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Apache II scoring in predicting surgical outcome in patients of perforation peritonitis

Anand Agarwal*, Ganpat Singh Choudhary, Mansingh Bairwa, Amit Choudhary

Department of Surgery, Dr. S.N. Medical College Jodhpur, Rajasthan, India

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*Correspondence:

Dr. Anand Agarwal, E-mail: dranand109@gmail.com

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ABSTRACT

Background: Many scoring systems have been found useful in predicting the outcome in critically ill patients, amongst them acute physiology and chronic health evaluation score (APACHE II) appeared to be the most widely used and had a general acceptance in assessing the critically ill patients, for its easy applicability and ability to predict outcome.

Methods: To predict the surgical outcome in patients of perforation peritonitis APACHE II scoring done in every diagnosed case of perforation peritonitis in a prospective study from January 2015 to June 2016 was done. 100 patients with perforation peritonitis fulfilling the inclusion and exclusion criterion underwent exploratory laparotomy in Mahatma Gandhi hospital, Dr. S.N. Medical college, Jodhpur, Rajasthan, India.

Results: In current study, 69 patients were in the low risk group (apache score 0-5) and 24 patients were in the medium risk group (Apache score 6-10) and 7 patients were in the high-risk group (Apache score 11-16). Of these 100 % patients in low risk group and 95.8% patients in medium risk group were discharged in satisfactory manner and 100% patients expired in high risk group.

Conclusions: APACHE II score correlated well with the outcome in current study, it also correlated well with the hospital and ICU stay.

Keywords: APACHE II score, Exploratory laparotomy, Outcome, Perforation peritonitis

INTRODUCTION

Peritonitis is defined as inflammation of the serosal membrane that lines the abdominal cavity and the organs contained therein. Currently, peritonitis is organized into three divisions based upon the source and nature of microbial contamination. Primary peritonitis is an infection without any visceral perforation.

Secondary peritonitis is the most common type of peritonitis all over the world. Secondary peritonitis follows an intraperitoneal source usually from perforation of a hollow viscus. Tertiary peritonitis develops following treatment failure of secondary peritonitis.

Secondary peritonitis usually presents as acute generalized peritonitis which is a potentially lifethreatening condition. It is a common surgical emergency in most of general surgical units in all over the world. It is often associated with significant morbidity and mortality.^{1,2} Grading the severity of acute peritonitis has assisted in decision making and has improved therapy in the management of severely ill patients.3 The ability to objectively estimate patients risk for mortality or other important outcome measures an important part of managing severely ill patients.4 The risk assessment by important clinical parameter has been extremely useful in evaluating new therapies, in monitoring resources utilization and improving the quality of care.^{5,6} The objective evaluation of severity, therapeutic approach and effectiveness of treatment of acute generalized peritonitis from perforation is hampered by the lack of precise classification in this environment. Crude morbidity and mortality data for the purpose of medical audit is often misleading. Early prognostic evaluation is desirable to be able to select high-risk patients for more aggressive treatment especially in severe peritonitis.

Many scoring systems have been found useful in predicting the outcome in critically ill patients, thus allowing application of resources for effective use.⁷ Amongst them acute physiology and chronic health evaluation score (APACHE II), simplified acute physiology score (SAPS), sepsis severity score is mostly used and other scores specifically for peritonitis like the mannheim peritonitis index and the peritonitis index altona II.

APACHE II score is very popular and has been used in both surgical and non-surgical patients. It has also been validated using many patients over several years in many centres in all over the world. Of the present prognostic scoring systems, APACHE II appeared to be the most widely used and had a general acceptance in assessing the critically ill patients, for its easy applicability and ability to predict outcome. APACHE II parameters have been shown to have a stronger relationship to the outcome than previous groupings such as causes, age and chronic ill health without consideration for systemic effect of the intraabdominal sepsis. Hence, APACHE II score is being used in present study.

METHODS

This clinical study is done on 100 patients admitted in surgical department, M.G. hospital associated with Dr. S. N. Medical College, Jodhpur, Rajasthan India. Design of the study is a prospective study; all the eligible cases that are encountered during the period of study were taken up in the study.

Inclusion criteria

Patients presenting with perforation peritonitis:

- Patients aged> 16 years
- Patients diagnosed as peritonitis underwent surgery.

Exclusion criteria

- Patients less than 16 years of age group
- Patients unfit for surgery.

RESULTS

Table 1 shows age distribution of the population. Majority 52% of patients were in the age group 18-30 years. 28% of patients were in the age group 31-50 years. 20% of patients were in the age group 51-70 years. The mean age of the study population was 37.57 years.

Table 1: Age distribution.

Age (in yrs)	No. of patients	Percentage (n=100)
18-30	52	52
31-50	28	28
51-70	20	20
Mean±SD	(37.57±16.29)	-

Table 2 shows gender distribution in the study population. 76% patients were males and the remaining 24% were females.

Table 2: Sex distribution.

Sex	No. of patients	Percentage
Male	76	76
Female	24	24

Table 3 demonstrates the etiological distribution of the patients diagnosed with peritonitis. Peptic perforation peritonitis forms the major group, 39% among the study patients. The next leading causes were tubercular and typhoid perforation peritonitis comprising 24% and 19% respectively.

Table 3: Etiology distribution.

Etiology	No. of patients	Percentage
Acid peptic disease	39	39
Tuberculosis	24	24
Typhoid perforation	19	19
Blunt injury	6	6
Gangrenous bowel	5	5
Stab injury	4	4
Post MTP	1	1
Any other	2	2

Table 4 shows that patients of perforation peritonitis presented with the most common symptom was pain abdomen (100%) followed by vomiting (57 %), Constipation (24%) and fever (20%).

Table 4: Distribution of subjects according to clinical presentation.

Clinical presentation	No. of patients	Percentage
Pain abdomen	100	100
Vomiting	57	57
Constipation	24	24
Fever	20	20
Diarrhoea	19	19

Table 5 shows 80% patients presented within 3 days of onset of symptoms and 15% patients presented within 4-6 days. Only 5% patients presented after one week of onset of symptoms. Table 6 shows 69% of the patients were in the Apache II score (0-5) and 24% were in the Apache II

score (6-10), 7% were in the Apache II score (11-16). The mean Apache II score was 4.75.

Table 5: Distribution of subjects according to duration of illness (perforation).

Duration (in days)	No. of patients	Percentage
1-3	80	80
4-6	15	15
>7	5	5

Table 7 shows that out of 7 patients having Apache II score (11-16) all develop systemic complications and 6 patients develop local complication. Out of 69 patients

having Apache II score (0-5) only 11 patients develop local complication with no systemic complications and all patients survived. Mortality was maximum (100%) in Apache score 11-16.

Table 6: Distribution of subjects according to Apache II score.

Apache II score	No. of patients	Percentage
0-5	69	69
6-10	24	24
11-16	7	7
Total	100	100
Mean±SD	4.75±3.48	-

Table 7: Distribution of subjects according to morbidity and mortality.

Apache II score	Total no. of patients	Local complications	Systemic complication	Mortality
0-5	69	11 (15.9%)	0	0
6-10	24	19 (79%)	1 (4%)	1
11-16	7	6 (85%)	7 (100%)	7
Total	100	100	8	8

Table 8 shows patients having Apache II score 0-5 mean duration of illness at time of presentation was 2.56 days. In Apache II score 6-10 mean duration of illness at time of presentation was 2.62 days and In Apache II score 11-16 mean duration of illness at time of presentation was 3.57 days. The p value 0.568 which is non-significant.

Table 8: Correlation between Apache II Score with duration of illness at the time of presentation.

Apache II score	Mean duration of days at time of presentation
0-5	2.56±2.62
6-10	2.62±1.52
11-16	3.57±2.14

P value = 0.568.

Table 9: Outcome in relation to Apache II Score.

Apache II score	Total no. of patients	Survivor n (%)	Non-survivor n (%)
0-5	69	69 (100%)	0
6-10	24	23 (95.8%)	1 (4.16%)
11-16	7	0	7 (100%)

Table 9 shows 100% mortality was in Apache II score (11-16), 4.16% mortality in Apache II score (6-10) no mortality in Apache II score (0-5). Table 10 shows patients having Apache II score 0-5 mean hospital stay

was 8.14 days and mean ICU stay was 3 days. In Apache II score 6-10 mean hospital stay was13 days and mean ICU stay was 3 days. In Apache II score 11-16 mean hospital stay was13.28 days and mean ICU stay was 9 days.

Table 10: ICU and hospital stay in relation to Apache II Score.

_	Total no. of patients	Hospital stay (Mean±SD)	ICU stay (Mean±SD)
0-5	69	8.14±3.26	3±1
6-10	24	13±5.69	3±0.70
11-16	7	13.28±9.96	9±8.04

Table 11 shows comparison between survivors and non-survivors in various parameters. The mean age in survivors was 36.33 years and in non-survivors was 51.75 years and p value 0.009 which is not significant.

The Male: Female ratio in survivors was 3.38:1 and in non-survivors was 5:3 and p value 0.393 which is not significant.

The mean Hospital stay in survivors was 9.46 days and in non-survivors was 12.0 days and p value 0.180 which is not significant. The mean ICU stay in survivors was 0.22 days and in non-survivors was 4.87 days and p value <0.0001 which is highly significant.

Table 11: Comparison between different variations in patient's outcome (comparison between survivors and non-survivors).

	Survivors (n=92), mean±SD	Expired (n=8), mean <u>+</u> SD	P value
Age (in years)	36.33±15.33	51.75±21.08	0.009
Male: Female	3.38:1	5:3	0.393
Hospital stay (in days)	9.46±4.51	12.0±9.91	0.180
ICU stay (in days)	0.22±0.82	4.87±6.93	< 0.0001
APACHE II score	4.05±2.49	12.75±3.28	< 0.0001
Duration of illness at the time of presentation	2.59±2.39	3.25±2.18	0.458

The mean Apache II score in survivors was 4.05 and in non-survivors was 12.75 and p value <0.0001 which is highly significant. The mean duration of illness at the time of presentation in survivors was 2.59 days and in non-survivors was 3.25 days and p value 0.458 which is non-significant.

DISCUSSION

This study was undertaken to evaluate patients having perforation peritonitis and various factors during this study period.

Age and sex incidence

Out of 100 patients, 76 were males and 24 were females. Majority of subjects i.e. 52% belongs to age group 18-30 years followed by 28% in 31-50 and 20% in 51-70 years of age and overall, 80% of the study population were \leq 50 years. Overall mean age of the study population was 37.57 \pm 16.29 years.

In current study, the mean age was 37.57 years, which is comparable to 40.4 years in study done by Kitara et al.⁸ The incidence among males were more than the females in the ratio of 3.2:1. Sharma R, Huttunen et al in their study also reported male preponderance in cases with perforation peritonitis.^{9,10}

Clinical presentation

In current study patients of perforation peritonitis presented with the most common symptom of pain abdomen (100%) followed by vomiting (57%), Constipation (24%) and fever (20%).

Similar findings were observed in various other studies conducted by Gupta SK, Gupta R et al, Dickson and Cole and Anand P with 100% incidence of pain abdomen and fever in enteric perforation cases.

Duration of illness (perforation)

In current study 80% of patients presented within 3 days and nearly 5% of the patient presented after one week of onset of symptoms. As the duration of presentation

increased, the mortality and morbidity also increased. Most of them developed complications like wound infection, chest infection, septicemia in their hospital course.

Similar results had been shown by Petrosillo N et al in a national multicenter surveillance study which was conducted in 48 Italian hospitals and concluded that presentation for more than one week was significantly associated with morbidity and mortality. 11 Archampong and Karmasker et al also observed a similar correlation between duration of perforation and morbidity-mortality. 12

Cause of perforation

In current study, the most common cause of perforation peritonitis was Acid Peptic Disease (39%). These most commonly arise from the ulcers of the first part of duodenum, which was similar to study by Afridi SP et a in 2008, Jhobta RS et al in 2006, Dorairajan et al being 32%, 44.9%, 21.6% respectively. ¹³⁻¹⁵

The second most common cause being Tubercularcular perforation peritonitis (24%), which was similar to studies by Afridi SP et al, Jhobta RS et al, with incidence of 21% and 22% respectively. ^{13,14}

Post- op complications

It was noted that the patient having APACHE II score more than 10 at the time of admission had significant higher incidence of post-op complications as compared to patients having APACHE II score less than 10. The most common complication was wound infection in 36% of the cases. Similar result was shown by Sahu SK, Gupta A, Sachin PK, Bahl D Vin which APACHE II score as measured before the treatment of secondary peritonitis correlated significantly with the outcome of the disease with respect to mortality and morbidity. ¹⁶

Apache score and hospital and ICU stay

The mean ICU stay of patients having APACHE score 0-5 was 3 days and 6-10 was 3 days and 11-16 was 9 days with hospital stay of 8.14 days, 13.0 days, 13.28 days

respectively with the mean length of hospital stay following treatment in survivors being 9.46 days as compared to 18 days in a study done by Bohnen et al.² In another study of colonic perforation, Kamatsu et al found that APACHE II score 19 or more was significantly related to poor prognosis as seen in current study.

Apache score and outcome

In current study, 69 patients were in the low risk group (apache score 0-5) and 24 patients were in the medium risk group (Apache score 6-10) and 7 patients were in the high-risk group (apache score 11-16). Of these 100% patients in low risk group and 95.8% patients in medium risk group were discharged in satisfactory manner and 100% patients expired in high risk group.

In studies conducted by Bohnen et al, Adesunkanmi et al, Agarwal S et al the mean apache score among survivors was 8 (low risk group) and among non-survivors was 22.4 (high risk group). Thus, concluding that mortality is directly linked with higher scores.^{1,2}

CONCLUSION

The following conclusions were drawn:

- Perforation peritonitis was more common in the age group of 18-30 years (52%). It was more common in males (76%)
- The leading cause of perforation peritonitis was Acid Peptic disease (39%), followed by Tuberculosis (24%) and Typhoid peritonitis (19%)
- Most common clinical presentation was pain abdomen (100%) followed by vomiting (57%), constipation (24%) and fever (20%)
- Nearly 80% of the patients presented within 3 days of onset of symptoms
- Maximum number of patients (69) were in low risk group (APACHE score of 0-5), 24 patients were in the medium risk group (APACHE score 6-10) and 7 patients were in high risk group APACHE score (11-16)
- Wound infection was the most common post op complication developed in 36 % patients followed by wound dehiscence in 18% patients and ARDS, Septicemia in 8% of the patients
- APACHE II score correlated well with the outcome in current study, 69 patients in low risk group were discharged in a satisfactory condition and out of 24 patients in medium risk group 23 were discharged and 1 patient expired and out of 7 patients in high risk group all 7 patients were expired
- APACHE II score also correlated well with the hospital and ICU stay. In current study patient having apache score 0-5 mean ICU stay of 3 days and patients having apache score 6-10 with mean

ICU stay of 3 days and apache score 11-16 with mean ICU stay of 9 days.

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institutional ethics committee

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