Predictive Value of Metabolic Acidosis and CRP in Patients with Penetrating Trauma Admitted to the Intensive Care Unit

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ABSTRACT

Introduction: In addition to clinical evaluation and radiological studies, a number of factors seem to be able to be used independently in determining the prognosis and fate of trauma patients. Among these factors, metabolic acidosis and CRP seem to be helpful in the first two days of admission, and considering the large number of trauma patients referred to Imam Khomeini Hospital and the measurability of these factors in these patients, it seems that the effect is evaluated. And the accuracy of measuring these factors in the care and treatment of these patients is valuable. Material and Methods: During this study, demographic characteristics (age, sex), underlying diseases, organ failure, duration of mechanical ventilation, duration of hospitalization in the intensive care unit and hospital, frequency of mortality, CRP and trauma score were included in the checklist prepared by was realized and statistically examined after completion. Results: In this study, we also investigated the predictive value of CRP in patients with blunt trauma admitted to the intensive care unit. The results showed that CRP levels in the age group over 90 years are significantly different from other age groups and the mean CRP level in this age group is higher than other age groups. Conclusion: In this study, there was a significant difference between the mean duration of mechanical ventilation, length of hospital stay, patient outcome and mean trauma score in patients with high CRP levels.

Keywords: CRP, Trauma, Outcome, Mortality
Introduction

Despite the fact that the official statistics of deaths and morbidity due to trauma in Iran are not accurate, but there are about 30,000 deaths due to trauma and 200,000 severe injuries per year in Iran, which is a high cost for the treatment of these patients [1-3]. It is therefore important to examine the predictors of the outcome of trauma patients [4-6]. Clinical studies show that in trauma patients, immunological changes occur after trauma, which leads to MODS, and in the case of MODS, the mortality rate is up to 50%, and treatment costs are very high [7-9].

Also, after trauma, the patient is exposed to metabolic, hemodynamic, and immunological changes. Many inflammatory mediators are released, which is part of the traumatic patient's normal response, which can lead to SIRS leading to ARDS if the inflammatory mediators are released. In a study conducted at the Razi University of Medical Sciences in the intensive care unit, age, sex, underlying disease, organ dysfunction and CRP levels were assessed and compared with patients' mortality rates. Data analysis showed that serum CRP level is directly related to mortality, although it needs further investigation [10-12]. Early prognosis is difficult to assess in patients with multiple trauma [13].

Traditionally, the patient's clinical condition is assessed by cardiovascular, renal, hepatic, and respiratory function in patients [14]. However, sometimes MODS is not observed with tests and functional tests of these organs, so the normal nature of the tests does not guarantee the good functioning of these organs. So if we have a number of other factors to evaluate and predict, we will be more helpful in preventing MODS [15-17].

In addition to clinical evaluation and radiological studies, a number of factors seem to be able to be used independently in determining the prognosis and fate of trauma patients. Among these factors, metabolic acidosis and CRP seem to be helpful in the first two days of admission, and considering the large number of trauma patients referred to Imam Khomeini Hospital and the measurability of these factors in these patients, it seems that the effect is evaluated. And the accuracy of measuring these factors in the care and treatment of these patients is valuable.
Material and Methods

After approving the plan in the hospital research council and the university ethics committee, this study was conducted to investigate the relationship between metabolic acidosis and CRP in patients with blunt trauma admitted to the intensive care unit for a period of six months in 2019. During this study, demographic characteristics (age, sex), underlying diseases, organ failure, duration of mechanical ventilation, duration of hospitalization in the intensive care unit and hospital, frequency of mortality, CRP and trauma score were included in the checklist prepared by Was realized and statistically examined after completion. Quantitative variables were reported as mean and standard deviation and qualitative variables were reported as number (percentage) in the form of appropriate tables and graphs. Analysis of variance (if necessary, its non-parametric equivalent) and Chi-square for qualitative variables were used to compare the mean of quantitative variables in terms of grouping from the time of onset of symptoms to surgery. Data analysis was performed using SPSS 20 software and the level of significance in all tests was considered less than 0.05. All patient information is available to the researcher only and the results of the study are presented in groups and without names. All stages of the study were approved by the University Ethics Committee.

Results

In this study, metabolic acidosis was observed in 51 patients and also a significant difference was observed between the mean blood pH level between the age group of patients with metabolic acidosis. However, no significant relationship was observed between PCO2 and HCO3 levels with the age group of patients with metabolic acidosis. In our study in patients with metabolic acidosis, the mean levels of PH, PCO2 and HCO3 were significantly different from the sex of the patients, so that it was higher in females.

Also, in this study, a significant difference was observed between the mean duration of mechanical ventilation, length of hospital stay and mortality of patients with metabolic acidosis in trauma patients so that the mean duration of mechanical ventilation and length of hospital stay and mortality of patients with metabolic acidosis it was more.
In this study, we also investigated the predictive value of CRP in patients with blunt trauma admitted to the intensive care unit. The results showed that CRP levels in the age group over 90 years are significantly different from other age groups and the mean CRP level in this age group is higher than other age groups. On the other hand, the results of our study showed that there was a significant difference between the sexes of patients, length of hospital stay, duration of mechanical ventilation and mean CRP level, although no significant relationship was observed between the outcome of patients with metabolic acidosis.

Discussion

CRP is a protein made by your liver. It is sent to your bloodstream in response to inflammation. In the event of injury or infection, inflammation is the body's way of protecting body tissues. This can cause pain, redness and swelling in the affected area. Some autoimmune disorders and chronic diseases can also cause inflammation [18-20]. In some cases, symptoms such as fever and chills, diarrhea and vomiting, and difficulty breathing can indicate an infection in your body. A CRP test can easily confirm the presence of infection and inflammation in your body. It is also possible to diagnose cardiovascular disease and prevent heart attack with a CRP test. Hence, if you want to know more about CRP testing [21-23].

CRP (C-reactive protein) is a C-reactive protein. This reactive protein is not a foreign substance and is produced naturally in a process in the human liver. Miraculously, a reactive protein, or C, enters the bloodstream when the body is infected with an infectious or inflammatory disease. This protein travels through the liver with other proteins to move and enter the bloodstream. In the next step, C-reactive protein will repair and treat the damaged part [24]. Inflammation is a method that the body uses to protect itself against injury and infection. This can cause pain, redness and swelling in the affected area. Some autoimmune disorders and chronic diseases can also cause inflammation. Normally, the level of C-reactive protein in the blood is low [25]. High CRP levels may be a sign of a serious infection or other disorder [26]. The CRP Titer test also looks for C-reactive protein. The title Titer in this experiment indicates that it is small.

That is, the test results are presented in numbers. These types of tests are more accurate than qualitative types [27]. Doctors will first prescribe quantitative tests to check the patient's condition. Quantitative tests will be prescribed if a particular problem is seen as a result of the
test. CRP is a reactive protein that is present in very small amounts in the human liver. Disorders and possible inflammations that occur in our body are attacked and eliminated by this protein. This protein is involved in the release of macrophage and fat cell agents [28-30]. As the level of this protein in the body rises and it is diagnosed in a doctor's blood test, inflammatory, infectious and even cancer diseases in the body will be suspected [31-33].

Both tests are essentially the same and measure the same substance in the blood. However, the hs-CRP test measures very small amounts of CRP in the blood and is often prescribed to seemingly healthy people to assess their potential risk for heart problems. This test typically measures CRP in the range of 0.3 to 10 mg / L. Regular CRP testing is recommended for people who are at risk for infection or chronic inflammatory diseases. This test measures CRP in the range of 8 to 1000 mg / L. Quantitative CRP testing is basically no different from hs-CRP, but it can be said that hs-CRP is more sensitive. The Quantitative CRP test range is between 10,000-100 mg / ml and the hs-CRP test range is between 0.5-10 mg / ml. By comparing the numbers well, it can be seen that the hs-CRP test is more sensitive [34-36].

Conclusion

CRP is a blood protein that is made in the liver during inflammation and infection and is secreted into the bloodstream. Normally, the level of CRP in the blood is less than 10 mg / l, but in inflammatory conditions, its level begins to rise and reaches its maximum level in the blood within 48 hours after inflammation, and after reducing inflammation, its level reaches The speed decreases. Studies in patients with coronary artery disease have shown that in patients with mild to moderate disease, blood levels of this factor are around 20 to 50 mg / L; In severe cases, however, blood CRP levels exceed 50 mg / L, indicating inflammation and involvement of the lungs. Low levels of CRP protein in the blood is one of the positive points in a person's health. The lower the amount of this protein in the blood, the lower the risk of infectious and inflammatory diseases. Recently, however, researchers have found a new link between low CRP and lupus. Research has shown that abnormally low CRP may play a role in the development of autoimmune lupus. The reason for this trend is that CRP binds to cellular lesions and local antigens, preventing the formation of diseases and autoimmune reactions in the body. If dead and damaged cells in the body are not properly cleared by macrophages, these wastes accumulate in
the tissues and cause the immune system to malfunction. How CRP levels decrease depends on the cause of the increase. If the cause is related to the disease, you should seek medical intervention. But sometimes the wrong lifestyle will lead to an increase. In this case, its level in the body can be reduced in different ways.

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