PERFORATIVE PERITONITIS: CONTINUING SURGICAL CHALLENGE. (PROSPECTIVE STUDY OF 50 CASES)

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ABSTRACT Background: Perforative peritonitis poses a significant diagnostic and therapeutic challenge to the attending surgeon. Delay in diagnosis followed by sub-optimal treatment may lead to many complications, thereby increasing both morbidity and mortality. This is by virtue of various factors which affect the prognosis. Hence the need arises to identify these prognostic factors. Aims and Objectives: To study the various etiological factors of perforative peritonitis and to identify prognostic factors and comorbid conditions which influence the outcome in perforative peritonitis. Materials and Methods: 50 patients with an established diagnosis of perforative peritonitis due to various aetiologies confirmed by clinical and radiological investigations were included in the study and studied prospectively. On admission to the hospital, various haematological and radiological investigations were conducted to confirm the diagnosis. Patients subsequently underwent surgical intervention. Postoperative recovery and outcomes assessed. Results were tabulated and statistically analysed. Results: The mean age of patients in the study was 36.5 ± 5 years. Patients who presented in an advanced stage developed complications. The majority of patients were males. The interval between the onset of symptoms and operative intervention was directly related to postoperative complications. Pneumoperitoneum was the most common x-ray finding, followed by dilated bowel loops with free fluid in the peritoneal cavity as the most common ultrasonography finding. Tachycardia and oliguria, which were markers of the severity of the disease process, were associated with an increased rate of complications. Peptic ulcer perforation was the most common, followed by perforations caused by infective aetiology. Perforations caused by infective aetiology had a higher rate of complication. Primary closure of the perforation was the most commonly performed procedure. Significant abdominal contamination found intraoperatively contributed to a negative outcome, as were comorbid conditions, which also increased the complication rate significantly. Conclusion: Delayed intervention after the onset of symptoms, tachycardia, oliguria and comorbidities are associated with a higher complication rate. Radiological investigations help in confirming the diagnosis. Infective aetiology of the perforation and extensive peritoneal contamination was associated with higher complication rates. Prompt and aggressive resuscitation on admission, optimum antibiotic administration, and early meticulous surgical intervention can reduce morbidity and mortality to a bare minimum.

KEYWORDS Perforative, Peritonitis, Factors, Morbidity, Mortality
Introduction

Gastrointestinal perforations have always posed the greatest challenge to the general surgeon. [1] Perforation occurs once the pathology extends through the full thickness of the hollow viscus. This leads to spillage of intestinal contents into the peritoneal cavity. Perforation can occur anywhere in the gastrointestinal tract, from the oesophagus to the rectum. If untreated, it may lead to bacteraemia, septic shock, multi organ failure, and abdominal abscess formation, leading to high morbidity and mortality.[1,2] Diagnosis of perforative peritonitis may sometimes be challenging due to wide variation in the presentation. Delay in surgical intervention inevitably leads to significant morbidity and mortality. Since the patient of perforative peritonitis may present along the natural course of the disease process, the surgeon needs to know the natural history of the disease and the factors influencing the outcome. Therefore having an in-depth knowledge of all the factors influencing the outcome will enable optimum management leading to a satisfactory outcome. [3]

Aims and Objectives

The aim of this study was to identify the prognostic factors which impact successful surgical outcomes in perforative peritonitis.

Materials and Methods

Inclusion criteria:

1. All patients admitted to the single surgical unit had clinical features of perforative peritonitis.
2. All patients presenting to a single surgical unit with investigations suggestive of perforative peritonitis.

Exclusion criteria:

1. All cases of primary peritonitis.

Fifty consecutive patients admitted to a single surgical unit in a tertiary care teaching hospital from January 2018 to December 2018 were included in the study. The study was a prospective observational study. Approval for the study was obtained from the institutional ethics committee prior to commencing the study. Consent of each patient to be included in the study was obtained. On admission, the patient’s detailed history and clinical examination findings with special reference to vital parameters and abdominal findings were noted. Chest X-Ray (PA view) and an erect abdominal X-Ray were done in all patients, except in cases of suspected traumatic perforations in hemodynamically unstable patients. Ultrasonography and CT scan of the abdomen were done in patients with positive findings on clinical examination. All patients were subjected to an exploratory laparotomy. Perforations were managed according to the pathological process involved, which were recorded. Patients were studied in the postoperative period until discharge. Results were tabulated and statistically analysed to assess the significance of clinical parameters, various investigations, the underlying pathology, and surgical intervention’s nature, including the outcomes.

Statistical Methods

The SPSS statistical software version 19 was used for data analysis. Data were collected prospectively in patients who underwent surgery for perforative peritonitis. The Chi-square test was used for the comparison of categorical (qualitative) variables. A p-value less than 0.05 was considered significant.

Results

Age

The mean age of the patients in the study was 36.4 SD 5 years. The majority of patients belonged to the age group of 30-39 years. Of the 4 patients who expired, 3 belonged to the age group of 20-39 years and 1 to 60-69 years.

Sex

Of the 50 patients studied, 46 was males (92%), and 4 were females (8%).

The time interval between onset of symptoms and operative intervention:

13 out of 16 patients who had more than 24 hours between the onset of symptoms and operative intervention developed complications. This was found to be statistically significant (Table 1).

Relationship between pulse and complications:

23 out of 29 patients who developed complications had a pulse of more than 100 beats per minute at the time of presentation to the hospital. The relationship was found to be statistically significant (Table 2).

Relationship of urine output at the time of presentation with postoperative complications:

15 out of 29 patients who developed complications had a urine output of less than 500 cc at the time of presentation. The relationship was found to be statistically significant (Table 3).

CNS evaluation:

41 (82%) patients had normal CNS examination at the time of presentation to the hospital (Table 4).

Pneumoperitoneum

was seen on a chest x-ray in 37 patients (74%) (Table 5).

Ultrasonography findings:

Free fluid was found in 16 patients (32%), whereas 16 (32%) patients had a normal ultrasonography finding (Table 6).

The pattern of perforation:

Peptic ulcer was the most common cause of perforative peritonitis seen in 23 patients (46%). This was followed by perforation due to infective aetiology in 14 (28%) patients (Table 7).

Site of the perforation:

Out of the 29 patients who developed complications, 14 had ileal perforations. The relationship was statistically significant (Table 8).

Nature of perforation:

Out of 14 cases having infective aetiology as the cause of perforation, 13 cases developed complications. This relationship was statistically significant (Table 9).
Type of surgery:
Primary closure of the perforation was the most common surgery performed in 38 patients (79%) (Table 10). Primary closure, though the most common procedure performed, was associated with more complications as compared to other procedures performed. However, the relationship was not statistically significant (Table 10).

The severity of contamination:
25 out of 29 patients who developed complications had peritoneal contamination of more than 500 cc. However, this observation was not statistically significant (Table 11).

Comorbid condition:
18 cases had COPD as the most common comorbid condition. Out of the 18 patients who had comorbid conditions, 17 developed complications. This association was statistically significant (Table 12).

Discussion
Perforative peritonitis even today continues to be the greatest challenge to the general surgeon. Prognosis remains variable due to a multitude of factors affecting it. [3] In the present study of 50 cases of perforative peritonitis, the mean age was 36.4±5 years. The majority of patients belonged to the age group of 30 to 39 years. Of the 4 patients who expired, 3 belonged to the age group of 20 to 39 years, and once belonged to the age group of 60 to 69 years. The patient who succumbed was diagnosed with a malignant neoplasm of the rectum. Advanced age is associated with comorbid medical conditions, which have a significant impact on surgical outcomes.[3] Incidence of malignancy with advanced age is an important factor in determining the outcome, as observed in the present study of a single patient who has rectal cancer.[4] Advancing age is associated with the weakening of homeostatic mechanisms to surgical stress. This septic process is superimposed on such a weakened physiological system will inevitably lead to increased morbidity and mortality.[3] In cases of perforative peritonitis, patients with advanced age have a high incidence of comorbid medical conditions involving respiratory, cardiovascular, and the endocrine system. These diseases, by themselves, can cause the weakening of physiological responses. In some cases like COPD, medications such as steroids weaken the physiological responses leading to complications. Of the 50 patients included in the study, 46 were male. However, the gender of the patient was not found to bear any statistically significant correlation with the outcomes in the case of perforative peritonitis.

The interval between the onset of symptoms and operative intervention is an important determinant of the outcome, as observed in the present study. [5] There are many reasons which can explain these variations. Increased interval increases the contamination of the peritoneal cavity by allowing the increased volume of gastrointestinal fluid to spill into the peritoneal cavity. These contents contain activated enzymes, undigested food and organisms originating from the indigenous bacterial flora of the gut. Each one of these components has a tremendous capability to induce a very strong peritoneal reaction causing increased third space loss contributing to hemodynamic instability. The spill predominantly gram-negative organisms which find their way into the peritoneal cavity elicit a strong response. Various activated enzymes cause digestion of normal tissues allowing access of gram-negative organisms into the systemic circulation, thereby setting up a diffuse inflammatory response in the body, terminating into septic shock. The initial body response to this process is by reactive hyperaemia, termed the warm phase of septic shock mediated by endotoxins. If the patient receives prompt treatment during this phase outcome is much better, whereas if left untreated due to delayed presentation, it will lead to the cold phase of septic shock. Even if the patient receives resuscitative measures during this stage, mortality remains high. In the present study, 34 cases were presented within 24 hours of symptoms, out of these 16 patients who developed complications, out of the 16 patients who presented 24 hours after symptoms, 13 developed complications. These findings were statistically significant (p = 0.022). Of the 13 patients who developed complications, 3 expired.

Perforative peritonitis leads to extensive third space loss of fluid as more time elapses from perforation. As time passes, there is significant hypovolemia. The body’s physiological system attempts to maintain hemodynamic stability by causing an increase in sympathetic discharge, causing vasoconstriction. The earliest clinical features of hemodynamic instability are the development of tachycardia. If left untreated, it is usually followed by hypotension. Hypotension leads to a decrease in blood supply to vital organs, especially the kidney, the first organ system to bear the brunt. Impact on the kidney is manifested by a fall in urine output. Tachycardia, hypotension and decreased urine output on admission suggest a serious, shocking state and necessitates prompt and aggressive resuscitation prior to definitive surgery. In the present study, patients who had tachycardia, i.e. pulse more than a hundred beats per minute, had higher complications. This observation was found to be statistically significant, i.e., out of 29 patients who developed complications, 23 patients had a pulse, more than 100 beats per minute (p=0.003). Urine output correlates well with blood pressure. [6] In the present study, it was found that patients who had a urine output of less than 500 cc at the time of admission after catheterization had a higher complication rate. These observations about pulse rate, urine output, and complications were consistent with other studies. [5, 6, 7]

Hemodynamic instability in early phases causes alteration in pulse rate, blood pressure, and urine output. As time passes, in perforative peritonitis, the septic process attempts to grip the patient’s physiological system. During the early phase of warm septic shock, the pulse rate and blood pressure may not be grossly abnormal. This should not give a false sense of security to the attending surgeon by way of misinterpretation of hemodynamic stability. Therefore, an aggressive approach to resuscitation is mandatory in all patients presenting with perforative peritonitis irrespective of satisfactory hemodynamic parameters. [6, 7]

Hypotension, if left untreated, affects every organ system in the body. The effects are more prominent after the septic process takes the upper hand. This then leads to the state of extensive tissue hypoxia to which certain organ systems such as the brain are very sensitive. Hypoxia of the brain manifests with a wide spectrum of symptoms ranging from irritability to unconsciousness. The development of neurological deficit in a patient with septic shock has a very bad prognosis.[7,8] In the present study, out of 30 patients studied, 41 were fully conscious at the time of presentation, 8 were drowsy, and 1 was irritable. Of the 8 drowsy patients, 3 succumbed to the disease process.
**Table 1** Relationship between the onset of symptoms and operative intervention

| Complications | Interval               | Total |
|----------------|------------------------|-------|
|                | Less than 24 hrs       | More than 24 hrs |       |
| Yes            | 16 (47.1%)             | 13 (81.2%)    | 29 (58%) |
| No             | 18 (52.9%)             | 03 (18.8%)    | 21 (42%) |
| Total          | 34 (100%)              | 16 (100%)     | 50 (100%) |

\[X^2 = 5.221 \text{ DF} = 1 \text{ P value} = 0.022(\text{Significant}) \text{ (Chi square test)}\]

**Table 2** Relationship between pulse and complications

| Pulse       | Complications | Total |
|-------------|---------------|-------|
|             | Yes           | No    |
| Less than 100 | 06 (20.7%)   | 13 (61.9%) | 19 (58%) |
| More than 100 | 23 (79.3%)  | 08 (38.1%) | 31 (62%) |
| Total        | 29 (100%)     | 21 (100%)  | 50 (100%) |

\[X^2 = 8.782 \text{ DF} = 1 \text{ P value} = 0.003(\text{Significant}) \text{ (Chi square test)}\]

**Table 3** Relationship between urine output at the time of presentation and complications

| Urine       | Complications | Total |
|-------------|---------------|-------|
|             | Yes           | No    |
| Less than 500cc | 15 (51.7%) | 02 (9.5%) | 17 (34%) |
| More than 500cc  | 14 (48.3%) | 19 (90.5%) | 33 (66%) |
| Total        | 29 (100%)     | 21 (100%)  | 50 (100%) |

\[X^2 = 9.666 \text{ DF} = 1 \text{ P value} = 0.002(\text{Significant}) \text{ (Chi square test)}\]

**Table 4** CNS evaluation

| Urine       | Complications | Total |
|-------------|---------------|-------|
|             | Yes           | No    |
| Less than 500cc | 15 (51.7%) | 02 (9.5%) | 17 (34%) |
| More than 500cc  | 14 (48.3%) | 19 (90.5%) | 33 (66%) |
| Total        | 29 (100%)     | 21 (100%)  | 50 (100%) |

\[X^2 = 9.666 \text{ DF} = 1 \text{ P value} = 0.002(\text{Significant}) \text{ (Chi square test)}\]

**Table 5** X-ray findings

| X-ray findings     | Frequency | Percent |
|--------------------|-----------|---------|
| Normal Study       | 07        | 14      |
| Not done           | 06        | 12      |
| Pneumoperitoneum   | 37        | 74      |
| Total              | 50        | 100     |
Table 6 USG findings

| USG findings                | Frequency | Percent |
|-----------------------------|-----------|---------|
| Cholelithiasis Study        | 01        | 2.0     |
| Dilated Bowel Loops         | 05        | 10.0    |
| Gross amount of F.F.        | 04        | 8.0     |
| Minimal amount of F.F.      | 02        | 4.0     |
| Moderate amount of F.F.     | 10        | 20.0    |
| Normal study                | 16        | 32.0    |
| Not done                    | 12        | 24.0    |
| Total                       | 50        | 100.0   |

Table 7 Pattern of perforation

| Etiology        | Complications | Total |
|-----------------|---------------|-------|
|                 | Yes           | No    |      |
| Duodenal        | 04 (14.3%)    | 17 (81%) | 21 (42.9%) |
| Ileal           | 14 (46.4%)    | 02 (9.5%) | 15 (30.6%) |
| Jejunal          | 04 (14.3%)    | 01 (4.8%) | 05 (10.2%) |
| Rectal          | 02 (7.1%)     | 00 (0%)  | 02 (4.1%)  |
| Gastric         | 04 (14.3%)    | 00 (0%)  | 04 (8.2%)  |
| Gallbladder     | 00 (0%)       | 01 (4.8%) | 01 (2%)    |
| Appendicular    | 01 (3.6%)     | 00 (0%)  | 01 (2%)    |
| Total           | 29 (100%)     | 21 (100%) | 50 (100%)  |

$X^2 = 25.433 \ DF = 6 \ P \ value < 0.001$ (Significant) (Chi square test)

Table 8 Site of perforation

| Nature of perforation | Frequency | Percent |
|-----------------------|-----------|---------|
| Diverticular          | 01        | 2.0     |
| Infective             | 14        | 28.0    |
| Malignant             | 01        | 2.0     |
| Peptic Ulcer          | 23        | 46.0    |
| Traumatic             | 11        | 22.0    |
| Total                 | 50        | 100.0   |

Table 9 Nature of perforation

| Nature of perforation | Complications | Total |
|-----------------------|---------------|-------|
|                       | Yes           | No    | |
| Infective             | 13 (44.8%)    | 01 (4.8%) | 14 (28%) |
| Non-infective         | 16 (55.2%)    | 20 (95.2%) | 36 (72%) |
| Total                 | 29 (100%)     | 21 (100%) | 50 (100%) |

$X^2 = 9.698 \ DF = 1 \ P \ value = 0.002$ (significant) (Chi square test)
### Table 10: Type of surgery

| Surgery                          | Frequency | Percent |
|----------------------------------|-----------|---------|
| Appendicectomy                   | 01        | 2.0     |
| Cholecystectomy                  | 01        | 2.0     |
| Exteriorisation                  | 04        | 8.0     |
| Hartman Procedure                | 01        | 2.0     |
| Primary Closure                  | 39        | 78.0    |
| Resection & Anastomosis          | 04        | 8.0     |
| **Total**                        | **50**    | **100.0**|

| Surgery                          | Complications |
|----------------------------------|----------------|
|                                  | Yes | No     | Total  |
| Primary closure                  | 20 (69%) | 19 (90.5%) | 39 (78%) |
| Exteriorization                  | 05 (17.2%) | 00 (0%) | 05 (10%) |
| RA                               | 03 (10.3%) | 01 (4.8%) | 04 (8%) |
| Cholecystectomy/Appendicectomy   | 01 (3.4%) | 01 (4.8%) | 02 (4%) |
| **Total**                        | **29 (100%)** | **21 (100%)** | **50 (100%)** |

\[X^2 = 4.870 \text{ DF } 3 \text{ P value } = 0.182 \text{ (Not Significant) (Chi square test)}\]

### Table 11: Volume of contamination

| Contamination | Complications |
|---------------|---------------|
|               | Yes | No     | Total  |
| Less than 500cc | 04 (13.8%) | 07 (33.3%) | 11 (22%) |
| More than 500cc | 25 (86.2%) | 14 (66.7%) | 39 (78%) |
| **Total**      | **29 (100%)** | **21 (100%)** | **50 (100%)** |

\[X^2 = 2.710 \text{ DF } 1 \text{ P value } = 0.100 \text{ (Not Significant) (Chi square test)}\]

### Table 12: Co morbid conditions

| Comorbid conditions | Frequency | Percent |
|---------------------|-----------|---------|
| C.O.P.D.            | 16        | 32.0    |
| CO.P.D. & L.H.D.    | 01        | 2.0     |
| L.H.D.              | 01        | 2.0     |
| No                  | 32        | 64.0    |
| **Total**           | **50**    | **100.0**|

| Complications | Complications |
|---------------|---------------|
|               | Yes | No     | Total  |
| Yes           | 17 (94.4%) | 12 (37.5%) | 29 (58%) |
| No            | 01 (5.6%)  | 20 (62.5%) | 21 (42%) |
| **Total**     | **18 (100%)** | **32 (100%)** | **50 (100%)** |

\[X^2 = 15.33 \text{ DF } 1 \text{ P value } < 0.001 \text{ (Significant) (Chi square test)}\]
whereas, amongst the 41 conscious patients, only 1 succumbed.

A series of laboratory investigations are essential in all cases of perforative peritonitis. These provide information on the patient’s condition on presentation to the hospital and help study the initial response to resuscitation. [9] After that, with surgical intervention, failure of improvement in blood investigation parameters will significantly help in changing drug therapy such as antibiotic therapy or may indicate to commence blood products, especially in cases of suspected DIC. [9] In the present study, a complete blood count renal profile, random blood sugar levels and blood grouping and cross-matching were performed in all patients. These values were closely monitored at periodic intervals to study patients’ responses to treatment. High total leukocyte count was observed in patients who presented late.

Radiological investigations remain pivotal in the diagnosis of perforative peritonitis. [10] The simplest investigation of a plain X-ray abdomen in a standing position enables confirmation of perforation of a hollow viscus by way of pneumoperitoneum. Many times, despite physical findings being strongly suggestive of a hollow viscus perforation, radiological findings on plain x-ray may be absent. In such instances, a Ryle’s tube may be introduced and a certain amount of air inflated into the stomach followed by a repeat abdomen x-ray. This method is specifically useful in cases of gastric or duodenal perforation, which may have sealed due to small size but has already led to significant spillage of contents causing overt abdominal signs. This simple investigation can be performed in an emergency setting and provides invaluable information. [10]

Clinical findings in perforative peritonitis can be supported by ultrasonography of the abdomen. [10] In the present study, a wide spectrum of observations was recorded on ultrasonography. The most common findings were free fluid in the peritoneal cavity and dilated bowel loops. Other findings, such as cholelithiasis, were coincidental. The main advantage of ultrasonography, especially in advanced cases of peritonitis, is to identify areas of fluid collection, thereby enabling the surgeon to explore all these sites at laparotomy to prevent residual abscess formation. Another advantage of ultrasonography is in those cases that exhibit suboptimal response in the post-operative period due to the development of a residual intra-abdominal abscess. In such cases, ultrasonography not only helps in localizing the site of the collection but also aids in the drainage of these collections by aspiration or placement of a pigtail catheter. It is also helpful in diagnosing chest complications such as reactive pleural effusions, which develop in patients of perforative peritonitis presenting late.

The aetiology of perforative peritonitis exhibits a wide spectrum ranging from upper GI (gastric) to lower GI (rectal) perforations. Significant geographical variation is also observed in the aetiology of perforative peritonitis. Western studies reveal lower GI pathologies as a common cause of perforative peritonitis, whereas upper GI perforations are commonly seen in the Indian subcontinent. In the present study, duodenal ulcer perforation was the most common, followed by ileal perforation. [11] The site of perforation has a significant impact on the surgical outcome, which is related to various factors such as the nature of spill contents, the reaction of the peritoneum to these contents and the severity of presenting symptoms and signs. Biliary peritonitis due to the relatively sterile nature of bile may not present in the early stages with typical symptoms and signs of peritonitis. However, when a delayed diagnosis is made, increased severity of peritonitis is associated with high morbidity and mortality. [11] On the other hand, upper GI perforations such as peptic ulcer perforations present with early symptoms and signs enabling early diagnosis and prompt treatment, thereby decreasing morbidity and mortality. The most complex aetiology of perforative peritonitis is large bowel perforation due to the feculent contents filling the peritoneal cavity. The severity and rapidity of the development of the septic process lead to high morbidity and mortality. In the present study, ileal perforations were associated with a higher incidence of complications, which was statistically significant (14/29; p < 0.001). In the rest of these cases, the complication rate was relatively low. The majority of ileal perforations in the present study were due to enteric fever (13/50), while two cases of tubercular origin were seen. Contents of the ileum are rich in enzymes, semi-digested food particles and a significant load of organisms. These cause extensive peritoneal reactions, thereby initiating a severe septic process. The presenting features in these perforations correlate better with clinical presentation of the underlying disease rather than the peritonitis process, thereby causing a delay in diagnosis. [11] Both enteric fever and tuberculosis cause a multitude of systemic defects which can challenge the body’s physiological response to infections. These factors increase the morbidity and mortality in ileal perforations due to cumulative effects. [12]

In the present study of 50 patients, 14 had infective aetiology, whereas 36 had non-infective aetiology. Maximum complications were seen in the subgroup of infective patients, which was statistically significant (13/14; p = 0.002). It was also observed that the volume of contamination in patients with infective aetiology was higher than in patients with other causes. This is attributable to two mechanisms working simultaneously, i.e. the underlying aetiology or disease and the peritoneal reaction to the spill infected intestinal contents. [11, 12, 13] In the present study, it was observed that the volume of contamination was higher in cases of ileal perforation and correlated with a high incidence of complications. Out of 29 patients who developed complications, 25 had more than 500 cc of free fluid at the time of surgery. Similar findings were seen in other studies. [12, 13]

The nature of surgery performed included primary closure, exteriorization of the bowel and removal of diseased organs such as the appendix and the gallbladder depending upon the pathology and severity of peritonitis. [13, 14] Of the 50 patients studied, primary closure of perforation was done in 39 patients. 5 patients were subjected to exteriorization of the affected bowel. Resection anastomosis was done in four patients, and removal of the organ was done in two cases for penetrating the abdomen. Patients were monitored closely in the postoperative period for wound infections, paralytic ileus and septicaemia. It was observed that since a maximum number of cases were treated by primary closure, complications were seen to be higher in this subgroup of patients. (20 out of 29 patients of primary closure) Similar results were seen in other studies. [15, 16, 17, 18] Since number of patients subjected to exteriorization, resection anastomosis, and organ removal were less in this study, observation pertaining to them could not achieve statistical significance.

Wound infection can be treated as a typical sequel rather than a complication in patients surgically treated for perforative peritonitis. [19, 20] As these belong to the category of contaminated wounds, infection rates continue to be high despite all precautionary measures. Another sequel of wound infection is the development of an incisional hernia. [20, 21] Paralytic ileus is another common complication after abdominal surgery. In the present study, 14 patients developed paralytic ileus attributable...
to the septic process and electrolyte alterations. [21, 22] A conservative approach is sufficient to regain normalcy of the bowel. Leakage of surgical repair is another disastrous complication of perforative peritonitis. It is attributable to the choice of procedure, poor technique and inadequate postoperative support and care. [23, 24, 25] In the present study, none of the sutured perforations leaked, nor did any resection anastomosis develop any complications. However, amongst the five patients who underwent exteriorization, I developed a stoma complication, namely blackening of the stoma. This necessitated the recreation of the stoma. This added significantly to the patient’s morbidity as it was a case of carcinoma of the rectum, who later succumbed to the disease.

Comorbid conditions also had a significant impact on outcomes. [26, 27] These included chronic obstructive pulmonary disease (COPD), ischaemic heart disease (IHD) and diabetes mellitus (DM). In the present study, 16 patients had only COPD, 1 patient had COPD and IHD, and one had only IHD. None of the patients had DM. Of the 18 patients who had comorbid conditions, 17 developed wound infection. This observation was found to be statistically significant (p < 0.001), thereby rendering it an important prognostic factor in perforative peritonitis. This conforms with many other studies. [28, 29, 30]

Conclusion

Analysis of observations in the present study has led to the following conclusions regarding the prognosis of perforative peritonitis:

1. Advanced age is associated with a poor prognosis.
2. Time interval between onset of symptoms and operative intervention is directly proportional to morbidity and mortality.
3. Clinical features such as tachycardia, hypotension, and a decrease in urine output have a significant impact on prognosis.
4. Simple radiological investigations such as a plain x-ray of the abdomen and ultrasound of the abdomen not only help in diagnosing but also in quantifying the severity of the disease.
5. Peptic ulcer perforation was the most common cause of perforative peritonitis, followed by ileal perforation.
6. Primary closure of perforation was the most common procedure performed.
7. Non-infective causes of perforation outnumbered infective causes of perforative peritonitis.
8. Degree of contamination by way of an increased volume of the free fluid peritoneal cavity has a bad prognosis.
9. Comorbid conditions continue to affect the prognosis directly.

Based on these conclusions, it is suggested that prompt and aggressive resuscitation on admission, optimum antibiotic administration, and early meticulous and methodical surgical intervention with adequate optimization of comorbid medical conditions can reduce morbidity and mortality in perforative peritonitis.

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Conflict of Interest

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