



Original article

Analysis of patients presenting to the emergency department with carbon monoxide intoxication



Selim Yurtseven^a, Abdullah Arslan^b, Umut Eryigit^{c,*}, Mucahit Gunaydin^a, Ozgur Tatli^a, Faruk Ozsahin^a, Yunus Karaca^d, Nurhak Aksut^e, Ali Aygun^d, Abdulkadir Gunduz^d

^a Kanuni Training and Research Hospital, Department of Emergency Medicine, Trabzon, Turkey

^b Kanuni Training and Research Hospital, Department of Undersea and Hyperbaric Medicine, Trabzon, Turkey

^c Diyarbakır Selahaddin Eyyubi State Hospital, Department of Emergency Medicine, Diyarbakır, Turkey

^d Karadeniz Technical University, Faculty of Medicine, Department of Emergency Medicine, Trabzon, Turkey

^e Manisa State Hospital, Department of Emergency Medicine, Manisa, Turkey

ARTICLE INFO

Article history:

Received 11 January 2015

Received in revised form

1 May 2015

Accepted 29 May 2015

Available online 8 March 2016

Keywords:

Carbon monoxide intoxication

Hyperbaric oxygen

Troponin I

Echocardiography

ABSTRACT

Objectives: Carbon monoxide is a potentially fatal form of poisoning. The exact incidence is unclear, due to cases being undiagnosed or reported as fewer than the real number. Hyperbaric oxygen therapy (HBOT) is of proven efficacy in the treatment of CO intoxication.

The purpose of this study was to describe the general characteristics of carbon monoxide (CO) intoxications presenting to the emergency department and to investigate troponin I values and the effectiveness of hyperbaric oxygen therapy (HBOT) in these patients.

Material and methods: Patients presenting to the emergency department with CO intoxication over one year and patients with such intoxications receiving HBOT were examined retrospectively.

Results: One hundred seventy-one patients were included; 140 (81.9%) were poisoned by stoves, 18 (10.5%) by hot water boilers and 10 in (5.8%) by fires. COHb levels were normal in 49 of the 163 patients whose values were investigated, and were elevated in 114 patients. Mean COHb value was 16.6. Troponin I values were investigated in 112 patients. These were normal in 86 patients and elevated in 26. Mean troponin I value was 0.38 ng/ml. One hundred twenty-three of the 171 patients in the study were discharged in a healthy condition after receiving normobaric oxygen therapy, while 48 patients received HBOT. Forty-two (87.5%) of the patients receiving HBOT were discharged in a healthy condition while sequelae persisted in five (10.4%). One patient died after 15 session of HBOT.

Conclusion: Although elevated carboxyhemoglobin confirms diagnosis of CO intoxication, normal levels do not exclude it. Troponin I levels may rise in CO intoxication. No significant relation was observed between carboxyhemoglobin and receipt of HBOT. A significant correlation was seen, however, between troponin I levels and receipt of HBOT.

Copyright © 2016 The Emergency Medicine Association of Turkey. Production and hosting by Elsevier B.V. on behalf of the Owner. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Carbon monoxide (CO) is a potentially fatal form of poisoning. The exact incidence is unclear, due to cases being undiagnosed or reported as fewer than the real number. Hyperbaric oxygen therapy (HBOT) is of proven efficacy in the treatment of CO intoxication.¹

During respiration of oxygen at high pressure, levels of oxygen dissolved in plasma independent of hemoglobin are raised. More oxygen is thus enabled to reach the tissues. Comparing HBOT with normobaric oxygen therapy (NBOT), time to improvement of intoxication symptoms is shorter and the incidence of mortality and late neuropsychiatric findings is lower.²

The heart is one vital organ affected in CO intoxication. Myocardial damage induced by acute CO intoxication can be shown biochemically by an increase in cardiac markers and creatine phosphokinase (CPK) levels. Serum cardiac troponin I (cTnI) level is a test with high sensitivity and specificity in showing myocardial

* Corresponding author. Tel.: +90 543 2162758.

E-mail address: umuteryigitacil@gmail.com (U. Eryigit).

Peer review under responsibility of The Emergency Medicine Association of Turkey.

damage.³ Studies in recent years have suggested that serum cTnI levels may be an important marker in showing cardiac injury in CO intoxication and deciding to initiate HBOT.³

This study investigated the demographic characteristics of patients presenting with CO intoxication, their cardiac enzyme findings and the effect of HBOT used in the treatment of intoxication on both clinical and biochemical markers. Findings obtained regarding successful treatment of this significant public health problem may provide clues regarding this intoxication that can be used in emergency practice.

2. Materials and methods

This study was performed under local ethical committee approval (no. 2013/94). The research was conducted as a joint study between the Underwater and Hyperbaric Medicine Clinic, the sole hyperbaric oxygen treatment center in the Eastern Black Sea region of Turkey, and the emergency medicine clinic of the Kanuni Training and Research Hospital. The study was performed retrospectively among patients presenting to the emergency department within the first 24 h of CO intoxication between 1 March, 2011 and 1 March 2012. Data for the patients enrolled in the study were obtained from patient files and computer records with ICD-10 code starting with T.58.XX (Toxic effect of carbon monoxide). Missing information was completed by contacting patients or their families by telephone. Data obtained were transferred onto a study form. Patients presenting after more than 24 h following exposure to CO, undergoing infarction within the previous month, diagnosed with pulmonary embolism in the previous month, attending due to COPD attack, with acute cerebrovascular disease, with acute and chronic renal failure and undergoing simultaneous trauma and pulmonary injury (pneumothorax, hemothorax or pulmonary contusion) were excluded. One hundred seventy-one patients with no exclusion criteria were included. Patients with severe neurologic symptoms, syncope, seizure, continued neurologic symptoms after NBO therapy, having evidence of myocardial ischemia, cardiac arrhythmias, elevated troponin values, high carboxyhemoglobin (COHb) levels (COHb > 40%), pregnancy with COHb level > 15% were treated with HBOT.

3. Statistical analysis

Data obtained were subjected to statistical analysis on SPSS 18.0. Data compatibility with normal distribution was determined on the basis of the Kolmogorov–Smirnov test. The Mann–Whitney U test was used to investigate the presence of variation of non-normally distributed variables between groups. $P < 0.05$ was regarded as statistically significant. Patients' age, gender, time of presentation, sources of CO exposure, troponin I and COHb levels and levels of persistence of post-treatment sequelae were subjected to descriptive statistical analysis. Pearson correlation analysis was performed for normally distributed data in order to determine correlation between variables, and Spearman's rho correlation was used for non-normally distributed data. Biserial correlation analysis was also performed in examining correlation between COHb and receipt of HBOT and between troponin I and receipt of HBOT.

4. Results

One hundred seventy-one patients presenting to the training and research hospital were included in the study, 84 (49.1%) men and 87 (50.9%) women. Total number of presentations to the emergency department during the study period was 256,674. CO intoxications represented 0.06% of all emergency department presentations. No significant difference was determined between

gender and COHb values ($p > 0.05$). Mean age of the 171 patients was 34.91 ± 23.5 . CO intoxication was the most common in the 15–20 age group, with 19 patients (11%). No significant difference was determined between patients' ages and COHb values ($p > 0.05$).

In terms of months in which patients exposed to CO presented to the emergency department, the most common was March, with 67 cases. There were no CO intoxication-related presentations in June or August. Seventeen (9.9%) patients presented in January, 19 (11.1%) in February, 67 (39.2%) in March, 8 (4.7%) in April, 19 (11.1%) in May, 3 (1.8%) in July, 1 (0.6%) in September, 4 (2.3%) in October, 15 (8.8%) in November and 18 (10.5%) in December.

In terms of sources of CO intoxication, 140 (81.9%) patients were poisoned by stoves, 18 (10.5%) by hot water boilers, 10 (5.8%) by fires and 3 (1.8%) from other causes.

In terms of COHb values, 49 of the 163 patients had normal COHb values (0–5%) and 114 high. Mean COHb value was 16.6 ± 13.4 . The lowest value was 0.1, while COHb levels were above 50 in two patients. The highest value was 55.8 of 171 patients' COHb value was not measured because they had treatment in another center.

Troponin I values were investigated in 112 patients. These were normal (0–0.1 ng/ml) in 86 (76.8%) patients and elevated in 26 (23.2%). A reverse but non-significant correlation was determined between COHb and troponin I levels ($p = 0.511$, $r = -0.64$). The highest troponin I value measured was 50 ng/ml. Mean troponin I after exclusion of extreme values was 0.39 ± 1.15 ng/ml.

One hundred twenty-three of the 171 patients included in the study were discharged in a healthy condition after receiving normobaric oxygen therapy (NBO) in the emergency department. Forty-eight patients were taken for HBOT. Twenty (41.7%) of these were treated on an outpatient basis and 28 (58.3%) were hospitalized and monitored for 1–15 days. Mean number of HBOT sessions received was 3.25. The lowest number of sessions was one and the highest 15. Forty-two (87.5%) of the 48 patients receiving HBOT were discharged in a healthy condition while sequelae persisted in five (10.4%). One patient (2.1%) who was transferred to intensive care unit died after 15 HBOT sessions on the 180th day of treatment because of sepsis and multiple organ dysfunction syndrome. Impaired vision developed in two patients following CO intoxication. Full vision was restored in both after HBOT, although neurological sequelae persisted in one. Paresthesia persisted in the upper extremity after HBOT in one patient brought to the emergency department in a tetraparesic state (3/5 loss of strength). Two intubated patients referred from external centers were extubated after HBOT and discharged in a healthy condition. No sequelae persisted in either patient. HBOT-related complications were investigated, with bilateral hemotympanum developing in three patients receiving HBOT.

Correlation analysis was performed to determine the association between patients' COHb values and HBOT. No significant correlation was determined between patients' COHb values and receipt of HBOT ($p > 0.05$). The same statistical technique was performed for correlation between patients' troponin I values and receipt of HBOT, and a positive significant correlation was determined ($p < 0.05$). No significant difference was determined between COHb and troponin I ($r = -0.064$, $p > 0.05$). Twenty-five patients had elevated troponin I. Wall motion disorder was determined with echocardiography (ECO) in 11 of these, while ECO was normal in the other 14. No significant correlation was determined between troponin I values and wall motion disorder ($p > 0.05$).

Magnetic resonance imaging (MRI) was performed on 22 patients, and was normal in 16. MR findings secondary to CO intoxication were determined in six. Globus pallidus involvement was present in two patients. Widespread involvement was seen in

Download English Version:

<https://daneshyari.com/en/article/2604098>

Download Persian Version:

<https://daneshyari.com/article/2604098>

[Daneshyari.com](https://daneshyari.com)