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Application of APACHE II Score in assessing the severity and outcome in peritonitis due to hollow viscus perforation

M. Venkat Reddy¹, T. Amarsimha Reddy^{1*}, Satyadev¹, B. RaghuRam Teja¹, P. ShanmugaRaju²

¹Department of Surgery, ²Department of Physical Medicine and Rehabilitation, Chalmeda AnandRao Institute of Medical Sciences, Karimnagar, Telangana, India

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*Correspondence:

Dr. T. Amarsimha Reddy,

E-mail: dr.amarasimha@yahoo.co.in

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ABSTRACT

Background: Acute generalized peritonitis from Gastrointestinal hollow viscus perforation is a potentially life threatening condition. The aim of the study was to assess the application of APACHE II score in assessing the severity and outcome in peritonitis due to hollow viscus perforation and to correlate morbidity and mortality patterns using the modified APACHE II Score and its significance on the outcome.

Methods: A prospective survey of 50 patients with acute generalized peritonitis due to hollow viscus perforation was carried out in general surgical wards, CAIMS, Karimnagar. APACHE-II scores were assigned to all patients in order to calculate their individual risk of mortality before undergoing emergency surgery.

Results: Total 50 patients were admitted during the study period. Age and sex distribution shows that perforation was common >60 years in our study. Higher modified APACHE II scores statistically influenced mortality in all the patients irrespective of aetiology with p<0.001 which is statistically significant.

Conclusions: Modified APACHE II scoring predicts mortality which was significant irrespective of the aetiology.

Keywords: APACHE II score, Hollow viscus perforation, Mortality, Outcome, Peritonitis

INTRODUCTION

Acute generalized peritonitis from Gastrointestinal hollow viscus perforation is a potentially life threatening condition. It is a common surgical emergency in many general surgical units in the developing countries and it is often associated with high morbidity and mortality. Grading the severity of acute peritonitis has assisted in no small way in decision making and has improved therapy in the management of severely ill patients. ²

Empirically based risk assessment for important clinical events has been extremely useful in evaluating new therapies, in monitoring resources for effective use and improving quality of care.³⁻⁵ The introduction of injury

severity scale by Baker's et al, in 1974 and abbreviated injury scale in 1981 successfully opened avenues from further development of severity grading systems.^{6,7} Many scoring systems have been designed and used successfully to grade the severity of acute peritonitis and abdominal sepsis.

The most commonly utilized scoring systems are the APACHE (acute physiology and chronic health evaluation) system and the SAPS (simplified acute physiology score) system. These systems were designed to predict outcomes in critical illness and use common variables that include age; vital signs; assessments of respiratory, renal, and neurologic function; and an evaluation of chronic medical illnesses.^{8,9}

Aim and objectives of the study were to:

- To assess the application of APACHE II score in assessing the severity and outcome in peritonitis due to hollow viscus perforation.
- To correlate morbidity and mortality patterns using the modified APACHE II Score and its significance on the outcome.

METHODS

A prospective study of 50 patients with acute generalized peritonitis due to hollow viscus perforation was carried out in general surgical wards of Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar during the period from January 2015 to June 2016.

Inclusion criteria

Inclusion criteria were adult patients with features of acute peritonitis due to hollow viscus perforation; patient whose plain x-ray abdomen showed features of hollow viscera perforation & peritonitis; patients with blunt or penetrating injury of the abdomen with signs of hollow viscus perforation; adult age groups of both the sexes are taken into the study.

Exclusion criteria

Exclusion criteria were patient who presented with features of peritonitis and had no evidence of perforation radiologically and per operatively; patients with post operative peritonitis as a complication of surgery; patient with iatrogenic perforation during laparotomy or endoscopy; patient with esophageal perforation; perforative peritonitis in paediatric age group.

All patients were evaluated clinically, hematological and bio chemical investigations were carried out. Patients were resuscitated with intravenous fluids and correction of electrolyte. Imbalance as indicated by the results of the electrolytes and urea.

The following acute physiological parameter of APACHE II were assessed and recorded at the admission point preoperatively. Temperature, mean arterial blood pressure (mmHg), heart rate, respiratory rate, serum sodium, serum potassium, serum creatinine, hematocrit, white blood count, HCO3, arterial Ph, and partial pressure of $\rm O_2$.

These were scored in accordance with the Modified APACHE II chart, scoring the abnormality high or low levels. The scores ranged from 0 to 4 on each side of normal value. Zero represents normal values and increase to 4 indicating the extreme end of high or low abnormal values. These parameters represent the acute physiological scores (APS), included in this study as part of APS was the serum urea. This was scored using the parameter similar to that of serum creatinine.

After approval by the Institute Ethics Committee, Chalmeda AnandRao Institute of Medical Sciences, Karimnagar was prospectively carried out from 2015 to 2016

Statistical analysis

Mean and standard deviation of the total modified APACHE II Score was compared for each of the complication and mortality for the study. 't'- test was used to compare the statistical significance of the mean values, p-value <0.05 was considered as statistically significant.

RESULTS

In this study, out of 50 patients 50 underwent laparotomy. Table 1 shows that perforation was common >60 years in our study, especially due to duodenal ulcer perforation.

Table 1: Age distribution.

Age group (years)	No. of patients	Percentage (%)
10-20	4	8
21-30	10	20
31-40	5	10
41-50	8	16
51-60	7	14
>60	16	32

Table 2: Site of perforations.

Site of perforation	No. of cases	Percentage (%)		
Duodenum	29	58		
Stomach	6	12		
Jejunum	3	6		
Ileum	8	16		
Appendix	2	4		
Colonic perforation	2	4		

Table 2 shows 55% of duodenal ulcer patients give a history of previous peptic ulcer diseases. Among the 6 gastric perforations one had malignant perforation that underwent gastrectomy later.

Ileal perforations were 8 there were 2 cases due to chrons disease who underwent resection and end to end anastomosis, one case due to stricture in whom resection and end to end anastomosis was done and other due to enteric fever which was subsequently proved by investigations.

Three patients had jejunal perforation in this study. Two patients were due to trauma, 1 patient at the level of previous gastrojejunostomy. Appendicular perforations were seen in 2 cases. Appendix was found to be gangrenous in both the cases.

In our study there were two cases of colonic perforation one was due to malignancy the other was at previous colorectal anastomosis in which closure of perforation followed by colostomy was done (Table 3).

Table 3: Modified APACHE II SCORE observed in our study.

Aetiology	Modified	APACHEII s	Total no. of cases		
	0-4	5-9	10-14	15-20	-
Duodenal	6	9	12	2	29
Gastric ulcer	-	4	-	2	6
Jejunal	-	3	-	-	3
IIeal	1	4	1	2	8
Appendicular	1	-	1	-	2
Colonic	-	-	2	-	2
Total	8	20	16	6	-

Table 4 shows the mean number of days for hospital stays in patients with post operative complications were higher. The complications were treated according to the nature of the complications.

Table 4: Modified APACHE II score and post operative complications.

	APACHE II Score				
	0-4	5-9	10-14	15-20	
No of cases complications	4	8	5	4	21

Table 5: Mortality and APACHE scores.

Aetiology	Death and APACHE score				Total
	0-4	5-9	10-14	15-20	
Duodenal	-	-	-	1	1
Gastric	-	-	-	-	0
Jejunal	-	-	-	-	0
Ileal	-	-	1	1	2
Appendicular	-	-	-	-	0
Colonic	-	-	-	-	0
Total	-	-	-	-	3

Table 5 shows that the total mortality was 3 among 50 patients. One in duodenal ulcer perforations, 2 in small bowel perforations. The mortality were very high in the group of 10-14 and 15-20 range of modified APACHE scores.

In this study, it was observed that there is an increase in mean APACHE scores for patients having severe post operative complications like intraperitoneal abscess, fecal fistula and wound dehiscence.

This study helps to identify high risk groups where severe morbidity can be expected. Higher modified APACHE II scores statistically influenced mortality in all the patients irrespective of aetiology with p<0.001 which is statistically significant.

DISCUSSION

Peritonitis remains a hot spot for the surgeons despite advancements in surgical technique and intensive care treatment. Various factors like age, sex, duration, site of perforation, extent of peritonitis and delay in surgical intervention are associated with morbidity and mortality.

A successful outcome depends upon early surgical intervention, source control and exclusive intraoperative peritoneal lavage. Also various methods and scoring systems are used to identify the risks and to morbidity and mortality in those patients. In our study showed common etiology being duodenal ulcer, ileal, gastric, appendicular perforation, colonic or jejunal in order of frequency.¹⁰

We analyzed the mortality parameter in relation to age, duration of peritonitis, time taken for surgical consultation, waiting period for surgical intervention and etiology of peritonitis; but failed to demonstrate the statistically significant relationship. The main reported cause of death is septicaemia (59%) therefore contamination is a crucial consideration in patients with peritonitis and problem of mortality is a problem of infection. Etiology wise duodenal ulcer patients had very low mortality 1 in 29, whereas enteric perforation had high mortality i.e., 2 out of 8.

APACHE II parameters have been shown to have stronger relationship to the outcome then previous grouping such as anatomy, causes, abnormality, age and chronic ill health without consideration for systemic effects of the intra abdominal sepsis.¹¹

The 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 centers in the developed countries.

The modified APACHE II score for the morbidity for the patients having severe complications like abdominal abscess, fecal fistula, wound dehiscence, were higher but were not statistically significant. This may be due to the cross sectional nature of our study and the sample size. They helped to identify high risk groups where higher complications can be expected.

Scores for survivors was a mean of 9.13 and a standard deviation of 4.12, and for nonsurvivors, mean of 16.67 and standard deviation of 2.51, p<0.001 which is statistically significant which compares with earlier studies by Adesunkanmi et al.¹²

In our study, the mortality and higher APACHE II scores were noted in this study. There was no death in scores ranging from 0-4, 5-9, 6.25% where as mortality was higher in patients who scored 10-14 groups and 33.3% in 15-20 groups.

Preoperative modified APACHE II scores are simple and effective method for assessing disease severity which is observed by our study. Early prognostic evaluation is desirable to be able to select high risk patients for more aggressive treatment especially in severe peritonitis.

The present study confirmed the ability of modified APACHE II score to predict mortality in acute peritonitis sepsis.

The present study showed that it could be easily applied to grade the severity of acute generalized peritonitis in centers like ours, despite inadequate facilities, with some degree of effectiveness.

CONCLUSION

Modified APACHE II scoring predicts mortality which was significant irrespective of the aetiology. Modified APACHE II Scores can be used easily and effectively to identify high risk patients for intensive therapy.

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Ethical approval: The study was approved by the Institutional Ethics Committee of Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar, India

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