CONFLICT OF INTEREST: NONE DECLARED

ORIGINAL PAPER

Staphylococcal Bacteraemia/Sepsis - Characteristics of Laboratory Parameters

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Introduction: While determining a diagnosis and during a disease follow-up, laboratory, or non-specific inflammatory parameters in particular, platelets reference values, nitrogen matters, and liver enzymes play a significant role because their values may indicate multiple organ failures. **Goals:** To analyse laboratory parameters in patients diagnosed with the staphylococcal bacteraemia /sepsis. **Patients and methods**: Analysed patients have been treated at the Clinic for Infectious Diseases through the period of ten years. **Results**: Differences in average CRP values, leucocytes, neutrophils and platelets among the patients diagnosed with the sepsis and bacteraemia are not statistically relevant p>0,05. Difference in the average sedimentation values of the erythrocytes between the patients diagnosed with the sepsis and the patients diagnosed with the bacteraemia are statistically relevant p=0,035. Differences between the average INR values between the patients diagnosed with sepsis and the patients with bacteraemia are not statistically significant, but indicative p=0,051. Differences in the average blood sugar values, urea, creatinine, bilirubin and ALT between the patients diagnosed with bacteraemia and sepsis are not statistically significant p>0,05. **Conclusion**: The results have showed that even in the course of a bacteraemia, there is a significant increase in the non-specific inflammatory parameters indicating the gravity of bacteraemia as well, with a constant risk of developing sepsis and septic shock. The importance of running and following-up the laboratory parameters herewith is emphasised for the purpose of detecting sepsis in a timely manner and administering an adequate therapy.

Key words: Staphylococcal bacteraemia/sepsis, laboratory parameters.

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1. INTRODUCTION

Staphylococcal infections, bacteraemia and sepsis in particular, amount to a burning issue in the developed countries as well, primarily due to the actual personality as well as to the increase of resistance not only in internal but in external hospital environment, too. Clinical picture and sepsis presentation varies which is one of the reasons to conduct a research that could assist in a fast detection and adequate treatment.

In sepsis pathogenesis, an important role is played by the pro-inflammatory cytokines so that in the course of the past few years there has been an accent on researching and proving the sepsis biomarkers such as presepsin that could help in an early detection of bacteraemia and sepsis and whose reference values significantly indicate the gravity of the disease (1). In addition, haematological and other biochemical parameters amount to the important indicators of the gravity of the disease through which multi-organ failures are identified, so that they should be classified as routine diagnostic methods (2).

2. PATIENTS AND METHODS

In this study, we have analysed the history of disease for 87 patients, 57,5% (50) of whom are men, 42,5% (37) women, whose age is less than one and up to eighty years. All the patients were hospitalised at the Clinic for Infectious Diseases of the Clinical University Centre of Sarajevo during the course of a ten-year period.

3. RESULTS

CRP, L, Ne and Plt average values differences (median values) between the patients diagnosed with sepsis and bacteraemia are not statistically significant p>0,05.

Results show that erythrocyte sedimentation in sepsis and bacteraemia subcategory has been conducted for all the patients and the average reference value (median value) in sepsis was 80, while in bacteraemia 54,5. CRP has been conducted for 39 patients in the sepsis group, with the average reference value of 185, while for bacteraemia the number was 16 patients, average reference value of 105. Leukocyte average value has been conducted for all the patients and in the sepsis group it was

12,1, while in the bacteraemia group it was 10,95. Neutrophils have been conducted in the sepsis group of 62 patients whose average reference number was 77,2, while in the bacteraemia group of 18 patients, the average reference value was 76,55. Platelets average value has been conducted for all the patients and it was 236 for sepsis, and 277 for bacteraemia respectively.
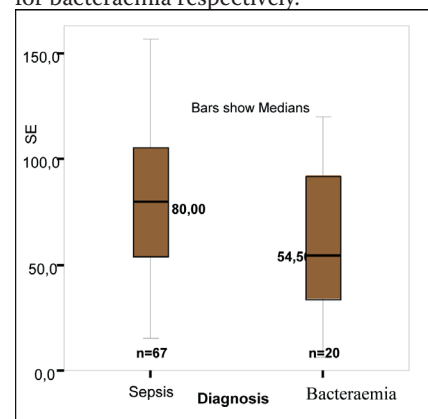

Figure 1. Average reference value differences (median values) of erythrocyte sedimentation (SE) as diagnosed

The Man Witney test has indicated that the erythrocyte sedimentation (SE) average value difference (median value) between the patients diagnosed with sepsis and the bacteraemia patients respectively is statistically significant p=0,035.

The Man Witney test has showed that the difference average values (median values) of INR between the patients diagnosed with sepsis and the patients diagnosed with bacteraemia respectively is not statistically significant but indicative p=0,051 (p is close to the value of a=0,05).
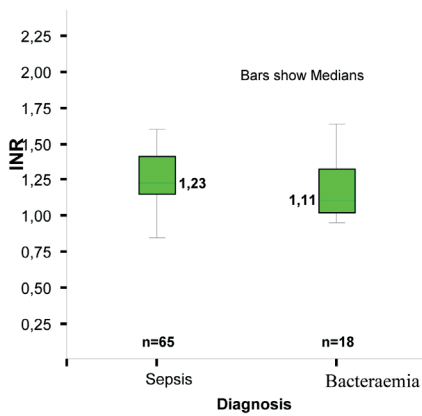
Figure 2. Average reference value (medians) difference of INR as diagnosed

Differences in average reference values (median values) in blood sugar, urea, creatinine, bilirubin and AST between the patients diagnosed with bacteraemia and sepsis are statistically not significant p>0,05. The Man Whitney test has showed that the differences of the average reference values (median values) of aspartate aminotransferase (ALT) between the septic patients and patients diagnosed with bacteraemia respectively are statistically significant.

4. DISCUSSION

Staphylococcal sepsis is developed by spreading an infection from any extravascular or intravascular focus into the blood stream (3, 4). Diagnosis is determined on the grounds of a series of epidemiological, clinical, laboratory, and radiology facts that need to be detected and linked, because one causer, in a broad meaning, may indicate different septic presentations, and at the same time some other causers may lead to the nearly identical impression.

In case of any infectious disease of any etiology, the laboratory parameters assist a clinical doctor in the process of detection, general clinical impression, and future follow-up of the disease. If the laboratory parameters are discussed, they primarily refer to erythrocyte sedimentation, which still amounts to an important indicator in monitoring and following-up the disease. Absence of this parameter is a laboratory sloth, increase-decrease in value and absence of an active infection follow-up. Value of the C-reactive protein (CRP) and its significance in monitoring infections has eventually replaced the traditional position of erythrocyte sedimentation in diagnostics and follow-up of bacterial infections. CRP is a prominent indicator, firstly because value increase primarily supports the fact that there is the existence of bacterial infections, and secondly value increase may occur within 6-8 hours, i.e. value decrease by 50% per day, which amounts to an important predicator of monitoring the

gravity of the infection, i. e. the adequateness of the therapy administered. Most likely, the most frequently used non-specific inflammation parameter is the reference value of leucocytes, and on the other hand the problem is that the number of leucocytes might be normal in up to 80% cases so that it cannot be the realistic indicated whatsoever. In the study of Paakkonen and colleagues (5), analysing bone and joint infections with the predomination of staphylococcal etiology in children, the erythrocyte sedimentation value was 51 mm/h, while CRP was 87. Lobo and colleagues (6) showed in their study that in a heterogeneous population group in an intensive care unit, the serum reference value of CRP correlated with an increased risk of multiple organ failure and death. In the study of Yamade and colleagues (7) the average reference value of leukocytes in sepsis patients was 11,12, while the number of leukocytes less than 4 was associated with an increased mortality, which has been proved by other studies, as well.

In our study, the average reference value (median value) of erythrocyte sedimentation in sepsis was 80, in bacteraemia 54,5, while the differences in the median value of the C-reactive sedimentation were not significant.

Staphylococcal sepsis is commonly associated with thrombocytopenia due to locally activated platelets and disseminated intravascular coagulation (DIC). S. aureus, may activate platelets and the process is conditioned by releasing a few surface proteins. In the further progress, the bacteria cover the adhered platelets, and this may be an important mechanism that contributes to colonization of endovascular epithelium. When this occurs in a localized manner, it may result in formation of a thrombus, leading to thrombocytopenia. Finally, if the coagulation cascade is activated, DIC ensues. Gafter-Gvili and colleagues (8) have established that in clinical practice thrombocytopenia and the other associated processes are more common in patients diagnosed with staphylococcus infections than with infections caused by other bacteria. The aforesaid study included 1.052 patients with S. aureus sepsis. Thrombocytopenia was observed in 22,3% patients and was associated with severe sepsis. In addition, publication data suggest that thrombocytopenia is one of the leading sepsis early prediction indicators and its increased mortality. Numerous studies have accented the significance and gravity of staphylococcus sepsis given the fact that thrombocytopenia develops with them (9, 10, 11)). In our study, the platelets average reference value in sepsis was 236, while in bacteraemia it was 277. Results have showed that there was no significant decrease in the number of platelets, which does not definitely imply that there were no patients with serious forms of staphylococcal sepsis.

In addition, having monitored the co-

agulation parameters (fibrinogen, INR, APTT) leading us to different coagulation disorders, we have observed the difference in the average reference values (median values) of INR between the patients diagnosed with sepsis and bacteraemia respectively is not statistically significant, but indicative p=0,051, which imply a greater prediction importance of INR in sepsis. In literature, we have not found any studies that would correlate with these parameters with regard to the diagnosis.

In severe sepsis cases, there is a system inflammatory response leading to multiple organ failures reflected in clinical pictures, laboratory parameters and radiological tests. Results of basic biochemical findings covered by our studies have showed that the differences in the average reference values (median values) in blood sugar, urea, creatinine, bilirubin and aspartat aminotransferase test (AST) in the patients diagnosed with bacteraemia and sepsis respectively are not statistically significant p>0,05. The Man Whitney test has showed that the differences in the average reference values (median values) of alanine aminotransferase test (ALT) in the sepsis respondents and bacteraemia respondents are statistically relevant p=0,021.

5. CONCLUSION

The results have showed that even during bacteraemia there is a significant increase of the non-specific inflammation parameters indicating the seriousness of bacteraemia with a risk of developing into sepsis and septic shock. The importance of conducting and following-up the laboratory parameter is herewith accented due to a timely detection of sepsis and administering the adequate therapy.

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