CLINICAL FEATURES AND EVOLUTION OF ORGAN DYSFUNCTIONS IN SEPSIS

Codrina Bejan¹, Isabela Loghin¹, F. Roșu², G. Dorobăt², Carmen-Mihaela Dorobăt¹
University of Medicine and Pharmacy “Grigore T. Popa” – Iasi
Faculty of Medicine
1. Discipline of Infectious Diseases
2. Discipline of Anesthesiology and Intensive Care

CLINICAL FEATURES AND EVOLUTION OF ORGAN DYSFUNCTION IN SEPSIS
(Abstract): In sepsis, the systemic inflammatory response is adapted to the etiologic agent and the increase in the level of mediators is associated with organ dysfunction. Currently, a rapid assessment of patient ability to develop an adequate immune response is not possible, the response mechanisms being similar in the context of different etiological agents. 

Aim: To find statistical arguments for the evolution of laboratory parameters in sepsis patients.

Material and methods: This retrospective study included 90 patients diagnosed with sepsis. The clinical, etiological, and laboratory data, and Carmeli and APACHE II prognostic scores were analyzed. The data were processed using SPSS version 16.0. 

Results: The causative agents was identified in 16 cases; organ involvement and systemic response varied, and no statistical correlations were found between the inflammatory syndrome parameters and Carmeli or APACHE II prognostic scores or identification of the causative agent.

Conclusions: Statistical correlations were found between maximum blood glucose levels and the presence of organ dysfunction in the studied sepsis patients. No correlations were found between sepsis severity and the presence of anemia or thrombocytopenia, or between fever syndrome and inflammatory syndrome.

Keywords: DATA ANALYSIS, ORGAN FAILURE, SYSTEMIC INFLAMMATORY RESPONSE SYNDROME.

The notion of sepsis had been under intense debate and considerable efforts have been made over the past 20 years to identify therapies that reduce mortality (1,2). There is such an extraordinary heterogeneity in patients with sepsis characterized by different conditions, infection site, microbial agents with large variations in virulence and concentration, as well as a different inflammatory response and immunological adaptation, that limiting the concept of sepsis to a surge in inflammation may be considered no more than a simplistic approach (3, 4, 5).

Inflammatory response is often adapted to the etiological agent or toxinic agression or, on the contrary, a series of microorganisms may lead to an increase in the level of mediators that cause aggressions in the infected organism, associating acute respiratory dysfunction, multiple organ dysfunctions, and refractory hypotension (6, 7). At present, a quick evaluation of patients’ capacity to show an adequate immune response is impossible and it is considered that mechanisms related to or-
gan dysfunction and those involved in evolution towards death could be similar in the context of different etiological agents, while variable response in sepsis may be related to infection distribution at organ level (7, 8).

MATERIAL AND METHODS
This 7-month retrospective study (January-July, 2013) aimed to determine clinic-epidemiological and evolutive correlations under specific therapy based on the analysis of the data in patient records. Ninety patients with sepsis of known or unknown etiology admitted to the Iasi Hospital of Infectious Diseases were included in this study. The following were analyzed: social status, length of hospital stay, duration of febrile state, etiology, Carmeli prognostic score, APACHE II score, and some biological parameters based on which we tried to establish correlations or differences in terms of statistical significance.

Inclusion criteria were: suspected or proven infection associated with systemic inflammatory response syndrome (at least two criteria: fever/hypothermia, tachycardia/tachypnea, leukocytosis/leucopenia), and severe sepsis diagnosed by the presence of such associated organ dysfunctions as respiratory, renal and cardiac failure, neurologic impairment, disseminated intravascular coagulation or shock.

Biological samples were processed according to the standards for bacteriology, hematology and biochemistry laboratories, and the database created in Excel was processed using SPSS 16.0. \( p < 0.05 \) being considered statistically significant. When quantitative parameters did not show a normal Gauss-Laplace distribution and \( t \)-student test could not be applied, nonparametric tests were used (Mann-Whitney Test).

RESULTS
The 90 patients included in this study were aged 3 to 84 years, mean age 58.5 years, median age 62 years. The mean age of patients associating organ dysfunctions was 60.4 years, while the median age of those classified according to APACHE II score was 59 years. No statistically significant age differences were found between the patients associating organ dysfunction and those without dysfunctions (calculated \( p = 0.292 > 0.05 \)).

The causative agents could be identified in 16 cases, and organ and systemic affection varied (tab. I).

<table>
<thead>
<tr>
<th>TABLE I</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Etiology and organ damage in the study sepsis patients</strong></td>
</tr>
<tr>
<td><strong>Microorganism</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><em>E. coli</em></td>
</tr>
<tr>
<td><em>Staphylococcus aureus Meti-R</em></td>
</tr>
</tbody>
</table>
Clinical features and evolution of organ dysfunctions in sepsis

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>No. of cases</th>
<th>Isolation site</th>
<th>Organ damage</th>
<th>Carmeli score</th>
<th>APACHE II score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coagulate-negative staphylococcus</td>
<td>1</td>
<td>HC</td>
<td>lungs</td>
<td>3</td>
<td>24 (II)</td>
</tr>
<tr>
<td>Streptococcus spp.</td>
<td>1</td>
<td>HC</td>
<td>heart</td>
<td>2</td>
<td>22 (II)</td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>2</td>
<td>HC</td>
<td>1: liver 1: kidneys</td>
<td>2</td>
<td>20-29 (II)</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>1</td>
<td>HC</td>
<td>lungs + liver</td>
<td>2</td>
<td>26 (I)</td>
</tr>
<tr>
<td>Bacilli Gram negative</td>
<td>1</td>
<td>HC + UC</td>
<td>CNS + liver + kidneys</td>
<td>3</td>
<td>28 (II)</td>
</tr>
<tr>
<td>E. coli + Enterococcus spp.</td>
<td>1</td>
<td>HC + UC</td>
<td>kidneys</td>
<td>3</td>
<td>34 (III)</td>
</tr>
</tbody>
</table>

HC= hemoculture; UC= uroculture; CNS= central nervous system

In all study patients the parameters of inflammatory syndrome (white blood cells (WBA), fibrinogen, erythrocyte sedimentation rate (ESR), and CRP were determined upon admission and we aimed at determining both the possible correlations between these parameters and between them and blood glucose levels. Significance level was below 0.05, so no correlations between these parameters were found in our sepsis patients.

Blood glucose levels were higher in patients associating organ dysfunction, the statistically significant difference confirming a correlation between blood glucose level and the presence of organ dysfunction in the study patients (fig. 1).

![Fig.1](image.png)

Fig.1. Correlations between blood glucose levels (g/l) and organ dysfunction in the study sepsis patients
DISCUSSION
The statistical analysis of the avriables of systemic inflammatory syndrome has shown no correlations between high blood sugar, fibrinogen, ESR, and CRP levels and high body temperature in sepsis patients with or without associated organ dysfunction.

Anemia syndrome, defined as a serum hemoglobin concentration of less than 10 g%, and thrombocytopenia as a platelet count below 100,000/mm³, were more common in the patients with APACHE II severity classes II and III than class I, but no statistically significant differences were found. Thus, the t-student test was used for hemoglobin, and the Mann-Whitney test for thrombocytes, the data not being normally distributed.

The possible correlations between organ dysfunction and the identified cause of sepsis were analyzed using the Chi-Square test, no statistically significant correlations being found.

CONCLUSIONS
In the study sepsis patients we have found statistical correlations between maximum blood glucose level and the presence of organ dysfunctions.

Anemia and thrombocytopenia, frequently associated with the systemic inflammatory response in these patients, did not correlate with the severity of their sepsis progression. Also, no statistical correlations were found between febrile syndrome and inflammatory syndrome in patients with or without organ dysfunctions.

REFERENCES