Case Report

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Coexistence of Carbon Monoxide Intoxication and COVID-19

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Abstract

This case report aimed to report two patients admitted to the emergency department with a preliminary diagnosis of carbon monoxide intoxication and was diagnosed with COVID-19 during their follow-up. A 73-year-old female patient presented with weakness and shortness of breath complaints to the emergency department. Carboxyhemoglobin (COhgb) reached 36.2 %. Atypical pneumonic infiltration with peripheral and central patchy consolidations in the zones in hemothorax images from computerized tomography. The patient was tested positive for COVID-19 after a PCR test. The COhgb values of the patient reached 16 % after 3 h. Then, it dropped to 3.0 % after 8 h. A 77-year-old male patient presented with shortness of breath and nausea complaints to the emergency department. COhgb (carboxyhemoglobin) reached 30%. Emphysematous changes in the lung parenchyma and increased peribronchial densities in the lobes were shown in computed tomography. The patient was tested positive for COVID-19 after a PCR test. The COhgb values of the patient reached 13 after 3 h. It dropped to 2.4 after 8 h. Carbon monoxide intoxication is a significant public health problem with a high probability of death. Detailed studies and meta-analyses are needed to affect the prognosis of COVID-19 disease.

Keywords: Covid-19 carboxihemoglobin, carbon monoxide diffusion capacity

Introduction

It has been reported that the diffusion capacity of carbon monoxide, a colorless and odorless gas, may increase in patients diagnosed with COVID-19, which has a grave prognosis as in chronic lung diseases [1].

Carbon monoxide is a colorless, odorless gas that has the capacity to separate oxygen from hemoglobin and accordingly reduces the oxygen carrying capacity of the blood [2]. Carbon monoxide is produced by hemooxygenases, an enzyme that can be stimulated by biochemical stress. Hemooxygenase enzyme is most commonly found in the spleen and bone marrow, but it is also found in the liver, kidney and lung. An increase in exhaled carbon monoxide has been observed in inflammatory lung diseases [3]. In addition, there is not enough data that carbon monoxide intoxications cause a predisposition to chronic or acute lung diseases. In studies, the carboxyhemoglobin level is not even above 5%, including in patients who need mechanical ventilation for a long time [4-6].

Studies investigating carbon monoxide levels with Covid-19 are generally retrospective and it was not possible to obtain information from patients in terms of carbon monoxide exposure. [5]. Carbon monoxide intoxications are not generally questioned and many diagnoses are made instead of carbon monoxide intoxications [7]. Most of the time, in the diagnosis of obstructive diseases, although the use of domestic fuel is known in the etiology, carbon monoxide exposure is ignored.

This case report aimed to report two patients admitted to the emergency department with a preliminary diagnosis of carbon monoxide intoxication and was diagnosed with COVID-19 during their follow-up.

Case Reports

Case-1

A 73-year-old female patient presented with weakness and shortness of breath complaints to the emergency department. The general condition of the patient was moderate, cooperative, and oriented. The patient had a fever of 36.5°, a heart rate of 70/min, a BP of 140/90mmHg, a respiratory rate of 22/minute, and a saturation of 95%. The patient had known diseases of hypertension and diabetes mellitus. The patient stated that she had complained of weakness and

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nausea for a few days. Routine examinations were conducted. The following results were observed for the routine exams: pH reached 7.4, PCO_2 reached 40 mmHg, HCO_3 reached 24, carboxyhemoglobin (COhgb) reached 36.2 %, lactate reached 2.4 mmol/L, white blood cells (WBC) reached 7.59 K/µL, hemoglobin(hgb) reached 14.4 g/dl, platelet(plt) reached 222 K/µL, urea reached 24.4 mg/dl, creatinine reached 0.76 mg/dl, aspartate aminotransferase (AST) reached 23 U/L, alanine aminotransferase (ALT) reached 17 U/L, sodium reached 138 mmol/L, potassium reached 4.3 mmol/L, and troponin reached 18.03 ng/L (normal range is 2.5–100 ng/L). Atypical pneumonic infiltration with peripheral and central patchy consolidations in the upper, middle, and lower zones in hemothorax images from computerized tomography. (Figure 1).

Therefore, the patient was diagnosed with COVID-19 was tested positive for COVID-19 after a PCR test. The COhgb values of the patient increased to 16 % after 3 h. Then, it dropped to 3.0 % after 8 h.

Case-2

A 77-year-old male patient presented with shortness of breath and nausea complaints to the emergency department. His general condition was good. The patient had a GCS (Glasgow coma scale) of 15 and had a fever of 36°, the heart rate was 80/min, BP (blood plessure) was 125/78 mmHg, respiratory rate was 17/min, and saturation was 97%. The patient, who did not have any disease in his history, complained of weakness for a few days. In routine examinations, pH reached 7.42, PCO_2 reached 35 mmHg, HCO_3 reached 22.6 mEq/L, COhgb reached 30%, lactate reached 1.87 mmol/L, WBC was 9.08 K/µL, hgb reached 14.5 g/dl, plt reached 145 K/ µL, urea reached 49.5 mg/dl, creatinine reached 1.03 mg/dl, AST reached 33 U/L, ALT reached 19 U/L, sodium reached 139.4 mmol/L, potassium reached 4.12 mmol/ L, troponin reached 31.53 ng/L (normal range 2.5–100 ng/L). Emphysematous changes in the lung parenchyma and increased peribronchial densities in the bilateral lower lobes were shown in computed tomography (Figure 2).

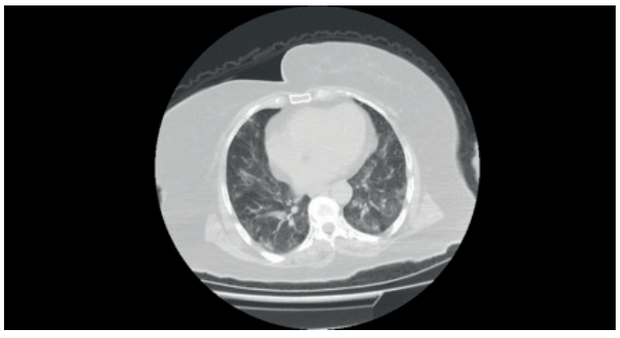

Figure 1. CT image of atypical pneumonic infiltration of our female patient.

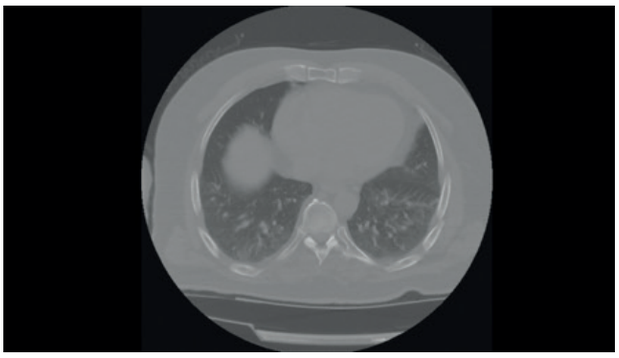

Figure 2. CT image of emphysematous changes in the lung parenchyma of our male patient.

The patient tested positive for COVID-19 after a PCR test. The COhgb values of the patient reached 13 after 3 h. It dropped to 2.4 after 8 h. Both patients also said they were affected by stove smoke at their house for 2 h before they reached the hospital. Both patients were given intravenous fluids and oxygen with a reservoir mask (10lt/min). Hyperbaric oxygen therapy was recommended due to high COhgb, but both patients did not accept it. Both patients, who did not develop chest pain, clouding of consciousness, or relieving shortness of breath during their follow-up, were discharged with recommendations after 48 h of follow-up.

Discussion

Carbon monoxide poisoning is more common in Turkey in winter and indoors. It has been shown in studies that carbon monoxide poisoning is more common in females. This is because women spend more time indoors [7]. Although there was exposure to carbon monoxide simultaneously and in the same place, in our case report, the carboxyhemoglobin level was higher in our female patient. Fatigue, shortness of breath, and nausea complaints can be observed in carbon monoxide intoxication and during COVID-19 disease. Carboxyhemoglobin levels increased by up to 30 after domestic stove use and 2 h of exposure. It was observed in a prospectively planned study that the carboxyhemoglobin level was lower in the mortal group of patients diagnosed with COVID-19 [5]. Ledoux et al. found no statistically significant difference in carboxyhemoglobin levels between mortal and non-mortal groups in a study conducted with intensive care patients [6]. An increase in carboxyhemoglobin levels was observed in 26.7% of 431 patients diagnosed with COVID-19 in a retrospectively planned study. There was a statistically significant correlation between high carboxyhemoglobin levels and intubation and mechanical ventilation [8]. In the 30-day follow-up of our patients, their diseases did not progress, and they did not have symptoms that required hospital admission. The elevation in the carboxyhemoglobin level did not affect the COVID-19

prognosis. Faisal et al. reported methemoglobinemia in a patient followed up in the intensive care unit. Although the patient stayed in the intensive care unit for a long time, the methemoglobin level returned to normal during the recovery period [9].

As far as we can detect, there are no reported cases or articles associating carbon monoxide intoxication and COVID-19 positivity in the literature. COVID-19 can affect the diffusion capacity of carbon monoxide, but in limited studies, no statistical relationship was found between mortality and carboxyhemoglobin levels. However, carboxyhemoglobin levels were relatively low in these studies [5,6].

Conclusion

Carbon monoxide intoxication is a significant public health problem with a high probability of death. There are not enough studies on the possibility of predisposing to infection or the fact that the transmission will be even more with carbon monoxide exposure. Our aim was to state that there is a need for prospective studies on carbon monoxide intoxications. Detailed studies and meta-analyses are needed to affect the prognosis of COVID-19 disease.

The case report has written in an anonymous characteristic, thus secret and detailed data about the patient has removed. Editor and reviewers can know and see these detailed data. These data are backed up by editor and by reviewers.

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