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[原著］Correlations of the APACHE II score and sepsis score to the clinical outcome in patients with acute abdomen

Correlations of the APACHE II score and sepsis score to the clinical outcome in patients with acute abdomen

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ABSTRACT

The purpose of this study was to analyze the predictive value of various preoperative clinical and laboratory data on the operative outcomes based on the APACHE (acute physiology and chronic health evaluation) score and sepsis score systems. From January 1991 to December 1995, 34 consecutive operations were performed on 34 patients with acute abdomen. We retrospectively studied the clinical and laboratory data based on the medical records of these patients within a 48-hour period before operation. The APACHE II classification system and sepsis grading system were thus applied to the 34 patients. Each attribute was scored and the sum of all scores was considered to represent the total effect of the acute abdomen state on the patient. Five of these patients (nonsurvivors=5) died, whereas the remaining patients (survivors=29) survived. The sum of the APACHE II score in the nonsurvivor group (20.4 ± 1.63, range 18-24) was significantly higher than in the survivor group (12.45 ± 2.45, range 8-18, $p<0.05$). The sum of the sepsis score in the nonsurvivor group (25.6 ± 7.25, range 17-35) was also significantly higher than in the survivor group (5.21 ± 3.32, range 2-14, $p<0.05$). By these two scoring systems we can therefore assess an individual patient's operative outcome more accurately. *Ryukyu Med. J., 19(1)7~9, 1999*

Key words: Acute abdomen, APACHE II score, Sepsis score Operative outcome

INTRODUCTION

The patients with acute abdomen account for around 8.5% of the patients in the emergency outpatient clinic[1]. Since acute abdomen is an extremely critical disease, patients with acute abdomen are at high risk for operative morbidity and mortality. While it is generally accepted that increased preoperative complications closely correlate with greater postoperative morbidity and mortality, we need more accuracy in determining whether or not a patient with acute abdomen can tolerate an operation. This could be achieved when we could mathematically determine the stress and operative reserve.

With this objective, we retrospectively studied how the APACHE (acute physiology and chronic health evaluation) II classification system[2] and the sepsis grading system[3] can correctly predict the postoperative outcome for the patients with acute abdomen.

PATIENTS AND METHODS

From January 1991 to December 1995, 34 consecu-

tive patients with acute abdomen who underwent an emergency operation were involved in this study. The patients were arbitrarily divided into two groups, nonsurvivors and survivors. The APACHE II classification system and the sepsis grading system were applied to all patients, each attribute was measured, and the sum of all scores was used to represent the total effect of the acute abdomen state on the patients.

The Wilcoxon test was used to study the difference between the two groups. The results were indicated as the mean ± standard deviation (SD) of the mean value. The significance of differences was assessed by the Wilcoxon test. Differences were considered to be significant at p value of less than 5% ($p<0.05$) in all statistical analyses. The APACHE II score and sepsis score were applied to all patients and calculated within the 48-hour period before they underwent an emergency operation.

RESULTS

There were 5 nonsurvivors (2 males and 3 females) and 29 survivors (8 males and 21 females). The mean age

Table 1 Patient backgrounds

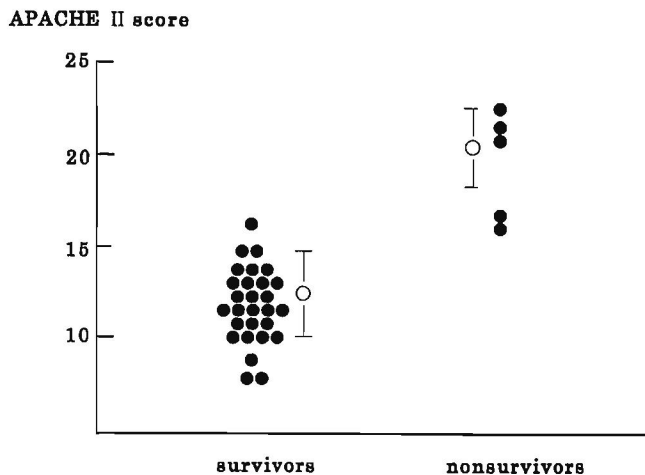|	survivors		nonsurvivors	
	male	female	male	female
	8	21	2	3
Age	9~87 y.o (50.6±21.2)		24~79 y.o (55.8±25.1)	
APACHE II score	8~18 points (12.45±2.46)		18~24 points (20.4±1.63)	
Sepsis score	2~14 points (5.21±3.32)		17~35 points (25.6±7.27)	

APACHE II score

Fig. 1 The distribution of the APACHE II score in the survivors and nonsurvivors. The sum of the APACHE II score in the nonsurvivor group (20.4±1.63, range 18-24) was significantly higher than in the survivor group (12.45±2.45, range 8-18, p<0.05).

Sepsis score

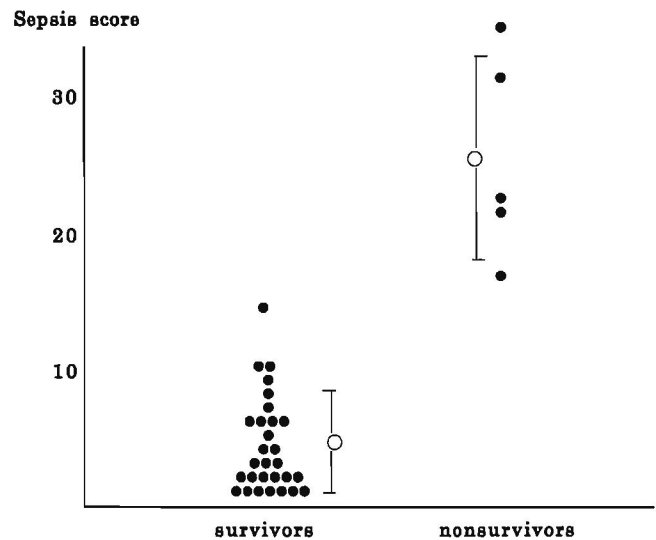
Fig. 2 The distribution of the sepsis score in the survivors and nonsurvivors. The sum of the sepsis score in the nonsurvivor group (25.6±7.25, range 17-35) was also significantly higher than in the survivor group (5.21±3.32, range 2-14, p<0.05).

was 55.8±25.1 years (range, 24-79) in the nonsurvivor group and 50.6±21.2 years (range, 9-87) in the survivor group, respectively. Nonsurvivors are cases who died within 30 days postoperatively. No significant differences were observed regarding the average age and gender of the patients in both groups.

Regarding the APACHE II classification system, the sum of all the scores ranged from 18 to 24 points in the nonsurvivor group, and from 8 to 18 points in the survivor group. In the nonsurvivor group, the lowest score exceeded 18, whereas in survivor group, the score only rose to as high as 18 in one case. The APACHE II score in the nonsurvivor group (20.4±1.63; range, 18-24) was significantly higher than that in the survivor group (12.45±2.46; range, 8-18) (p<0.05) (Fig. 1).

Regarding the sepsis grading system, in the nonsurvivor group, the sum of the scores ranged from 17 to 35 points with a mean score of 25.6±7.25. Whereas, it ranged from 2 to 14 points with a mean score of

5.21±3.32 in survivor group. In the nonsurvivor group, the lowest score rose above 15, whereas the highest score did not exceed 15 in the survivor group. The sepsis score in the nonsurvivor group was significantly higher than that in the survivor group (Fig. 2).

All nonsurvivors had abdominal malignancies as the underlying disease: a perforation of the gastrointestinal tract (small and large bowel, small bowel and stomach) during chemotherapy in 3 patients (leukemia, malignant lymphoma and esophageal cancer) and a bowel obstruction due to malignancies (colonic leiomyosarcoma and uterine cervical cancer) in 2 patients. All patients underwent a resection of the affected bowel, unfortunately resulting in death due to the clinical manifestations of septic shock.

On the other hand, in the survivor group, 17 had a bowel obstruction (colostomy in 7, adhesiotomy in 6,

colectomy in 3 and bypass anastomosis in 1), 7 had appendicitis (all appendectomies), and 5 had miscellaneous causes of acute abdomen. Eleven of the 17 bowel obstruction cases were secondary to abdominal malignancies. In these patients the sum of the scores did not exceed 18 based on the APACHE II scoring system and 14 based on the sepsis scoring system.

DISCUSSION

Both of the above described scoring systems provide a simple method for grading the severity of a patient's illness and predicting survival for patients with acute abdomen. The APACHE (acute physiology and chronic health evaluation) classification system was first described in 1981 by Knaus et al[2]. This system is composed of two parts: consisting of a physiology score representing the degree of acute illness and a preadmission health evaluation indicating the health status before acute illness. The physiological portion of the APACHE classification is designed to objectively measure the degree of acute illness, while the preadmission health status is determined by reviewing the patient's medical history for details. An analysis of the initial studies resulted in the exclusion of variables with no independent influence on survival and thus led to the development of a modified version called the APACHE II score.

The sepsis grading system, a system for grading the severity of sepsis, has been developed by scoring the attributes of sepsis under four headings, including: the local effects of tissue infection, pyrexia (oral temperature), the secondary effects of sepsis and laboratory data.

Both scoring systems use routinely collected preoperative clinical and laboratory data, which are readily available at district general hospital levels, and thus provide a positive predictive value of postoperative outcome. Both systems share the same classification, but the APACHE II system is used to classify groups of patients based on the severity of acute illness while the sepsis grading system is for classifying groups of patients based on the severity of sepsis.

With the intention of using the scoring system to directly predict the postoperative outcome, we divided the patients with acute abdomen into two groups according to the postoperative outcome, consisting of the nonsurvivor group in which the patients died in hospital and the survivor group in which the patients survived postoperatively. As a result, we found clear differences in the total scores between the nonsurvivors

and survivors. In this study, all patients with a score of 20 or more in the APACHE II scoring system and a score of 17 or more in the sepsis scoring system died postoperatively. We thus found a very strong correlation between the total scores and the postoperative outcome. Bosscha et al[4] reported that all patients with a score of 20 or more in the APACHE II system and a score of 27 or more in the Mannheim Peritonitis Index died in hospital. Larvin et al[5] also reported the APACHE II score to be a useful method for determining the progressive pathological phase for acute pancreatitis since none of the patients who had a score of 20 or more survived. As a result, the total scores of the assigned weights for all recorded measurements represent the severity of the patient's illness. Therefore, the higher the score, the sicker the patient.

In conclusion, although the number of patients analyzed herein was small, the combined use of the APACHE II classification system and the sepsis grading system is considered to be a significant predictor of the postoperative outcome in patients with acute abdomen.

In addition, the significantly different postoperative outcome of the two groups is mainly associated with their different degrees of severity of acute abdomen. Our results indicate an improvement in the prognosis of patients with acute abdomen when those at high risk for developing septic shock are treated early. Further studies based on a large number of patients are expected to help clarify these findings.

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