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Original Research Article

Analysing prognostic factors among patients with perforative peritonitis

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ABSTRACT

Background: The mortality of perforation peritonitis is highly dependent on early approach to the hospital, quick diagnosis and prompt surgical treatment as it correlates with the duration and degree of peritoneal contamination, the patient's age, the general health of the patient and the nature of the underlying aetiology. The present study was done to assess the role of various prognostic factors which have a bearing on the final outcome of the patients.
Methods: This prospective observational cross-sectional study was conducted in the at a tertiary level hospital in Maharashtra, in which 47 patients who presented a surgical emergency of perforation peritonitis and underwent an exploratory laparotomy were included. We compared different variables between patients who survived and those who died.
Results: High mortality was also found in patients who presented after 24 hours of developing symptoms. Ileal perforation was significantly more common among dead patients (50%) as compared to patients who survived (20%), p-value<0.05. There were significantly higher proportion of patients who had shock on day 1 who died (67%) as compared to those who survived (12%), p-value<0.05. Also, the group of patients who died, had significantly higher MPI (p-value<0.01), higher proportion of patients with multiple perforations (p-value<0.05), larger perforations (p-value<0.01) and contamination more than 1000 ml (p-value<0.05).
Conclusions: High mortality was observed in patients who presented late, had ileal perforations, multiple and large perforation and developed shock on day one.

Keywords: Perforative peritonitis, Surgical outcome, Etiology, Complication, Mortality

INTRODUCTION

Gastrointestinal perforations can happen as a result of numerous pathological processes, which may include, trauma, and diagnostic or therapeutic procedures.[1] Perforation is defined as an abnormal opening in a hollow organ or viscus. It is derived from the latin perforatus, meaning 'to bore through'. Gastrointestinal perforations lead to diffuse peritonitis, toxemia, septicemia, metabolic and circulatory instability, renal failure, and pulmonary insufficiency, which can be worsened in aged and patients with comorbidities.[2] Perforative peritonitis is the most common surgical emergency in general surgical practice in India.[3] The Indian etiological spectrum of perforation continues to differ from that of the western world and there is paucity of data regarding its aetiology, prognostic indicators, morbidity and mortality pattern. In the majority of cases, delayed presentation to the hospital occurs with well-established generalized peritonitis and varying degree of septicaemia.[4] The mortality of perforation peritonitis is highly dependent on early approach to the hospital, quick diagnosis and prompt surgical treatment as it correlates with the duration and degree of peritoneal contamination, the patient's age, the general health of the patient and the nature of the underlying aetiology.

The present study was done to assess the role of various prognostic factors which have a bearing on the final outcome of the patients.

METHODS

Study design and sample population

This prospective observational cross-sectional study was conducted in the department of general surgery, District Hospital, Nashik, Maharashtra. From January 2020 till December 2020, we included 47 patients who presented a surgical emergency of perforation peritonitis and underwent an exploratory laparotomy. Cases of primary peritonitis, iatrogenic perforations, and anastomosis leak were excluded from the study. Perforation peritonitis cases due to corrosive ingestion were also excluded. The diagnosis of gastrointestinal perforation was made on the basis of detailed history, physical examination, radiological investigations, and operative findings. Associated comorbidity conditions and postoperative period was noted for each patient. Exploratory laparotomy patients were managed according to the site of perforation and managed in a postoperative ward. All patients were placed on parenteral nutrition and broad-spectrum antibiotics, oral feeding was resumed once bowel sounds were present. Peritoneal contamination was treated by intraoperative peritoneal lavage with 2% povidone iodine, normal saline, and metronidazole solution. In all the cases of gastrointestinal perforations broad spectrum antibiotics were started pre-operatively. Postoperatively, patients were managed by intravenous fluid and electrolytes, antibiotics, analgesics, nasogastric aspirations, and chest physiotherapy.

Data collection and data analysis

Using a pre-designed semi-structured study proforma, we noted the demographic information of the patients. We noted the delay in presentation after development of symptoms, the type of peritonitis and other clinical features on admission. Shock was defined as reduced peripheral perfusion and the presence of any two: systolic blood pressure of no more than 90 mm Hg, heart rate of at least 100 beats per minute, urine output of less than 80 ml/four hours, use of pressors to maintain BP for at least ≥1 hour. Mannheim peritonitis index (MPI) is a scoring system used in peritonitis which is simple and cost-effective, was developed by discriminant analysis of 17 possible risk factors, 8 of these were of prognostic relevance and was currently employed widely for predicting mortality from peritonitis.[5] From the intra-operative notes, we noted the site, number and size of the perforation and the amount of contaminated material. Surgical procedures were grouped as 'definitive surgery' which included primary closure and resection anastomosis, while 'damage control procedures' included diversion or staged procedures. Post-operative complications were noted for all surviving patients.

RESULTS

In the present study, we included 47 patients during the study period. Of these, 6 died (14.6%). Table 1 compares various patient related variables between survived and died group. We observed that both the groups had similar age and gender distributions. In our study, 44% of the survived group belonged to 21 to 40 years and 50% of the dead patients were from 21 to 40 years. Males comprised 56% of the survived group and 50% of the dead group. The common presenting symptoms in gastrointestinal perforations were pain, distension, and constipation followed by vomiting, fever, diarrhea, and melena. The presentation was delayed by more than 24 hours in 34% of the patients in the survived group and 67% in the dead patients group. This difference was significantly different (p-value<0.05). Ileal perforation was significantly more common among dead patients (50%) as compared to patients who survived (20%), p-value<0.05. Two patients who survived had appendicular and one case had large bowel perforation. There were significantly higher proportion of patients who had shock on day 1 who died (67%) as compared to those who survived (12%), p-value<0.05. As described in Table 2, we observed that the group of patients who died, had significantly higher MPI (p-value<0.01), higher proportion of patients with multiple perforations (p-value<0.05), larger perforations (p-value<0.01) and contamination more than 1000 ml (p-value<0.05). Definitive surgery which included primary closure and resection anastomosis were performed in 63% of the survived patients, while damage control procedures, like diversion or staged procedure were performed more commonly among patients who died (p-value<0.01). The most common post-operative complication was wound infection (12%), while others are described in Table 3. No complications were reported by 80% of the surviving patients.

Table 1: Comparison of baseline characteristics of survived and dead patients.

	Survived (N=41)		Died (N=6)		p value*
Variables	**Frequency**	**Percent**	**Frequency**	**Percent**	
Age groups (years)					
Up to 20	9	22	1	17	0.88
21 to 40	18	44	3	50	
41 to 60	9	22	1	17	
More than 60	5	12	1	17	
Gender					

Continued.

	Survived (N=41)		Died (N=6)		p value*
Male	23	56	3	50	0.21
Female	18	44	3	50	
Duration (hours)					
Up to 24	27	66	2	33	<0.05
More than 24	14	34	4	67	
Type of peritonitis					
Gastric	14	34	2	33	<0.05
Duodenal	16	39	1	17	
Ileal	8	20	3	50	
Others	3	7	0	0	
Shock on day 1					
Yes	5	12	4	67	<0.05
No	36	88	2	33	

*analysed using chi-square test

Table 2: Comparing surgical findings between survived and dead patients.

	Survived (N=41)		Died (N=6)		p value*
Variables	**Frequency**	**Percent**	**Frequency**	**Percent**	
Mannheim's peritonitis index					
<21	17	41	0	0	<0.01
21 to 29	15	37	2	33	
>29	9	22	4	67	
Number of perforations					
Single	31	76	1	17	<0.05
Multiple	10	24	5	83	
Size of perforation					
Up to 1 cm	34	83	2	33	<0.01
More than 1 cm	7	17	4	67	
Amount of contamination					
Up to 1000 ml	32	78	1	17	<0.05
More than 1000 ml	9	22	5	83	
Surgical procedure					
Definitive (primary closure/resection anastomosis)	26	63	1	17	<0.01
Damage control (diversion/staged procedure)	15	37	5	83	

*analysed using chi-square test.

Table 3: Post-operative complications of surviving patients.

Postoperative complications among survivors (N=41)	Frequency	Percent
Wound infection	5	12
Burst abdomen	2	5
Dyselectrolemia	1	2
Septic shock	1	2
None	33	80
Total	41	100

DISCUSSION

In the present study, we observed that mortality was higher in patients who presented after 24 hours of developing symptoms and developed shock on day one of admission. It is possible it happens because of the spread of infection within the peritoneal cavity, resulting in sepsis. Other patient variables like comorbidity, age of the patient and other risk factors can affect this. In another similar study, Budamala et al reported that mortality for patients presenting within 24 hours was 0%, which has increased to 15% for 24 to 72 hrs and up to 80% for delayed presentation of more than 4 days.[1] In addition, the authors also reported that shock on day one was significantly associated with higher mortality. Similar observations were made by Kumar et al, who reported that mortality increased correspondingly with delay in perforation.[2] It was 5% for less than 24hours, while it was 88% up to 9 days, and 100% for more than 9 days. Moreover, shock patients had higher mortality (58% vs 12%).

Age and gender of the patients was not significantly associated with mortality in the present study. Similar observations were made by Budamala and Kumar. However, Chandra and colleagues reported that mortality

was high among elderly patients (21.4%) and 40-60 years age groups (11.9%) compared to rest of the age groups and this difference in the mortality rates was found to be statistically significant.[3] Male also patients had higher mortality (10.2%) compared to females (7.3%) in their study.

We found that ileal perforation was more common among patients who died. In addition, more number and larger perforations were associated with mortality. Budamala and colleagues also reported that enteric perforations had higher mortality of 50%. Delay in presentation, atypical clinical features, general complication of typhoid seem to contribute to higher mortality rate in their study. In the study by Kumar et al, the mortality rate of Duodenal perforation, tubercular and traumatic were similar at 33 while enteric was 40%. Malignant perforation had 100% mortality, while perforation of the stomach had lowest 14% mortality; none of the stomach perforations were malignant. Chandra et al also reported that patients with ileal (25.8%) and large bowel (19.5%) perforations had higher mortality compared to other sites, while patients with appendicular perforation had the lowest mortality (0.93%). In another study by Kamble et al, 2.8% of the cases with <1 cm size of perforation died which was significantly less as compared to 36.4% of cases with ≥1 cm size of perforation, and the difference was statistically significant.[4]

In addition, we found that higher MPI was found to be significantly associated with mortality. Similar observations were made by Kamble and colleagues, who reported that of 11 cases with MPI>29, 5 died which was statistically more than deaths in group of patients with MPI 21 to 29 and less than 21 (p-value<0.01). In a similar study, Singh et al reported all four deaths in patients with MPI of more than 29, while none died with MPI score of less than 29.[5] Also, in the present study, most common post-operative complication was wound infection (12%). Kumar and colleagues reported fecal fistula in 7%, wound sepsis in 24% and multi-organ failure in 15% of their patients. Kamble et al reported complication rate at 46%. The most common complication was wound infection (34%) followed by pulmonary complications (12%). In the study by Chandra et al, wound infection was observed in 30%, pulmonary complications in 21%, electrolyte imbalance in 19%, septicemia in 16% and wound dehiscence in 12% of the patients.

CONCLUSION

The clinical severity of peritonitis can vary according to the population under study. Gastric and duodenal perforations are the most common, though not significantly associated with high mortality. In the present study, high patient mortality was associated with ileal perforations, multiple and more than 1 cm in size perforations. High mortality was also found in patients who presented after 24 hours of developing symptoms, developed shock on day one of admission, had a high MPI and had more than a litre of contamination. Despite advancements in surgical techniques, anti-microbial therapy and intensive care, management of peritonitis continues to be highly demanding, complex and various patient related variables determine the outcome.

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