

EVALUATION OF VARIOUS PROGNOSTIC FACTORS IN PERFORATIVE PERITONITIS MANAGEMENT

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ABSTRACT: Peritonitis is one of the major problems confronting the surgeons in day to day practice. Despite many advances in understanding pathophysiology, mortality rate of diffuse suppurative peritonitis remains high. A prospective study, with prior institutional ethics committee approval, involving 100 patients of perforative peritonitis is done to assess the various prognostic factors in management of generalized peritonitis. Role of age, gender, duration, type of perforation, associated systemic factors are studied in relation to morbidity and mortality in the outcome of management of peritonitis. Elderly age, ileal perforations, delay in presentation of more than 24 hours and associated shock on day one are found to have bad prognosis.

KEYWORDS: Peritonitis, Hollow viscera, Perforation, Prognosis.

INTRODUCTION: Peritonitis continues to be one of the major problems confronting the surgeons. Despite the many advances in anti- microbial agents and supportive care, the mortality rate of diffuse suppurative peritonitis remains unacceptably high. Its causes vary from the one requiring immediate surgical intervention to that requiring conservative management. Its accurate diagnosis and management is a challenge to every surgeon.

The management of peritonitis has taken a new turn with the understanding of patho-physiologic basis of the disease, the concept of sepsis syndrome and multi- organ failure. Medicine's comprehension of the patho-physiology of the peritoneal cavity is still evolving. Despite this, the mortality rates for patients with secondary peritonitis have fallen in the last century from almost 100% to <10%.

The scoring systems such as sepsis severity score¹, Peritonitis Index Altona (PIA)² and the Mannheim Peritonitis Index (MPI)³ that provide objective descriptions of the patient's conditions at specific points in the disease process, aid in understanding the course of the disease and determining the line of management in a particular patient. Several factors were identified and evaluated for assessing the prognosis of peritonitis by Kohli⁴, Verma⁵ and Svanes⁶.

AIMS AND OBJECTIVES: To study the role of the following prognostic factors in the management and outcome of generalized peritonitis.

- a. **Patient factors:** Age, Gender and General health of the patient – nutrition, anemia and co-morbidities.
- b. **Disease process:** Site of perforation, Duration of perforation and the extent of peritoneal contamination.

- c. Effect of general systemic complications:** Respiratory, Cardiovascular, Shock and Multi-organ failure.

MATERIALS AND METHODS: A prospective study involving 100 patients diagnosed as peritonitis and admitted in the hospital or who developed features of peritonitis due to various causes after being admitted from December 2013 to September 2014. Prior approval of institutional ethics committee was obtained.

Inclusion Criteria:

1. Written informed consent from the patient for inclusion in the study.
2. Patients admitted with peritonitis due to abdominal hollow visceral perforation

Exclusion Criteria:

1. Patient not willing to give consent for inclusion in the study.
2. Patients with other than hollow visceral perforation, e.g., gall bladder and bile duct perforation peritonitis
3. Gynaecological peritonitis
4. Post-operative peritonitis
5. Age below 12 years

Software: Statistical software namely SPSS 11.0 and Systat 8.00 was used for analysis of data and Microsoft word and Excel has been used to generate graphs and tables.

OBSERVATIONS AND ANALYSIS:

Age: The age of the patients ranged from 18 years to 75 years. Maximum number (66%) was in middle age (31-60 years). But the mortality rate was highest (56%) in the elderly age (>60 years) group. (Table 1)

SEX: 83% of patients were male, but mortality rate was more in females (12%) when compared to males (8%). (Table 2)

Duration: The time of presentation of patients after onset of symptoms ranged from <24 hours to >4 days. Maximum patients presented in 1-2 days (80%). Mortality increased correspondingly with delay in presentation. It was 0% for <24hours and 80% for >4 days. (Table 3)

Type of perforation: Duodenal perforation was the commonest cause (81%) followed by gastric and ileal. The mortality rate of ileal perforation was more compared to duodenal and gastric perforations, while perforation of the duodenum had the lowest (4%) mortality. (Table 4)

Effect of shock on mortality: 11 patients (11%) presented with shock on day one of admission. They had high mortality of 55% in comparison to 3.3% in patients without shock. (Table 5)

Effect of prognostic factors on mortality: Duration of perforation (78%) followed by age of >50 yrs (66%), shock on day 1(66%) and ileal perforation (45%) adversely affected the outcome of the peritonitis. (Table 6)

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STUDY OF FACTORS CONTRIBUTING TO MORBIDITY: Development of complications during management of peritonitis and requirement of hospitalization exceeding 20 days were considered as indicators of morbidity. The factors which had bearing on mortality were selected to study whether they had any effect on morbidity.

Age: Patients who were ≤ 50 yrs had less general complications than patients who were > 50 years. Patients with younger age group tended to develop more local complications like wound sepsis (57%) and pelvic abscess (67%), than older patients. One or more complications developed in 57 patients. The complication rate was 55% (36/66) in ≤ 50 years age group, while in > 50 years patients it was 62% (21/34). (Table 8)

Patients of ≤ 50 years had less number of complications while elderly had more number of complications per patient. 24 patients in ≤ 50 years group had only 1 or 2 complications, while 12 patients had 3 or more complications. In > 50 years group, only 7 patients had 1 or 2, while majority had more than 3 complications. (Table 7)

Duration of Perforation and Morbidity: Duration of perforation (<24 hrs/ >24 hrs) seems to be having most corresponding relationship to complications. In survivor group (<24 hrs) the general complications were mostly pulmonary (23%), while it was 67% pulmonary, 65% renal and 89% toxemia in mortality group (>24 hrs). Even local complications were more in mortality group with wound sepsis in 65% and faecal fistula in 88%. Only 15% patients developed complications in survivor group, whereas 33% developed complications in mortality group. The number of complications per patient was also more in mortality group. (Table 7&8)

Hospital Stay as Indicator of Morbidity: As with other complications, the duration of hospital stay was more in >50 yrs age group and patients who came for treatment >24 hrs after the onset of symptoms. (Table 8)

DISCUSSION: Peritonitis is a dreaded complication and if not treated in time, can terminate fatally. In our study on 100 patients, we found various factors like age, type of perforation, duration of perforation, associated medical illness and shock at the time of admission as important prognostic factors in the outcome of these patients. The data we obtained were tabulated and percentage calculated wherever necessary, the significance of difference in various groups were calculated using χ^2 test, student-t test and other statistical methods. We have used results obtained from similar other studies to illustrate our point.

1) Study of patient factors:

Age: Age seems to be the important factor in determining the outcome. Elderly age had increased mortality rates. However, when it is divided into different group ranges from ≤ 20 , 21-30, 31-40 ... ≥ 60 , the difference in age group is not statistically significant, when verified using χ^2 test ($p > 0.05$). The probable explanation could be, the classified age groups <20 , 31-30, 41-50 which formed substantial population have similar rates. This is in agreement with studies by Dellinger et.al⁷, who found difference in mortality in different groups as above not statistically significant. When patients are regrouped into ≤ 50 , >50 age groups, the mortality rate was 5% and 18% respectively and the difference is statistically significant (χ^2 test value 4.42; $P \leq 0.05$). This

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is in agreement with studies by Wacha et al⁸. When patients are regrouped into <40 and >40 age groups, mortality was 2.5% and 13.4% in respective groups which is in comparison to 21% and 32% in a study by Tripathi⁹. Factors like decreased functional reserve, concomitant other illness such as diabetes, hypertension, and local factors such as malignancy seem to be the cause of increased mortality in elderly patients.

Sex: Male patients outnumbered females akin to most of the studies. Mortality rate was higher in females (Table 6). But this difference is not significant ($p < 0.05$, degree of freedom 1, chi square 0), may be because of very less number of females (only 17%) in our study.

2) Study of Disease Process: Mortality Vs. time of Presentation: In our study, duration of peritonitis seemed to have major impact. From (Table 7), it can be seen that mortality for patients presenting within 24hr was 0%, which has increased to 15% for 24-72 hrs and up to 80% for delayed presentation of more than 4 days. Further analysis of the data (χ^2 value 30.15, Degree of Freedom: 5, $P < 0.001$) confirmed that the difference in mortality is highly significant. This is in complete agreement with the result of studies by Tripathi⁹ and Dandapat et al.¹⁰

Hence, delay in presentation is associated with corresponding increase in mortality. The spread of peritonitis, shock due to delay and onset of sepsis syndrome seem to be the main causes for increase in mortality rate. This has to be weighed against patient factors like age, associated medical problems also. Even after discounting these factors there seem to be definite increase in mortality due to delay in presentation (Svanes).⁶

Mortality Vs. type of Perforations: Duodenal perforations formed bulk of the cases (78/100). They contributed as much as 4% to the mortality. Enteric perforations had higher mortality of 50%. Delay in presentation, atypical clinical features, general complication of typhoid seem to contribute to higher mortality rate (Nair,¹¹ Bobin¹²)

As illustrated in table 11, even though the trend in mortality rate is more or less similar, there is a definite difference in mortality rate among various studies. As noted by Dellinger⁷ and Billing¹³, this wide variation reported among various studies is due to variation in selection of cases. Some studies get cases with early presentation, while others may get delayed complicated cases. When all the prognostic factors are taken into account, there may not be much difference. Extent and type of contamination whether clear, purulent or faecal is important factor for mortality. In agreement with this, cases with fecal peritonitis had high mortality.

3) Effect of Shock on Mortality: In our study, effect of shock on day 1 was associated with considerable mortality (55%). The finding was statistically significant ($\chi^2 = 25.79$, $P < 0.001$). Dandapat et al¹⁰ and Dellinger et al⁷ found 62.5% and 51% mortality respectively in this group. In agreement with most studies, we had high mortality in these patients.

Study of Factors Contributing to Morbidity: For each analysis, the factors are divided into 2 groups.

1. **Survivor Group:** Age \leq 50 years, perforation duration \leq 24 hrs.
2. **Mortality Group:** Age $>$ 50 years, Perforation duration $>$ 24 hrs.

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In our study, we found, patients in survivor group tend to have less general complications and less serious local complications. Conversely, the mortality group had more serious local complications like fecal fistula, deep seated abscess. As for the perforation duration, patients presenting within ≤ 24 hours had very good prognosis with less complications both general and local. This is in agreement with studies by Boey¹⁴ and Dandapat.¹⁰

We studied another aspect of morbidity - number of complications during management in each patient (Table 7). We found considerable number of patients in survival group developing only one or two complications while patients in mortality group had three or more complications, which proves the fact that most patients who die, is as result of culmination of many complications which may be independent or inter-dependent on each other. As we see from table 8, patients presenting late, need to stay longer in hospital.

Age	Survived		Died		Total Value
	No. of Patients	%	No. of Patients	%	
≤ 20 yrs	6	100	-	-	6(6%)
21-30	19	100	-	-	19(19%)
31-40	14	93.33	1	6.67	15(15%)
41-50	24	92.31	2	7.69	26(26%)
51-60	24	96.00	1	4.00	25(25%)
>60 yrs	4	44.44	5	55.56	9(9%)
Total	91	100	9		100

Table 1: Effect of Age on Mortality

Sex	Survived		Died		Total
	No. of Patients	%	No. of Patients	%	
Male	76	91.57	7	8.43	83(83%)
Female	15	88.24	2	11.76	17(17%)
Total	91		9		100

Table 2: Effect of Sex on Mortality

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Duration	Survived		Died		Total
	No. of Patients	%	No. of Patients	%	
<24hrs	58	100	0	0	58(58%)
24-48hrs	21	95.45	1	4.54	22(22%)
48-72hrs	9	90.00	1	10.00	10(10%)
3- 4 days	2	40.00	3	60.00	5(5%)
>4 days	1	20.00	4	80.00	5(5%)
Total	91		9		100

Table 3: Effect of Duration on Mortality

Etiology	Survived		Died		Total
	No. of Patients	%	No. of Patients	%	
Gastric	9	81.82	2	18.18	11(11%)
Duodenal	78	96.30	3	3.70	81(81%)
Ileal	4	50.00	4	50.00	8(8%)
Others	-	0	-	0	-
Total	91		9		100

Table 4: Effect of type of perforation on mortality

Shock	Survived		Died		Total
	No. of Patients	%	No. of Patients	%	
On Day1	5	45.45	6	54.56	11(11%)
No shock	86	96.23	3	3.37	89(89%)
Total	91		9		100

Table 5: Effect of shock on mortality

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Prognostic factor		Number of deaths
Age	>50 years	6(66%)
Gender	Female	2(22%)
Duration of perforation	>3days	7(78%)
Type of perforation	Ip	4(45%)
Shock	On day1	6(66%)

Table 6: Effect of prognostic factors on mortality

Number of Complications	Age <50Yrs	Age >50Yrs	Duration < 24hrs	Duration > 24hrs
1	13	4	8	12
2	11	3	5	8
3	7	6	2	7
> 4	5	8	4	11
Total	36	21	19	38

Table 7: Complications - 1

Complications	Age ≤50 N =66	Age >50 N=34	Perforation Duration ≤ 24 hrs n = 58	>24hr n = 42
1. Pulmonary	14(47%)	16(53%)	7(23%)	23(77%)
2. Cardiac	1(20%)	5(80%)	1(20%)	4(80%)
3. Thrombotic	-	-		-
4. Renal	9(45%)	11(55%)	7(35%)	13(65%)
5. Toxemia	4(44%)	5(46%)	1(11%)	8(89%)
LOCAL				
1. Intestinal obstruction	-	1(100%)		1(100%)
2. Paralytic ileus				
3. Faecal fistula	1(25%)	3(75%)	-	4(100%)
4. Wound sepsis	13(57%)	10(43%)	8(35%)	15(65%)
5. Pelvic abscess	2(67%)	1(33%)	-	3(100%)
6. Sub-diaphragmatic abscess	3(100%)			3(100%)

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7. Burst abdomen	3(75%)	1(25%)		4(100%)
Hospital stay >20 days	10/66(15%)	13/34(38%)	8/58(13%)	15/42(35%)

Table 8: Complications - 2

CONCLUSION:

- Various factors affecting both mortality and morbidity in peritonitis patients were studied.
- Elderly age (>50 yrs) seem to have adverse effect on the outcome.
- The impact of sex on outcome could not be conclusively proved, even though female patients seem to have poorer prognosis.
- Type and extent of peritoneal contamination seem to have bearing on mortality. Patients with diffuse peritonitis, fecal contamination do worse.
- Associated factors like diabetes and cardiovascular problems add to mortality.
- Cases of peritonitis carry a high mortality which can be reduced by early diagnosis, risk stratification, appropriate treatment.
- Delayed presentation which has important effect on both mortality and morbidity is beyond our control. Only adequate Health education, proper referral mechanism can help in reducing this.
- Management of peritonitis and its sequelae involves lots of skill, expensive modalities of monitoring and treatment which have to be utilized judiciously based on risk stratification.

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