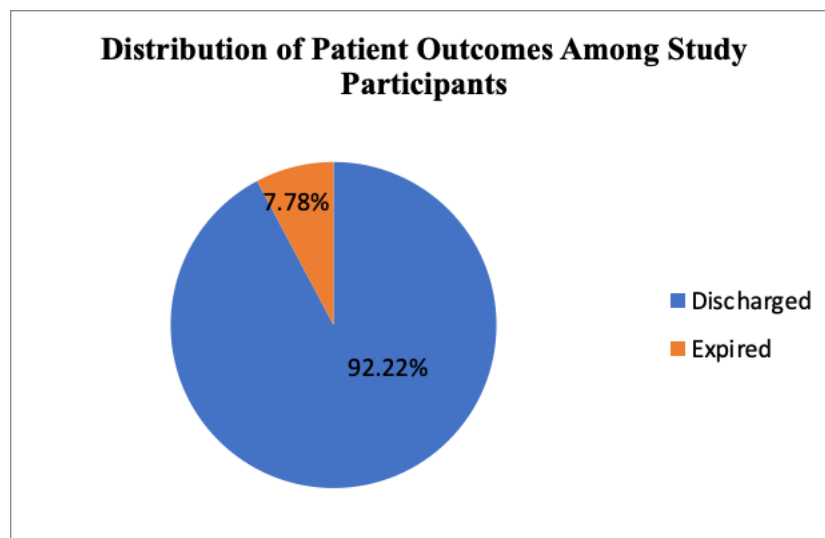


Fig. 3: Distribution of Patient Outcomes among Study Participants

Singh et al., in a prospective cohort of 84 patients, specifically demonstrated that preoperative physiological and biochemical characteristics were useful for identifying patients at increased risk of mortality [7]. The Peritonitis Study Group's prospective multicentre study involving 355 patients further demonstrated that age, comorbid disease, anatomical origin, type of admission, and successful elimination of the infectious source independently influenced outcomes [10]. Thus, the distribution of aetiologies in the present study is not merely descriptive; it provides an important framework for interpreting differences in morbidity, length of hospitalisation, and mortality.

This is because the severity of the presentation also determines the outcome. Those who are found to have tachycardia, hypotension, altered sensorium, oliguria, metabolic acidosis, elevated serum lactate or biochemical evidence of organ dysfunction comprise a significantly higher-risk population. This is in line with prospective data from India, which showed the usefulness of lactate and created severity scores as predictors. Jobin et al. studied 113 patients undergoing emergency laparotomy with perforation peritonitis and found the 28-day mortality was 15.04% with differences between survivors and non-survivors in age, SOFA, qSOFA, APACHE II, MPI, perforation site, and serial lactate concentrations. Most importantly, the use of lactate pre- and postoperatively was each independently predictive of mortality [8]. These results suggest that serial

physiological assessment should be included in the perioperative management of a patient in addition to the initial clinical evaluation.

Prognostic scoring systems are especially relevant in the prospective assessment of the prognosis of acute peritonitis. The Mannheim Peritonitis Index is based on the factors of patient characteristics, organ dysfunction, origin of sepsis and the extent of peritoneal contamination. The above findings point towards the use of risk stratification to identify patients who should be kept under close observation and should be treated aggressively for the perioperative period, in order to prevent mortality and other postoperative complications.

One key finding in the literature is the association between the delay until definitive treatment and adverse outcomes. A long-standing symptom duration allows for continued bacterial contamination and inflammation of the peritoneum, which raises the risk of systemic inflammatory response, septic shock and postoperative organ dysfunction. Any delay found in the present study should be viewed not as a logistical factor but as a potentially modifiable factor that influences the course of the disease; older age, perforation interval >36 hours and larger perforation size were confirmed as risk factors for postoperative morbidity and mortality in a prospective study of peptic perforation, as well as in population-based studies of perforated peptic ulcer [11,12].

This principle of adequate source control must also be taken into account in the management outcomes.

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Presently, international recommendations state that the use of antimicrobial therapy is crucial but not sufficient to overcome anatomical contamination [13]. The postoperative results of the present group should therefore be considered as the result of early resuscitation, antibiotic use, surgical timing, source control effectiveness, peri-operative critical care and organ dysfunction management.

Clinically significant postoperative complications after emergency laparotomy are wound infection, respiratory complications, intra-abdominal collections, wound dehiscence, anastomotic leakage, prolonged ileus and renal or cardiovascular dysfunction. They occur in a closely related manner to the severity of intra-abdominal sepsis and the physiological reserve of the patient. The findings in a prospective Indian cohort by Yelamanchi et al. were similar, with wound infection as the most common postoperative complication, followed by respiratory complications and wound dehiscence, requiring admission to the intensive care unit in a significant proportion of patients [14]. This further emphasises the need for postoperative monitoring, early mobilisation, respiratory management, nutritional management, appropriate antimicrobial de-escalation and early recognition of postoperative complications [15].

In conclusion, the present study confirms that a risk-adapted approach for the treatment of acute peritonitis is more suitable than a standard operative treatment. Early presentation without organ dysfunction may be associated with good outcomes following rapid diagnosis and definitive source control, while elderly, more comorbid, haemodynamically unstable, longer symptom duration, heavily contaminated, renal dysfunction, or elevated lactate levels may warrant increased resuscitation and critical care during the peri-operative period. The clinical significance of the present study is further enhanced by its prospective design, which enables a systematic evaluation of presentation, treatment, complications and outcomes [1,6]. However, interpretation should take into consideration the heterogeneity and the single-centre data of the underlying cause of peritonitis. Standardised severity scores, serial lactate measurements, microbiological data, antimicrobial resistance patterns and long-term outcomes should be collected by larger, multicentre prospective studies to further clarify determinants of prognosis.

5 | CONCLUSION

The study concluded that the majority of cases of GI perforation occurred in males, with the age above 50 years old. As for anatomical distribution, duodenal perforation had the highest frequency, which was followed by ileal and appendicular ones. The symptoms included vomiting, guarding and rigidity, obliteration of liver dullness, dehydration, and presence of pneumoperitoneum, which showed that there was a serious involvement of peritoneum at presentation. The most commonly used surgical procedure was the omental patch repair procedure, which is demonstrated by high frequency of duodenal ulcer perforation and possibility of its primary repair with omentum. The level of postoperative morbidity was high, 60.00% of the patients had one or more complications; lower respiratory tract infection and wound complications were frequently noted. Overall postoperative prognosis was favourable, 92.22% of patients were discharged and 7.78% died.

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