

Sepsis: a private hospital experience in Nepal

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Introduction: Sepsis, severe sepsis and septic shock are associated with high mortality. Data about patient profile and outcome of sepsis in ICU of Nepal is lacking. This study was conducted to investigate the source of infection leading to sepsis, its complications and eventual outcome.

Material and Methods: It is a prospective study carried out from August 2004 to July 2005 in the ICU of B & B Hospital. The patients admitted in the ICU with the diagnosis of sepsis in accordance to the criteria laid down by American College of chest physician and Society of Critical Care Medicine were analysed and followed up. Age, sex, source of infection, duration of stay in the ICU, co-morbidities (Mc Cabe's score), associated severe sepsis, septic shock, acute respiratory distress syndrome (ARDS), multiple organ dysfunction syndrome (MODS), disseminated intravascular coagulation (DIC) and the eventual outcome of sepsis were taken into account. The cause of death was also studied. Infection was diagnosed on the basis of clinical, radiological and microbiological parameters.

Results: Of the 28 patients included in the study, 53.6% were male and 46.4% were female, the youngest was 15 years old and the oldest was 93 years old. More than half of the patients were more than 60 years old (53.6%) the average stay in the ICU was 6 days and the main source of infection was lung/respiratory tract (57.14%). 10.7% had sepsis, 89.3% had severe sepsis, 82% had septic shock, 42.9% had MODS, 32.1% had ARDS and 7.1% had DIC. The overall mortality was 39.3%. In elderly the mortality rate was higher (46.7%). The mortality rate was highest in patients with MODS. The mortality rate of sepsis, severe sepsis and septic shock increased progressively from 0%, 39.3% and 47.8% respectively. The mortality rate in patients with ARDS was 55.6%. The most commonly failing organ was circulatory system (82.1%). The mortality was 100% in patients with 3 or more organ failure.

Conclusion: Sepsis with its complications has high mortality in our hospital that is similar to the recent findings in Brazil, Norway and USA. Awareness of sepsis and its appropriate treatment as per Surviving Sepsis Campaign Guidelines has become mandatory to reduce its mortality.

Introduction

Sepsis is an increasing problem in medical science. Some explanations for this are increasing proportion of elderly people in general population and those admitted to hospitals, more intensive and aggressive treatment of various diseases and injuries, and increased microbial resistance, especially in the hospital environment. Recent reports from USA suggest that sepsis is a serious national health problem, on the same level as ischemic heart disease, and the number of deaths due to severe sepsis is similar to the number of deaths related to ischemic heart disease¹. Data about patient profile and outcome of sepsis in ICU of Nepal is lacking. This study was conducted to identify the source of infection leading to sepsis, its complications and eventual outcome.

Material and Methods

It is a prospective study carried out from August 2004 to

July 2005 in which the patients admitted with the diagnosis of sepsis in the ICU of B & B Hospital were analysed and followed up. A total number of 30 patients were admitted with sepsis in this time period, out of which 2 patients were eventually transferred to other institutions and were excluded from the study. Age, sex, source of infection, duration of stay in the ICU, co-morbidities (Mc Cabe's score), associated severe sepsis, septic shock, acute respiratory distress syndrome (ARDS), multiple organ dysfunction syndrome (MODS), disseminated intravascular coagulation (DIC) and the eventual outcome of sepsis were taken into account. The cause of death was also studied. Sepsis and sepsis related conditions were diagnosed in accordance to the criteria proposed by American College of chest physician and Society of Critical Care Medicine² that is as follows –

Systemic inflammatory response syndrome (SIRS) was diagnosed by two or more of the following criteria-

Sepsis in a private hospital

Temperature $> 38^{\circ}\text{C}$ or $< 36^{\circ}\text{C}$,
Heart rate > 90 beats per minute,
Respiratory rate > 20 breaths per minute or
 $\text{PaCO}_2 < 32$ mm Hg,
WBC count $> 12,000/\text{cumm}$ or $< 4000/\text{cumm}$ or $> 10\%$
immature forms.

Sepsis was defined as SIRS due to infection.

Severe sepsis was defined as sepsis associated with organ dysfunction, hypoperfusion or hypotension³. The organ dysfunction variables included –

Arterial hypoxemia ($\text{PaO}_2/\text{FiO}_2 < 300$ torr),
Acute oliguria (urine output $< 30\text{--}50$ ml/hr for at least
2 hrs), Creatinine > 2.0 mg/dl
Coagulation abnormalities (INR > 1.5 or APTT
 > 60 seconds)
Thrombocytopenia (platelet count $< 1,00,000/\text{cumm}$)
Hyperbilirubinemia (Serum total bilirubin $> 2\text{mg/dl}$)
Haemodynamic variables (systolic blood pressure
 < 90 mm Hg or systolic blood pressure decrease
 > 40 mm Hg)

Septic shock was defined as acute circulatory failure despite of crystalloid fluid challenge unexplained by other causes³.

Acute circulatory failure was defined as persistent arterial hypotension (systolic blood pressure < 90 mm Hg or a reduction in systolic blood pressure > 40 mm Hg from the baseline despite adequate volume resuscitation).

MODS were defined as the presence of altered function of 2 or more organs in acutely ill patient³.

ARDS was defined as –

$\text{PaO}_2/\text{FiO}_2 < 200$ torr
Bilateral lung infiltrates in chest radiograph
No evidence of left heart decompensation clinically.
(Note; the third point of PCWP < 10 mm Hg as per American – European Consensus Conference Committee Criteria⁴ could not be implemented because of lack of facility of measurement of PCWP in our ICU. The lack of evidence of left heart decompensation clinically was used as a surrogate).

DIC was defined as constellation of the following in the setting of acute illness –

Thrombocytopenia ($1,00,000/\text{cumm}$)
INR > 1.5
APTT > 60 seconds
Positive D-dimer
Hypofibrinogenemia ($< 150\text{mg/dl}$)

DIC was deemed to be occult if there was no clinical bleeding and it was deemed to be frank if there was clinical bleeding. McCabe's score was graded as the following –

1= Non fatal illness
2= Ultimately fatal illness
3= Rapidly fatal illness

The patients were grouped in various groups by the decade and divided into male and female. The average stay in the ICU was also calculated. Infection was diagnosed on the basis of clinical, radiological and microbiological parameters. The infection source was classified as lung/respiratory tract, urinary tract, gastrointestinal and hepatobiliary, and female genital tract. We did not have any case of primary blood stream or wound site infection.

The cause of death was categorised as due to –
Sepsis
MODS
DIC

If the patient died due to refractory shock despite vasoactive/inotropic support he/she was categorised into death due to septic shock. If the patient's blood pressure was maintained above 90/60 mm Hg with vasoactive/inotropic support but died due to failure of other 2 or more organ system then he/she was categorised into death due to MODS. If the patient died due to exsanguination from bleeding despite of replacement therapy he/she was categorised into death due to DIC.

Results

Of the 28 patients included in the study 15 were males (53.6%) and 13 were females (46.4%). The youngest was 15 years old and the oldest was 93 years old. The patients were grouped into various age groups by the decade (Fig. 1).

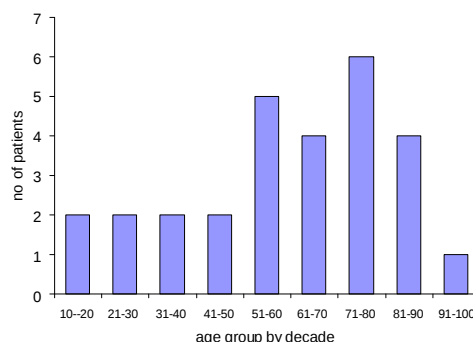


Fig. 1. Occurance of sepsis increases with age
Fifteen out of 28 (53.6%) were above the age of 60years

indicating more than half of the patients with sepsis were elderly. The average stay in ICU due to sepsis was 6 days. Respiratory tract was the commonest source of infection leading to sepsis (57.14%) followed by infection of the urinary tract (Table. 1).

Table. 1. Classification of infection source as a cause of sepsis.

Source of infection	No. of patients	Percentage
Lung/respiratory tract	16	57.14%
Urinary tract	9	32.14%
Gastrointestinal & hepatobiliary	2	7.14%
Female genital tract	1	3.57%

Of 28 patients, 3 had sepsis, 25 had severe sepsis, 23 had septic shock, 12 patients had MODS, 9 patients had ARDS and 2 patients had DIC. Out of 2 patients with DIC, one had occult DIC and the other had frank DIC (Table. 2).

Table. 2. Sepsis and its complications with its distribution

Sepsis and its complications	No. of patients	Percentage
Sepsis	3	10.7
Severe sepsis	25	89.3
Septic shock	23	82.1
MODS	12	42.9
ARDS	9	32.1
DIC	2	7.1

The overall mortality was 39.3%, 11 out of 28 patients died. In elderly (>60 years) the mortality was 46.7%, 7 out of 15 patients died. The mortality rate was highest in patients with MODS. Ten out of 12 patients with MODS died (83.3%). The mortality rate in patients with septic shock, severe sepsis and ARDS were 47.8%, 39.3% and 55.6% respectively (Table. 3).

Table 3. The mortality rate.

Sepsis and its complications	Total no of patients	No of patients died	Mortality rate %
Sepsis	3	0	0
Severe sepsis	25	11	39.3
Septic shock	23	11	47.8
MODS	12	10	83.3
ARDS	9	5	55.6

Patients with sepsis but without any evidence of organ failure or hypoperfusion did surprisingly well, all the three patients survived. The most commonly failing organ was

circulatory (82.1%), 23 out of 28 patients had septic shock. One patient had frank DIC and died of exsanguination despite of replacement therapy. One patient had occult DIC as a part of MODS and died of MODS.

Of the 11 patients that died in our study, 8 were due to septic shock (72.71%), 2 were due to MODS (18.2%), one was due to DIC (9.1%). All the patients who died invariably had septic shock although septic shock was not the cause of death in all the patients.

Higher McCabe's score was not associated with higher mortality rate in our study as anticipated. As a matter of fact, those with McCabe's score more than 2 had mortality of 33.3% (7 out of 21 patients). And those with score of 1 had higher mortality of 57.1% (4 out of 7 patients). There was no patient with McCabe's score of 3 in our study. But mortality definitely depended upon the number of organ failed, the greater the number of organs failed, the higher the mortality, with mortality of 100% in patients with 3 or more organ failure.

Discussion

In 1914, Schottmueller wrote "septicaemia is a state of microbial invasion from a portal of entry into blood stream which causes signs of illness". In the last few decades, the evidence that sepsis results from an exaggerated systemic inflammatory host response induced by infecting organisms is compelling; inflammatory mediators are the key player in the pathogenesis of septic shock and multiorgan dysfunction syndrome. Sepsis and its sequelae represent a continuum of clinical syndrome encompassing systemic inflammation, coagulopathy and haemodynamic abnormalities. Severe sepsis and septic shock continue to be major cause of morbidity and mortality worldwide⁵.

In our study the occurrence of sepsis was almost equal in both male and female. This is in keeping with an American study where they found that the number of cases of sepsis between men and women were about equal⁶. Occurrence of sepsis was found to increase with age. Reports from Angus D C et al also showed similar findings¹.

Flaatten et al from Norway⁷ also share our experience that mortality in sepsis increases with age. The main source of infection was lung/respiratory tract as was in the study done by Silva E et al from Brazil⁸. Mortality rates were highest in patients with MODS as it has also been shown in the Norwegian study⁷ where mortality rate with MODS was 71.8% compared to 83.3% in our study.

Severe sepsis and septic shock carried very high mortality rates of 39.3% and 47.8% respectively. Silva E et al showed mortality of 47% and 52% respectively for severe sepsis

Sepsis in a private hospital

and septic shock⁸. Flaatten H et al showed mortality rate of 27% in severe sepsis in his study⁷.

Patients with sepsis but without organ dysfunction or hypoperfusion all survived in our study. The Norwegian study showed a mortality of 7.1⁷. The seemingly good result in our study is most likely due to small sample size. The most common failing organ system in our study was circulatory (82.1%). A very high percentage indeed as compared to 23.4% in study conducted by Flaatten H et al⁷. Contrary to our anticipation, higher McCabe's score was not associated with higher mortality. This underscored the fact that it was not the severity of co-morbidities but the number of organs failed due to sepsis that determined the mortality, with mortality of 100% in those who had 3 or more organ failure.

Conclusion

Sepsis with its complications has got high mortality in our hospital that is similar to recent findings in Brazil, Norway and USA. Awareness of sepsis and its appropriate and early treatment as per Surviving Sepsis Campaign Guidelines⁹ has become mandatory. The goal of campaign is to achieve a 25% reduction in sepsis mortality by 2009. It will be of interest to see if we can achieve this goal in Nepal.

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