Change of critical COVID-19 disease in time

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ABSTRACT

Background: COVID-19 disease, which has taken over the world for more than a year, is unfortunately not yet understood and a definitive treatment has not been found. The aim of this study is to investigate the changes in clinical and laboratory tests of critical COVID-19 patients followed in the intensive care unit between March/2020 and December/2020 and to evaluate the factors that cause these changes with literature information.

Material and Method: In the study, during the beginning of the pandemic and its progress; 50 COVID-19 patients treated in the intensive care unit between March-April-May/2020 were defined as group 1, and 50 COVID-19 patients treated in the intensive care unit between October-November-December/2020 were defined as group 2. Clinical, laboratory and intensive care processes of the patients in the groups were analyzed retrospectively and compared.

Results: Demographic data were similar between groups. Group 2 patients had higher 28-day mortality, and this result was statistically significant (p=0.006). Transfer rates of group 1 patients to the service after intensive care were found to be statistically higher (p=0.029).

Conclusions: 28-day mortality was found to be different between similar patient groups who were admitted to intensive care during different periods of the pandemic. The reasons for this may be: changes in pathogenicity as a result of viral mutations, different immune responses of hosts to viral infection, intensive care experience of healthcare professionals.

Keywords: COVID-19, intensive care unit, pandemic, critical patient

INTRODUCTION

In December 2019, cases of atypical severe pneumonia were reported in Wuhan, China(1). The World Health Organization named this new virus, which causes atypical cases of severe pneumonia, as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the disease as COVID-19 (2). In the first months of 2020, the rapid global increase in the number of cases and deaths has made this disease one of the most critical global health emergencies of modern times(3). Critical disease findings are observed in approximately 10% of the confirmed cases(4). Intensive care units have an important place in the treatment of these patients. Critical COVID-19 is a disease with high mortality due to multiple organ failure(5). During the pandemic process, many treatment strategies have been proposed against COVID-19 disease. SARS-CoV-2 is one of the members of the RNA virus family. Therefore, just like other viral disease; antiviral drugs constitute an important part of the treatment of COVID-19. Additional treatments such as steroids and tocilizumab have been added to antiviral treatment protocols during the pandemic process(6,7). COVID-19 treatment guidelines have been published by the National Institutes of Health and the guideline is updated on new treatments(8). In the light of some theoretical information about changing treatment strategies and pathophysiological features of COVID-19 disease; we aimed to share the clinical results of patient groups who were admitted to intensive care during the beginning of the pandemic and in the last months and the factors that may cause these results with this original research article.

MATERIAL AND METHOD

The study was carried out with the permission of Kastamonu University Clinical Research Ethics Committee (Date: 17.11.2021, Decision No: 2020-KAEK-143-10.01). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

100 of 386 patients who were followed up in the Kastamonu Training and Research Hospital Covid Intensive Care Unit between March and December 2020 were included in our study. A total of 50 patients, including the first 17 patients in March for the first 17 patients in April and the first 16 patients in May, were included in the study and were named as Group 1. A total of 50 patients, including the first 17 patients in October, the first 17 patients of November and...
the first 16 patients in December, were included in the study and were named as Group 2. All patients included in the study had at least one of the conditions of involvement of SpO₂ ≤93%, respiratory rate ≥ 30 / min, PaO₂ / FiO₂ ≤ 300 or more than 50% in lung tomography according to the criteria of national health institutes(8). Confirmed COVID-19 PCR tests performed by our hospital laboratory were positive for all patients. Patients; comorbidity (Hypertension, Diabetes Mellitus, Cerebro Vascular Event etc.), age, gender, APACHE II scores, 28-day mortality, invasive mechanical ventilation support, transfer from intensive care to inpatient unit, CRP, Ferritin, D-dimer values were recorded and evaluated retrospectively.

Data from participants were encoded and analyzed using SPSS version 22 (IBM). Descriptive analysis was performed to calculate frequency and ratios. The Chi-square test was used to examine the level of relationship between variables. P<0.05 was considered statistically significant.

RESULTS

Age and gender distribution in terms of demographic data was similar between Group 1 and Group 2. In terms of additional disease; 46 patients in Group 1 and 40 patients in Group 2 had one or more additional diseases. APACHE II score average of Group 1 was 22, and APACHE II score average of Group 2 was 25. There was no statistically significant difference between the demographic data of the groups (Table 1).

The Crp, Ferritin, D-dimer values of the patients in the groups when they were admitted to the intensive care unit were compared. As a result of statistical analysis, while there was no significant difference between the groups in terms of crp and ferritin values, there was a significant difference between the d-dimer values. The values of the patients in Group 1 were found to be higher than in Group 2 (Table 2).

When the 28-day mortality of the patient groups is evaluated; It was found that 27 (54%) patients in Group 1 and 40 (80%) patients in Group 2 died within 28 days. The difference between the two groups was found to be statistically significant (p=0.006).

To all patients; In the intensive care follow-up, the treatments specified in the adult patient treatment guide published by the T.C. Ministry of Health were applied(9), 20 (40%) patients from Group 1 and 10 (20%) patients from Group 2 were transferred from the intensive care unit to the inpatient service. The difference between the two groups was found to be statistically significant (p=0.029).

During the ICU period, 34 (68%) patients from Group 1 and 39 (78%) patients from Group 2 needed invasive mechanical ventilation support. There was no statistically significant difference between the groups (p=0.26, Table 3).

In the subgroup analysis, it was determined that 24 (70. 5%) of 34 patients who required invasive mechanical ventilator support in group 1 were intubated during the intensive care period, and 18 (46. 2%) of 39 patients in group 2 were intubated during the intensive care period. A statistically significant difference was found between the two groups in terms of the need for intubation during the intensive care period (p<0.03).

DISCUSSIONS

Those who get COVID-19 disease at different times can give different responses to the disease. In this process, intensive care has an important place for COVID-19 patients hospitalized.

In the study of Jourdes et al has been reported that 42. 2% of the patients in the inpatient service were transferred to the intensive care unit(10). In Covid - 19 disease, patients who need intensive care follow-up are usually over 60 years old and with additional disease(11). In our study, the average age of the patients in both groups was over 60 years old.

The presence of additional diseases was quite high in our patients in both groups (Group 1: 92%; Group 2: 80%). In the current studies in the literature, COVID-19 disease was stated to be more common in the male population, and in our study, the male population was higher in both groups(12). Apache II scoring is a scoring used to predict the mortality of patients followed in intensive care. In some studies, the average Apache II score of COVID-19 patients was found to be 12(12) and 17(13), but in our study, higher values were found in both groups. Demographic data of both groups were statistically similar in our study.

It is known that Crp and Ferritin are prognostic factors in COVID-19 disease(14). There is a significant correlation between Crp height and PaO₂ / FiO₂ values. PaO₂ / FiO₂ values decrease with the increase of Crp values(15). In our study, Crp and Ferritin values admitted to intensive care were high in both groups.

COVID-19 disease can cause vascular thrombosis. D-dimer elevation is one of the prognostic factors in this disease(16). In our study, although Group 1 patients had higher D-dimer values, both groups had higher than normal values but Group
1 had lower mortality. The reason for this may be a successful treatment or the possibility of a change in the structure of the virus during the period when group 2 patients were admitted to covid intensive care.

In our study, when the 28-day mortality and successful termination of the intensive care period (being able to be transferred to the service) were compared in both groups, a statistically significant difference was found. Although the age, gender and apache II data of our patients in group 1 and group 2 were similar, the C reactive protein, ferritin and D-dimer values of our patients in group 2 were lower.

In the light of the increase in our knowledge of COVID-19 disease and the developing treatment processes(17), we encountered more severe results in the patients in Group 2, although both groups had similar characteristics. SARS-CoV-2 is an RNA virus, RNA viruses are known for their high mutation rates and hence rapid genome evolution. Some studies indicate that the transmission of the virus increases as a result of the mutations it has undergone(18).

As a result of this information, there are publications predicting that the infectiousness of the SARS-CoV-2 virus may change as a result of the mutations it has undergone(19). Although we could not perform genomic analysis in our patients, this may be one of the reasons why we encountered more severe results in patients in Group 2.

COVID-19 infection may be accompanied by a severe inflammatory response characterized by the release of pro-inflammatory cytokines known as cytokine storm. COVID-19 associated cytokine storm has been characterized by IL-1, IL-2, IL-17, IL-8, TNF and most importantly IL-6. The immune response of the hosts to the virus attack may be at different levels. Depending on this response, the severity of the disease varies(20). We think that one of the reasons for the difference in the clinical results of our patients in group 1 and group 2 may be the differences in the immune response of the host against the virus.

The COVID-19 pandemic has spread to a wider audience in our country as in the world. As a result, hospital applications increased, as well as the number of patients admitted to intensive care. As a result of the increasing workload healthcare professionals (doctor, nurse, etc.) who had less experience in intensive care and the follow-up and treatment of COVID-19 disease had to participate in this process. In the current literature, there are no publications about the effects of the experience of healthcare professionals in intensive care or in the follow-up and treatment of COVID-19 disease on clinical results. However, we think that this factor is important in the clinical results of the patients. The low number of participants is a limiting factor in our study.

CONCLUSION

Although there are similar patient groups while the pandemic process continues, factors such as antiviral drug resistance, change in pathogenicity as a result of viral mutations, different immune responses of hosts to viral infections, and fatigue of healthcare professionals can be considered in the emergence of different clinical results. Larger studies are needed to evaluate the effects of these factors.

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