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Original Research Article

Predicting the outcome of perforation peritonitis by using apache II scoring system

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ABSTRACT

Background: Peritonitis is inflammation of peritoneum and peritoneal cavity. This study was aimed at predicting morbidity and mortality in patients with peritonitis due to hollow viscous perforation by using APACHE II Scoring system.
Methods: This study was conducted in patients admitted as a case of perforation peritonitis in Tertiary centre Dehradun, over the period of 18 months. APACHE II score was calculated and correlated with their symptoms and clinical outcomes regarding morbidity and mortality.
Results: In present study APACHE- II significantly predict the morbidity and mortality with p value <0.001. It showed perfect correlation of APACHE-II score and predicted death risk (r = 0.96, P = 0.001).
Conclusions: The APACHE-II scoring system can be used to assess group outcomes in patients with peritonitis due to hollow viscous perforation. However, it does not provide sufficient confidence for outcome prediction in individual patients.

Keywords: APACHE II Score, Mortality, Morbidity, Peritonitis

INTRODUCTION

Peritonitis is inflammation of peritoneum and peritoneal cavity and is mostly due to a localized or generalized infection.[1] Peritonitis is inflammation of the peritoneum caused by bacterial infection.[2]

Perforation of hollow viscus organs is the most common cause of peritonitis. Secondary peritonitis, either spontaneous or traumatic, is the commonest cause. Peritonitis due to perforation of the hollow viscus is one of the most common surgical emergencies all over the world.[3] Early prognostic evaluation of patients with peritonitis is desirable to select high-risk patients for intensive management and also to provide a reliable objective classification of severity and operative risk.[4] APACHE II prognostic scoring system is one of the sought-after and well–accepted for both surgical and non–surgical case subjects. It is validated using multiple cases over several years in various countries.

METHODS

The prospective study was conducted over the period of 18 months on 100 patients (age>16) diagnosed with intestinal perforation. The studied was done at "Tertiary centre at, Dehradun, India".

Data collection

All patient diagnosed with perforation peritonitis were included in the study. All the vital parameter was taken before resuscitating the patient and before giving any treatment.

Post-operative: Following morbidities were followed:

- Wound infections
- Burst abdomen.
- Prolonged ileus.
- Acute respiratory distress syndrome.
- Acute renal Failure.

Data analysis

Statistical testing was conducted with the statistical package for the social science

System version SPSS 22.0. Continuous variables are presented as mean±SD, and categorical variables are presented as absolute numbers and percentage. The comparison of normally distributed continuous variables between the groups was performed using Student's t test. Nominal categorical data between the groups were compared using Chi-squared test or Fisher's exact test as appropriate. p <0.05 was considered statistically significant.

RESULTS

In present study, mean age was 42±15.83 years, ranging from 17 years to 75 years. Peak incidence (29%) was seen in the age group between 17-30 years followed by age group 31-40 years (23%) (Table 1).

Table 1: Age wise distribution.

Number of Patients	100
Minimum age (yrs)	17
Median (yrs)	40
Maximum (yrs)	75
Mean (yrs)	42.51
Std. Deviation	15.83

84 male patients and 16 female patients were involved. Out of 84 male patients 71 male patient (84. 53%) survived while 13 male patients (15.47%) expired. Total 16 female patients were involved out of which 14 female patients survived while 2 female patients (12.5%) expired (Table 2).

Almost all the patient had pain abdomen, 43% of patients had vomiting while 31% had constipation, followed by fever 17% (Table 3).

In our present study, the most common site of perforation was found gastro duodenal (53%) followed by Ileum (20%) (Table 4).

Table 2: Gender wise distribution.

Sex	Alive		Died		Total		P Value
	Frequency	%	Frequency	%	Frequency	%	
Female	14	16.5	2	13.3	16	16	
Male	71	83.5	13	86.7	84	84	1.000
Total	85	100	15	100	100	100	

Table 3: Distribution according to clinical presentation.

Symptoms	Alive (n=85)		Died (n=15)		Total (n=100)		P Value
	Frequency	%	Frequency	%	Frequency	%	
Pain Abdomen	85	100.0	15	100.0	100	100.0	–
Fever	16	18.8	1	6.7	17	17.0	0.456
Vomiting	37	43.5	6	40.0	43	43.0	1.000
Constipation	26	30.6	5	33.3	31	31.0	0.832

Table 4: Site of perforation- distribution of patient.

Site of Perforation	No. of patients (n=10	%
Gastric/ duodenum	53	53
Ileum	20	20
Meckle's diverticum perforation	1	1
Appendix	4	4
Large bowel	9	9
Blunt trauma abdomen /penetrating injuries	13	13

In present study mean temperature was 37.62ºC. Among survivors mean MAP was 80.35±12.92mmHg. Among non-survivors MAP was 80.36±12.01mmHg. Among survivors mean Heart rate was 102.21±18.51/ minute. Among non-survivor's heart rate was 114.27±22.75/minute. Among survivors mean R/R 19.79±2.45/minute. Among non-survivors mean R/R 23.40/min ± 2.26/min. Among survivors mean Pao2 was 97.16±56.16mmHg. Among non-survivors mean Pao2 was 124.38±12.01mmHg, pH, HR, R/R and GCS were found to be statically significant with p value <0.001.

In present study, Haematocrit values are slightly increased with mean 39.04%, in range minimum from 15.86% to 58.87%. WBC count was observed mean 8.57 Thousand/cumm, mean serum creatinine values were 1.54mg/dl (Table 5).

45% of the patients were in the APACHE II score (0-10) and 36%were in the APACHE II score (11-20) (Table 6).

In present study, mean predictive value of morbidity was 22.62±21.19%. With this, mean predictive value of mortality was 31.23±23.56%. Among the survivors the mean predictive value of morbidity was found to be 17.26±14.84, while among the non-survivor mean predictive value of morbidity was found to be 55.17±25.17% with p value of <0.001 (Table 7).

Table 5: APACHE -II score variables (physiological and biochemical) distribution.

	Alive (n=85)			Died (n=15)			Total (n=100)			P Value
	Mean± SD	Median	Min - Max	Mean±SD	Median	Min - Max	Mean±SD	Median	Min - Max	
HR	102.21± 18.51	100.00	62 - 152	114.27± 22.75	120.00	66 - 142	104.02± 19.56	104.00	62 - 152	0.003
RR	19.79± 2.45	20.00	14 - 24	23.40±2.26	24.00	20 - 26	20.33±2.73	20.00	14 - 26	<0.001
PaO2	97.16± 56.16	77.00	18 -289	124.38± 79.38	90.00	33 - 288	101.24± 60.52	79.50	18 - 289	0.226
Ph	7.35±0. 09	7.36	7.0 - 7.5	7.23±0.14	7.24	6.9 - 7.4	7.33±0.11	7.35	6.9 - 7.5	<0.001
Serum Na	137.31± 4.85	137.06	128.01 - 153.96	136.35±5.83	138.31	125.07 -148.5	137.17±4.99	137.18	125.07 -153.9	0.950
Serum. K	4.28±0. 76	4.24	2.6 - 6.0	4.12±0.91	3.85	2.9 - 5.9	4.26±0.78	4.18	2.6 - 6.0	0.251
S. creatinine	1.44± 1.05	1.10	0.2 - 6.7	2.15±1.45	1.30	0.9 - 5.5	1.55±1.13	1.10	0.2 - 6.7	0.024
Haematocrit	39.33± 9.49	40.25	15.86 - 58.87	37.42±5.59	38.56	25.61 -45.90	39.04±9.02	39.30	15.86 -58.87	0.337
WBC	8.08±5. 07	6.78	1.12- 23.04	11.10±9.79	6.13	3.50 - 32.37	8.53±6.04	6.70	1.12 - 32.37	0.654
GCS	13.40± 2.17	15.00	8 -15	8.47±2.92	8.00	3 - 15	12.66±2.89	14.50	3 - 15	<0.001

Table 6: Distribution according to APACHE II

APACHE - II score	No. of cases	Percentage
0-10	45	45
11-20	36	36
21-30	14	14
>31	5	5

Among the survivors the mean predictive value of mortality was found to be 24.90±17.18%, while among the non-survivor mean predictive value of mortality was found to be 67.08±23%.173 with p value of <0.001. The ability of the APACHE-II system to correctly predict group prognosis was also assessed by means of the Pearson correlation coefficient and its significance test. It showed perfect correlation of APACHE-II score and predicted death risk (r = 0.96, P = 0.001) (Table 8). 62 % post-operative complication was noted in the study. Acute renal failure was most common complication which comprises 27 % of overall morbidity (Table 9).

Table 7: Predictive values of morbidity and mortality.

	Alive (n=85)			Died (n=15)			Total (n=100)			P Value
	Mean±SD	Median	Min - Max	Mean± SD	Median	Min - Max	Mean± SD	Median	Min - Max	
Predictive value of morbidity (%)	17.26±14.84	12.90	2.90 - 78.60	55.17± 25.17	60.50	7.60 - 86.80	22.62± 21.19	14.60	2.90 - 86.80	<0.001
Predictive value of mortality (%)	24.90±17.18	19.90	5.4 - 87.7	67.08± 23.13	74.80	13.8 - 92.7	31.23± 25.56	22.30	5.4 - 92.7	<0.001

Patient was divided among eight group according to APACHE II score and it was observed that APACHE II score more than >20 observed mortality rate was >65 %. Mortality rate between score 0-9 was lowest (2.63%), while observed mortality rate was higher when APACHE II score was >20, 100% mortality rate was seen above score >34 followed by score 25-34 where observed mortality rate was 66.67% (Table 10).

DISCUSSION

Male predominance of 84% was seen, with Male to Female ratio 5.2:1. A similar results was seen in a study done by Kulkarni et al in which 39 (78%) males and 11 (22%) were female.[5]

Overall mean age of patients was 42±15.83 years, as compared to mean age of 23 years in study by Adesunkanmi et al.[6]

Table 8: Correlation between APACHE II score and predictive value of morbidity and mortality.

APACHE II score	Predictive morbidity	Predictive mortality
Pearson correlation	0.960	0.977
Sig (2 tailed)	0.000	0.000
N	100	100

Table 9: Morbidities.

Morbidity	Alive (n=85)		Died (n=15)		Total (n=100)		P Value
	Frequency	%	Frequency	%	Frequency	%	
SSI	24	28.2	1	6.7	25	25.0	0.107
Wound dehiscence	3	3.5	0	0.0	3	3.0	1.000
Burst abdomen	3	3.5	0	0.0	3	3.0	1.000
Prolonged ileus	5	5.9	0	0.0	5	5.0	1.000
Acute renal failure	20	23.5	7	46.7	27	27.0	0.063

Table 10: Outcome.

APACHE II score	n=100	Survived	Expired	Observed mortality
0-4	14	14	0	0 %
5-9	24	23	1	4.17 %
10-14	25	24	1	4 %
15-19	17	14	3	17.65 %
20-24	10	7	3	30.00 %
25-29	3	1	2	66.67 %
30-34	6	2	4	66.67 %
>34	1	0	1	100%

Maximum number of cases was between the age group 17-40 years which constitute 52% of total cases in comparison to study by Ramchandra LM et al where highest numbers of patients were found in the age group of 46-60 years and they constitute about 28.5% of the study.[7]

Almost all patient had pain abdomen, 43% of patients had vomiting while 31 % had constipation. In a study by Jhobta et al, pain was present in 98% of patients, followed by vomiting (59%), abdominal distension (44%), constipation (58%), fever (35%), and diarrhea (7%).[8]

More the APACHE II score lesser is the mean hospital stay. Similar results were seen in a study done by Sahu et al, showed that the mean duration of hospital stay was shorter in patients having a low score.[9]

The most common cause of perforation was from the ulcers of the first part of duodenum, which was similar to study by, Jhobta RS et al.[8] The second most common cause being Ileal perforation peritonitis (20%), which was similar to studies by Jhobta RS et al, with incidence of 22%.?[8]

pH, GCS, Respiratory rate and Heart rate were statically significant in contrast to study conducted by Sahu et al, where pH does not correlate with the findings.?[9] Similar study done by Khan SP, both heart rate and respiratory rate were found to significant factor for the development of complications and death.[10]

Mean APACHE II Score in present study was 13.13±8.62. Mean APACHE II Score among survivor was 10.99 while among non-survivor it was 25.27. In study by Agarwal S et al, the mean APACHE II score among survivors was 8 and among non-survivors were 22.4.[11] Thus, concluding that mortality is directly linked with higher scores.

Predictive value of morbidity was 22.62% as mean±21.19%. Mean predictive value of mortality was 31.23±23.56%. Among the survivors the mean predictive value of morbidity was found to be 17.26±14.84%, while among the non-survivor mean predictive value of

morbidity was found to be 55.17±25.17% with p value of <0.001. Results were comparable with Kulkarni et al, where mean predictive mortality observed was 23%.[5]

Patient were divided among 8 group according to APACHE II score and it was observed that APACHE II score more than >20, observed mortality rate was >65%. Mortality rate between score 0-9 was lowest (2.63%), while mortality rate was 66.67% between 25-34 scores while 100% mortality rate was seen score greater than 34. According to study by Adesunkanmi et al, patients with lower scores (0-9) had good prognosis with only 13% mortality compared to 2.63% mortality in present study.[6] As the score increased to 10-19 the prognosis became poorer with 10% mortality in present study and 50% by Adesunkanmi et al.[6] Worst prognosis was seen in patients with score more than 20 with mortality rate of above 38% in present study.

We came across 62% post-operative complication as compared to study done by Sahu et al and Adesunkanmi et al, where post-operative complication accounted 58% and 42.2% respectively.[6,9] Acute renal failure was most common complication which comprises 27% of overall morbidity in contrast to other studies done by Sahu et al, Agarwal et al, where local complication like surgical site infection (40%, 36% respectively) was most common.[9,11]

Limitation of present study is the inability to access all the physiological parameters of APACHE II. Same limitations were encountered by Sahu et al, Agarwal et al and Adesunkanmi et al.[6,9,11]

CONCLUSION

For prediction of death and complication in peritonitis, the physiology reserve of the patient is of great importance and the way it is estimated by APACHE II score. The APACHE II score as measured before treatment of abdominal sepsis correlated with outcome. This study presents our investigation into the validity of APACHE II in perforation peritonitis and we evaluated it at a standardized time, that is, before operative treatment.

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