Section: General Surgery

Original Research Article

PROGNOSTIC FACTORS IN DETERMINING THE MORBIDITY AND MORTALITY IN PERFORATION PERITONITIS – A PROSPECTIVE OBSERVATIONAL STUDY

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Abstract

Background: Perforation peritonitis is one of the most common surgical emergencies. Prompt and active surgical management is necessary to treat patients admitted with perforation peritonitis. **Aim:** This study aimed to determine the significant prognostic factors for morbidity and mortality risk in patients with perforation. **Material and Methods:** This single-centre prospective observational study included 100 patients with perforation peritonitis admitted to the Department of General Surgery in Kanyakumari Government Medical College. A thorough history, clinical examination of the patient, and blood investigation followed by abdominal radiography, USG, CT, and diagnostic paracentesis were performed according to the need of the hour. Various prognostic factors which have a bearing on morbidity and mortality were studied. **Results:** The study included 100 patients aged between 18 and 60 years, with a mean age at presentation of 42.06 years. The majority of patients were male (74%), and the most common perforation site was the duodenum (50%), followed by the gastric mucosa (31%). The most common comorbidity was diabetes mellitus (31%). We found that a delayed presentation time of greater than 24 hours, age greater than 40 years, and comorbidities were significant prognostic factors associated with morbidity and mortality of the patients. **Conclusion:** Late presentation, old age, and comorbidities significantly affected prognosis. Hence, these factors should be identified, and prompt treatment should be provided to reduce patient morbidity and mortality.

INTRODUCTION

Peritonitis due to hollow viscus perforation is a leading emergency in the surgical practice. It is defined as inflammation of the serosa that lines the abdominal cavity and visceral organs contained in it and can be localised or generalised. Peritonitis is often caused by introducing an infection intruding into the peritoneum through a bowel leak or hydrochloric acid from a perforated ulcer. Most duodenal and gastric perforations are initially sterile for several hours before they become secondarily infected. Although acute bacterial peritonitis arises from the alimentary tract, other routes of infection include exogenous contamination. There are also less common forms in which the aetiology is primary spontaneous peritonitis, which is a pure infection with streptococcal, pneumococcal, or Haemophilus bacteria.

Diffuse peritonitis is associated with a mortality rate of approximately 10%. It is based on the presentation time, degree, and duration of peritoneal contamination, age, fitness, and nature of the underlying cause. Hence, various prognostic factors that determine morbidity and mortality associated with perforation peritonitis have been studied.

Aim

This study aimed to identify factors that significantly affect morbidity and mortality in patients with peritonitis.

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MATERIALS AND METHODS

A prospective observational study was conducted on 100 patients with perforation peritonitis admitted to the Department of General Surgery, Kanyakumari Government Medical College's Surgery Ward, from October 2019 to September 2021. Ethical committee approval and informed consent were obtained before the study started.

Inclusion Criteria

The study included patients between the ages of 18 and 60 years, of either sex, who presented with acute abdomen accompanied by pneumoperitoneum on X-ray or CT scans and exhibited positive diagnostic aspirations on abdominal paracentesis.

Exclusion Criteria

Patients unwilling to participate, those with traumatic or iatrogenic perforations, those outside the age range of 18 to 60 years, and those who were pregnant or lactating were excluded.

Investigations included complete blood count, liver function test, renal function test, serum electrolytes, urine routine, chest X-ray, erect abdomen X-ray, electrocardiogram, viral markers (HIV, HBsAg, HCV), abdominal ultrasound, and CT scan.

Detailed patient history, clinical examination, and blood investigations were followed by X-ray, emergency USG, CT SCAN, and diagnostic paracentesis according to the need of the hour, depending on the clinical findings and imaging. The patients were primarily resuscitated, and according to haemodynamic status, a staged procedure or exploratory laparotomy was performed. Intraoperative findings indicated that the peritoneal fluid had been sent for culture and sensitivity. Based on the intraoperative findings and the amount of contamination, primary closure, resection, and anastomosis or diversion were performed. After treatment, patients were evaluated, and overall complications, number of hospital days (morbidity), and outcome (death/discharge) were determined. Various factors such as age, sex, comorbidities, size and site of perforation, amount of contamination, heart rate, blood pressure, respiratory rate, and presentation time were monitored, and their effects on the outcome were evaluated.

Statistical Analysis

The values were analysed using the chi-square test of significance. All statistical tests were performed at the 5% significance level.

RESULTS

There is a significant prevalence of perforation peritonitis in individuals over the age of 50 years. The age range between 41 and 50 years is the next most commonly affected. The most affected patients were males (74%) and females (26%). Patients arrive within 12–24 hours; this group accounts for 36% of the total population. Within the next main group, 28% of the patients appeared within 24–48 hours. In less than 12 hours, 18% of the patients appeared, and another 18% presented after 48 hours. The earliest manifestation was 6 hours, and the later presentation was five days.

Diabetic individuals accounted for 31% of the patients. Hypertension was the next most prevalent comorbidity, affecting 21% of patients. There were no comorbidities in 38% of the patients. Of all cases, only one had a double perforation involving the duodenum and ileum. The duodenum is the most common perforation site, constituting 50% of cases. The second most common site was gastric perforation, accounting for 31% of the cases. The least common perforation sites are the colon and rectum. One patient had a double perforation in the duodenum and ileum. Overall, 77% of the patients recovered and 23% died. The maximum number of patients had a hospital stay of 5–10 days; 59% were discharged, and 4% died. 20% of patients had a hospital stay of < 5 days, among which 18% expired.17% had a hospital stay of more than 10 days, 15% were discharged, and 1% died. [Table 1]

Age is a significant factor in determining mortality. The p-value obtained for the presentation time was <0.0001, which is highly significant and shows that this is the most significant factor determining mortality. Comorbidities also significantly affected mortality, as evidenced by the above statistics (Table 3). Age, comorbidities, and presentation time determine the length of hospital stay, significantly affecting morbidity. [Table 2]

The patients' mean age was 44.37 years (± 13.31), with a mean time of 40.42 minutes (± SD 30.46). Patients exhibited a mean heart rate of 81.61 beats per minute (± SD 11.59), systolic blood pressure (SBP) of 99.70 mmHg (± SD 10.00), and diastolic blood pressure (DBP) of 65.50 mmHg (± SD 7.57). The respiratory rate among the subjects was recorded at a mean of 29.03 breaths per minute (± SD, 4.81).

The average number of perforations observed was 1.01 (± SD, 0.10), indicating a relatively low frequency in the study population. The amount of contamination measured was 1304.00 units (± SD 671.34). The mean duration of hospital stay was 8.21 days (± SD, 4.19). [Table 4]

Table 1: Demographic data of the study

		Frequency	Percentage
Age	<20	7	7
	21-30	14	14
	31-40	15	15

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	41-50	23	23
	>51	41	41
Sex	Female	26	26
	Male	74	74
	<12	18	18
		36	36
	24-48	28	28
	>48	18	18
Comorbidities	CAD	6	6
	CKD	1	1
	COPD	1	1
	Diabetes	31	31
	Hypertension	21	21
	TB	2	2
	NIL	38	38
Site of Perforation	Colon	1	1
	Rectum	1	1
	Caecum	2	2
	Jejunum	4	4
	Appendix	5	5
	Ileum	7	7
	Gastric	31	31
	Duodenum	50	50
Outcome	Recovered	77	77
	Dead	23	23
Hospital Stay	<5	20	20
	5-10	63	63
	>10	17	17

Table 2: Comparison of age, time of presentation, and comorbidities between outcome

		Outcome		P value
		Recovery	Dead	
Age	<12	18(100%)	0	<0.0001
	12-24	36(100%)	0	
	24-48	22(78.6%)	6(21.4%)	
	>48	1(5.6%)	17(94.4%)	
Time of presentation	<12	18(100%)	0	<0.0001
	12-24	36(100%)	0	
	24-48	22(78.6%)	6(21.4%)	
	>48	1(5.6%)	17(94.4%)	
Comorbidities	No	37(97.4%)	1(2.6%)	<0.0001
	Yes	40(64.5%)	22(35.5%)	

Table 3: Comparison of age, time of presentation, comorbidities, and outcome between hospital stay

		Hospital stays			P value
		<5	5-10	>10	
Age	<20	0	7(100%)	0	0.004
	21-30	1(7.1%)	11(78.6%)	2(14.3%)	
	31-40	0	14(93.3%)	1(6.7%)	
	41-50	4(17.4%)	12(52.2%)	7(30.4%)	
	>51	15(36.6%)	19(46.3%)	7(17.1%)	
Time of presentation	<12	0	18(100%)	0	<0.0001
	12-24	0	30(83.3%)	6(16.7%)	
	24-48	6(21.4%)	13(46.4%)	9(32.1%)	
	>48	14(77.8%)	2(11.1%)	2(11.1%)	
Comorbidities	No	0	32(84.2%)	6(15.8%)	<0.0001
	Yes	20(32.3%)	31(50%)	11(17.7%)	
Outcome	Recovery	0	61(96.8%)	16(94.1%)	<0.0001
	Dead	20(100%)	2(3.2%)	1(5.9%)	

Table 4: Mean parameters of the study

	Mean ± SD
Age	44.37±13.31
Time of presentation	40.42±30.46
Heart rate	81.61±11.59
SBP	99.70±10.00
DBP	65.50±7.57
Respiratory rate	29.03±4.81
No of Perforation	1.01±0.10
Amount of contamination	1304.00±671.34
Hospital stays	8.21±4.19

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Table 5: Various factors between the outcomes of the study

	Outcome	
	Alive	**Dead**
Age	42.06±13.44	52.09±9.58
Time of presentation	27.71±14.62	82.96±31.32
Heart rate	79.81±11.52	87.65±9.82
SBP	102.34±7.05	90.87±13.11
DBP	67.53±4.91	58.70±10.58
Respiratory rate	27.45±3.67	34.30±4.49
No of Perforation	1.00±0.00	1.04±0.21
Amount of contamination	1072.73±474.80	2078.26±659.86
Hospital stays	9.53±3.58	3.78±2.84

DISCUSSION

A total of 100 patients admitted with peritonitis perforations were included in the study. The highest number of patients encountered in this series was in the > 50 age group, followed by the 41–50 age group. The mean age of the patients in this study was 42.06 years. This is comparable with the study by Jhobta et al., who studied 504 cases of perforation peritonitis, in which the mean age was 36.8 years.

In the present study, the sex ratio incidence of perforation, irrespective of site and pathological condition, was 2.84:1. Perforation was more common in males. Different authors have reported variable results for the sex ratio. The most common site involved in this study was duodenal ulcer perforation (50%), followed by gastric (31%) and ileal perforations (7%). Jhobta et al. found that the duodenum was the most common site of involvement, followed by appendicitis and gastrointestinal perforation.

In this study, 54% of patients who presented within 24 hours of the onset of pain had a good prognosis and 100% recovery. Of those who presented late after 48 hours, only 5.6% survived. The length of hospital stay was prolonged in the later stages of presentation. All patients who presented within 12 hours were discharged within ten days. Of the patients who presented within 12-24 hours, 83.3% were discharged within 5–10 days, and 16.7% had hospital stays for more than ten days. Among the patients who presented within 24-48 hours, 46.4% were discharged within 5–10 days and 32.1% after ten days. Patients presenting late after 48 h – 14% died, and 11.1% of patients had a prolonged postoperative stay. This study shows that the presentation time is one of the most significant factors in determining morbidity and mortality in perforation peritonitis.

The survival rate of patients without comorbidities was 64.5%. In contrast, patients with comorbidities had a survival rate of 64.5%, and the length of hospital stay of more than ten days was 15.8% in patients without comorbidities and 17% in those with comorbidities. This indicates that comorbidities have a significant impact on patient morbidity and mortality.

All patients with performative peritonitis were treated in surgical emergencies. Preoperatively, all patients underwent broad-spectrum antibiotic coverage, nasogastric suction, fluid and electrolyte imbalance management, and oxygen supplementation when necessary. Patients with anaemia require a blood transfusion. Postoperatively, parenteral antibiotics were continued, and oral antibiotics were given for five days. In all cases of peritonitis, thorough peritoneal lavage was administered with 0.9% saline, and drains were kept in the pelvis and the site of perforation, which were usually removed on the third and fifth postoperative days or when the drainage was <30 ml. The nasogastric tube was usually removed on the second and third postoperative days and started orally on the fourth day, depending on the bowel sounds. All patients started chest physiotherapy on the first postoperative day.

CONCLUSION

The most common age group was 50 years and older, and duodenal ulcer perforations were more common in patients aged ≥ 50 years. Gastric ulcer perforation is the second most common cause of peritonitis. Males were the most commonly affected population. The diagnosis was made clinically and confirmed by pneumoperitoneum on radiological investigations. Age, time of presentation, and comorbidities were the most significant prognostic factors determining morbidity and mortality in patients with perforation peritonitis. Early admission, prompt treatment, and care will prevent mortality and morbidity in cases of perforation peritonitis.

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