

Management and Outcome of Sepsis Cases in a Hospital

E. Chinnaiah^a, Sharath C.T.^b

^aAssistant Professor ^bSenior Resident, Department of General Surgery, Oxford Medical College, Bengaluru, Karnataka 562107, India.

Abstract

Introduction: Septic shock is a medical condition as a result of severe infection and sepsis, though the microbe may be systemic or localized to a particular site. It can cause multiple organ dysfunction syndrome (formerly known as multiple organ failure) and death. Its most common victims are children, immuno-compromised individuals, and the elderly, as their immune system cannot deal with infection as effectively as those of healthy adults. *Methodology:* All patients with suspected/confirmed sepsis admitted in the surgical unit were included in the study. This included operated, non-operated and trauma patients (eg: perforation peritonitis, Diabetic ulcer foot with gangrene Necrotizingfascitis). Patients had to fulfill two or more criteria of systemic inflammation. The parameters involved in calculating the SOFA score were collected on a daily basis. *Results:* Among the 41 patients ventilated 33 (80.5%) expired and among the 59 patients who did not require ventilator support 14 (23.7%) expired. *Conclusion:* Out of 32 patients whose SOFA score on admission was low (less than 8), 8 patients died. This data depicts, even with low SOFA score on admission, few patients died, because so many other factors are also contributing to the death of critically ill patients.

Keywords: Sepsis; Management; SOFA.

Introduction

Multi - organ dysfunction syndrome (MODS) is the leading cause of morbidity and mortality for patients admitted with sepsis, and develops in about 15% of all admissions. Over the past years many scoring models have been developed to describe the severity of illness in patient admitted with sepsis. As an example, the first Sepsis-related Organ Failure Assessment score, later called the Sequential Organ Failure Assessment (SOFA) score, was introduced in 1994 [1].

In 1992, Bone and colleagues convened a consensus conference on the problem of organ damage caused by excessive activation of the endogenous inflammatory response. They defined four sepsis-related clinical syndromes. These four syndromes were defined in pathophysiologic terms as a hierarchy corresponding to four steps of increasingly exaggerated inflammatory responses- SIRS, sepsis, severe sepsis and septic shock [2]. The first category of SIRS is caused by inflammatory mediators released by lymphocytes, macrophages, granulocytes, and vascular endothelial cells. These activated immune cells release cytokines, enzymes, and oxygen radicals that are beneficial because they can destroy invading microorganisms. These immune mediators also initiate coagulation pathway, amplify the release of additional cytokines and vasoactive agents, and increase capillary membrane permeability.

Infection is defined as presence of microorganism in the body tissue or in blood stream associated with inflammatory response to that organism. At the site of infection the classic findings of rubor, calor, and dolor in areas like the skin or subcutaneous tissue are common.

SIRS can be caused by a variety of disease

Corresponding Author: Sharath C.T., Senior Resident, Department of General Surgery, Oxford Medical College, Bengaluru, Karnataka 562107, India.
E-mail: nitinsurgery2016@yahoo.com

Received on 23.06.2017, Accepted on 03.07.2017

processes, including pancreatitis, polytrauma, malignancy, and transfusion reaction, and infection. SIRS caused by infection is termed *sepsis*, and is mediated by the production of a cascade of pro-inflammatory mediators produced by exposure to microbial products.

Septic shock is a medical condition as a result of severe infection and sepsis, though the microbe may be systemic or localized to a particular site. It can cause multiple organ dysfunction syndrome (formerly known as multiple organ failure) and death [3]. Its most common victims are children, immunocompromised individuals, and the elderly, as their immune system cannot deal with infection as effectively as those of healthy adults.

Frequently, patients suffering from septic shock are cared for in intensive care unit. The mortality rate from septic shock is approximately 25–50% [4]. Septic shock is defined as stage of SIRS (Systemic inflammatory response syndrome), in which sepsis, severe sepsis and multi organ dysfunction were considered as different stages of its pathophysiological process.

The pathophysiology of shock in sepsis is multidimensional and complex because of the interaction of multiple physiologic and inflammatory events. The majority of patients with septic shock have hypotension associated with arterial vasodilation. A minority of patients in septic shock are hypovolemic as a result of inflammatory edema or fluid loss and they have a hemodynamic pattern of marked vasoconstriction and low-flow shock. Typically, patients in vasodilatory septic shock have cardiac output 2 fold or greater than normal associated with mean arterial pressure less than 65 mm Hg. The reduction in systemic vascular resistance (SVR) in these patients is attributed to vasodilation in organs with high capillary density, like skin and skeletal muscle [5].

Experimental evidence indicates that excessive production of nitric oxide, a potent vasodilator, is a primary mechanism for the reduced SVR in patients with septic shock. Because of the induction of a potent enzyme system, patients with severe sepsis and septic shock produce large amounts of nitric oxide, and elevated generation of nitric oxide near vascular

smooth muscle overwhelm the vasoconstrictive effects of the endogenous vasoconstricting hormones (α -adrenergic catecholamine, angiotensin II, and vasopressin) [6]. In clinical trials, treatment of patients in vasodilatory shock with inhibitors of nitric oxide synthesis did not improve their outcome [7]. Further research is needed to identify treatments that effectively modify the adverse influence of nitric oxide in septic shock [8].

Methodology

100 patients admitted to the surgical unit in medical college hospital with suspected/confirmed sepsis formed the study subjects

Patients which are included in the study are perforation peritonitis with Septicemia, Diabetic ulcer foot with gangrene, Necrotizing fasciitis of limbs and abdomen, Burns, Mesenteric ischemia with bowel gangrene, Intestinal Obstruction, Carcinoma, Blunt injury abdomen with solid organ injury.

All patients with suspected/confirmed sepsis admitted in the surgical unit were included in the study. This included operated, non-operated and trauma patients (eg: perforation peritonitis, Diabetic ulcer foot with gangrene Necrotizing fasciitis). Patients had to fulfill two or more criteria of systemic inflammation. The parameters involved in calculating the SOFA score were collected on a daily basis. The score was calculated till discharge from ICU, mortality or day 7 of admission to ward whichever was the earliest. The SOFA at admission was labelled T0 and at day 2 was labelled as T48 (i.e. at 48 hours) and at day 4 was labelled as T96 (i.e. at 96 hours). The difference calculated as Delta SOFA. The Maximum, Mean and total SOFA were also calculated and Compared with outcome of the patient.

Results

Among the 100 patients involved in the study 53% survived and 47% succumbed to their illness. The minimum age of the person enrolled in the study was 17 and the maximum age was 85.

Table 1: SOFA score on admission

SOFA score	Survivors	Non survivors	Total
6–7	5	1	6
8–9	19	7	26
10–11	13	4	17
12 and above	16	35	51
Total	53	47	100

The minimum SOFA score of the patients admitted was 6. Hence the data column starts with values of 6 and above. This table shows that there is a sharp rise in non survivors at a SOFA score above 12.

Out of 69 male patients, 36 (52.2%) patients expired

and out of 31 female patients, 11 (35.5%) patients expired.

Among the 41 patients ventilated 33 (80.5%) expired and among the 59 patients who did not require ventilator support 14 (23.7%) expired.

Table 2: Outcome Based on Sex

Sex	Survivors	Non survivors	Total
Male	33	36	69
Female	20	11	31
Total	53	47	100

Table 3: Outcome for ventilator support

Mechanical Ventilation status	Survivors	Non survivors
Ventilated	8	33
Non ventilated	45	14

Table 4: Operated and Non-Operated Cases

Status of operation	Operated	Non-operated	Total
Survivors	27	26	53
Non-survivors	21	26	47
Total	48	52	100

Table 5: Status of Body Fluid Cultures

Positive	45
Negative	55

Discussion

Since the cost of health care is increasing day to day, assessment of a patient's prognosis is vital during the course of treatment. Outcome prediction gains importance in this regard. So scoring systems have been used to predict this. SOFA scoring system, because of its simplicity and easy applicability, has been widely used in critical situation. This system has also been evaluated in many ICUs and found to be useful as a simple bedside tool.

In our study sex of the patient did not play a significant role in influencing mortality. The morbidity and mortality is purely related to the underlying disease state.

But, the need for mechanical ventilation clearly predicted mortality outcome, since the patients who were ventilated showed a higher mortality rate compared to those who did not require ventilator support, as evidenced by the statistically significant p value < 0.001.

There is a significant increase in mortality rate when the SOFA score is above 12. There is a steep rise in the mortality curve at this value. Admission SOFA, 48 hours SOFA and 96 hours SOFA are all statistically

significant with a p value < 0.001 which is comparable to other studies [9,10].

Delta SOFA which is the difference in values over a period of time is also statistically significant in our study. There is a strong evidence that, patients whose delta SOFA values when increased from the previous value, there is a greater chance that the patient may succumb to his illness.

Mean SOFA value also proved to be an independent predictor of mortality. A value of more than 11 showed a sharp rise in mortality. Total SOFA score is also statistically significant in predicting mortality, irrespective of the disease state. A total SOFA score of more than 33.5 is associated with increased mortality.

Conclusion

In our study, out of 51 patients whose admission SOFA score was very high (above 12), 16 patients were survived. This data depicts that, with early prediction of outcome using SOFA score and suitable therapeutic intervention, 16 critically ill patients were survived.

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