

SOURCE OF INFECTION IN PATIENTS WITH SEPSIS ADMITTED IN ACUTE MEDICAL CARE UNIT

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ABSTRACT

Introduction: Sepsis is the leading cause of mortality in acute medical care (AMC) units. Outcome mainly depends on proper empirical antibiotic therapy which in turn primarily based on the detection of primary focus of infection. The present study is undertaken to study the foci of sepsis and the microbial profile in adult patients in the AMC units.

Methods & Materials: The patient population included adult patients admitted in AMC with diagnosis of sepsis during one year period from Aug-2010 to July-2011; patients with systemic inflammatory response syndrome with no evidence of infection and nosocomial sepsis were excluded from the study. Blood samples and the samples from suspected primary foci were collected before the start of empirical antibiotic therapy for culture & sensitivity. Definitive etiological diagnosis was made after the isolation of the micro-organisms from the blood and for local site of infection.

Results: During the study period, 136 patients fulfilled the inclusion & exclusion criteria and were included into the study. 70% of patients were males with female to male ratio of 1:2.3 and mean age of 56.5years. Incidence of sepsis was more in patients aged above 40 years. Co-morbid conditions were found in 62% of cases; they were diabetes, hypertension, chronic renal failure, and carcinoma and liver disorders. The commonest source of sepsis was respiratory tract followed by urinary tract.

Conclusions: Respiratory tract infections are common source of infections with gram negative organisms being the frequent isolates from culture.

KEYWORDS: Acute Medical Care Units, Focus of Sepsis

INTRODUCTION

Sepsis refers to the systemic response to serious infection; it can be a response to infection by any class of microorganism. Any site of infection can result in sepsis or septic shock. Microbial invasion of blood stream is not essential for the development of sepsis. However, blood cultures yield bacteria or fungi in approx 20 – 40 % of cases of severe sepsis, and 40 – 70 % of cases of septic shock^{1,2,3}. The presence of bacteremia is an indicator of disseminated infection and also generally indicates a poor prognosis associated with localized disease. Sepsis had been reported to be the most common cause of death in non – coronary intensive care unit. Approximately 23-35 % of patients with severe sepsis and 40 - 55 % of patients with septic shock die within 30 days^{2,4,5,6,7}.

OBJECTIVES

- To study the foci of sepsis in the acute medical care units
- To study the microbial profile in the adult patients with sepsis that helps in knowing the antibiotic profile.

METHODS AND MATERIALS

The patient population included in this study was adult aged 18 years and above who had been admitted in acute medical care (AMC) under General Medicine of our hospital due to sepsis during one year period from Aug 2010 to July 2011.

Diagnosis of sepsis was done according to a revised consensus conference definition in 2001 (Table 1)⁸.

Table 1: Diagnostic Criteria for Sepsis

<p>Infection,^a documented or suspected, and some of the following:</p> <p>General variables</p> <ul style="list-style-type: none"> · Fever (core temperature >38.3°C) · Hypothermia (core temperature <36°C) · Heart rate >90 /min or >2 SD above the normal value for age · Tachypnea · Altered mental status · Significant edema or positive fluid balance (>20 mL/kg over 24 hrs) · Hyperglycemia (plasma glucose >120 mg/dL or 7.7 mmol/L) in the absence of diabetes <p>Inflammatory variables</p> <ul style="list-style-type: none"> · Leukocytosis (WBC count >12,000 /mm³) · Leukopenia (WBC count <4000 /mm³) · Normal WBC count with >10% immature forms · Plasma C-reactive protein >2 SD above the normal value · Plasma procalcitonin >2 SD above the normal value <p>Hemodynamic variables</p> <ul style="list-style-type: none"> · Arterial hypotension (SBP <90 mm Hg, MAP <70, or an SBP decrease >40 mm Hg in adults or <2 SD below normal for age) · SvO₂ >70% · Cardiac index (CI) >3.5 L.min⁻¹.M^{-2.3} <p>Organ dysfunction variables</p> <ul style="list-style-type: none"> · Arterial hypoxemia (PaO₂/FIO₂ <300) · Acute oliguria (urine output <0.5 mL.kg⁻¹.hr⁻¹ or 45 mmol/L for at least 2 hrs) · Creatinine increase >0.5 mg/dL · Coagulation abnormalities (INR >1.5 or aPTT >60 secs) · Ileus (absent bowel sounds) · Thrombocytopenia (platelet count <100,000 /mm³) · Hyperbilirubinemia (plasma total bilirubin >4 mg/dL or 70 mmol/L) <p>Tissue perfusion variables</p> <ul style="list-style-type: none"> · Hyperlactatemia (>1 mmol/L) · Decreased capillary refill or mottling <p>WBC, white blood cell; SBP, systolic blood pressure; MAP, mean arterial blood pressure; SvO₂, mixed venous oxygen saturation; INR, international normalized ratio; aPTT, activated partial thromboplastin time.</p> <p>^aInfection defined as a pathologic process induced by a microorganism;</p>

Patients were included into the study within 48 hours of admission. Patients with systemic inflammatory response syndrome with no evidence of infection and nasocomial sepsis were excluded from the study.

Aggressive fluid resuscitation and intravenous empirical antibiotic therapy was administered according to standard institutional treatment algorithms as early as possible.

Data Collection: According to standardized procedure, we recorded the following information prospectively: (1) demographics (2) co morbidities; (3) diagnosis (4) presenting complaints at admission (including systemic, respiratory, gastrointestinal, and neurological symptoms) (5) precipitating factors, (6) vital signs, (7) biochemical profile and (8) events and treatments during treatment.

Blood samples were collected before the institution of empiric antibiotic therapy for culture and sensitivity; at least two blood samples were taken for culture. Gram stain and culture of the material from the primary site of the infection for the microbial etiology was taken, other specimens collected were sputum, urine, pleural fluid, ascitic fluid etc. according to site of infection. Definitive etiological diagnosis was made after the isolation of microorganism from the blood and local site of infection. This study was approved by institutional ethics committee and informed consent was taken either from the patient or from the guardian.

RESULTS

During the study period, 147 adult patients were admitted to AMC with suspected episodes of sepsis but 11 patients did not achieve the diagnostic criteria of sepsis and were excluded. Out of 136, only 40 patients were females and the rest were males (70%). This reflects the male dominance of the disease and the current epidemiology of sepsis in rural area of Khammam, Andhra Pradesh. The age of male patients ranged from 18 years to 83 years. The age of female patients were ranged from 19 years to 85 years. The female to male ratio is 1: 2.3. In this study age of patients ranged from 18 to 85 with the mean age of 56.5 years. The incidence was more in patients above the age of 40 years.

Table 2: Age Distribution of Study Population

Age in Years	Male	Female	Total
18-27	5	7	12
28-37	6	2	8
38-47	18	7	25
48-57	23	5	28
58-67	20	10	30
68-77	19	5	24
78-87	5	4	9
Total	96	40	136

Co-morbid conditions were identified in 62% of cases. Common co-morbid conditions were diabetes, hypertension, chronic renal failure, carcinoma, liver disorders.

Table 3: Co-Morbid Conditions

Co-Morbid Conditions	No of Patients
Diabetes, Hypertension, Chronic renal failure	66
Malignancy	9
Chronic liver disease	4
Chronic Obstructive pulmonary Disease	3
Urinary tract infection	2

The commonest source of sepsis was respiratory tract (43%) followed by urinary tract. In nearly 41% cases the source of infection was not identified.

Table 4: Source of Infection

Primary Source	Male	Female	Total
Respiratory system	42	17	59
Urinary tract	21	11	32
Gastro-intestinal tract	3	1	4
Disseminated	10	6	16
Unclassified	28	25	56
Total	96	40	136

Blood cultures were positive in only 25% of cases. Gram negative organisms were two times more common than gram positive organisms. E.coli, pseudomonas and klebsiella were the most common organisms isolated from urinary tract and staphylococcus was the most common organism from respiratory tract and wounds.

Table 5: Isolation of Organisms in Blood Culture

Type of Organism	No of Patients
Gram positive	11
Gram negative	24
Candida	2
Total	35

The overall mortality was 37.5%, more in age group of 58-87 years. Patients with more than one predisposing factors had increased mortality. Outcome was poor in advanced age group. Mortality was more in males compared to females.

Table 6: Outcome of Sepsis Management

Gender	Outcome	
	Recovered	Died
Male	48	38
Female	37	13
Total	85	51

DISCUSSIONS

Sepsis is a major healthcare problem, affecting millions of individuals around the world each year and increasing in incidence. Similar to polytrauma, acute myocardial infarction, or stroke, the speed and appropriateness of therapy administered in the initial hours after sepsis develops are likely to influence outcome.

Martin GS et al found that sepsis was more common in men, accounting for 48.1% of cases on average per year and men were more likely to have sepsis than women with mean annual relative risk of 1.28². Todi S et al from India in a multi center trial showed that sepsis was more common in males (67%) than females⁷. In our study, 90 patients were male (71%) and 40 patients were females (29%). Studies by other researchers also indicated a higher incidence among men⁹.

Various studies found that sepsis is more common in people above the age of 50 years^{2,7}. In the present study we also found that sepsis was more in the age group of more than 47 years which correlates with these studies. This higher incidence seems to be related with increasing incidence of associated co-morbid conditions in this group.

Studies by Sands K.E,et al ,showed that blood cultures were positive in about 28 % of cases with gram positive cultures being most frequent isolates¹⁰. Indian study by Todi S, et al, showed that though gram positive infections were more common in the western studies⁷. In our country, gram negative infections were more common than gram positive.

In our study a total of 136 adult patients with clinical diagnosis of septicemia were studied, blood cultures were positive in 35 patients of sepsis only (25%). Positive cultures vary from 20 to 40 % of cases of sepsis and hence our findings are consistent with other studies^{7,10}.

Positive blood cultures depend on severity of sepsis and the underlying causes. Studies by Sands K.E,et al ,showed that blood cultures were positive in about 28 % of cases with gram positive cultures being most frequent isolates¹⁰. Out of 35 patients Gram negative blood cultures accounted for 68.5% and gram positive cultures accounted for 31% which are similar as in other studies.

Calandra T et. al, identified six most common sources for the causation of sepsis⁹. These are pneumonia, blood stream infections including infective endocarditis, intra vascular catheter related sepsis, intra abdominal infections, urosepsis and surgical wound infections. Common sources of sepsis studied in our 136 patients revealed most common being the respiratory tract (43%) followed by urinary tract infections (24%). In 41% of patients cause could not be identified. Catheter related infections are not included in our study as we have excluded nasocomial infections from the study.

Mortality due to sepsis in various studies described ranging between 16.8 to 34%^{2,10}. Mortality was attributed to advanced age and various risk factors prevalent in that age groups. In the present study, 51 patients died (37.5%). The slight increase in mortality is probably due to presence of high incidence of co-morbid conditions (62%) like diabetes, chronic renal failure and malignancy.

CONCLUSIONS

The present study shows that the respiratory tract infections are the common source of sepsis followed by urinary tract and GI infections; gram negative organisms being the frequent isolates from culture. Along with knowledge of the ACCP/SCCM recommendations for treatment, this information would likely to assist emergency department staff in rapidly initiating empirical treatment of this very serious and life-threatening condition.

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