Case Report

Accidental carbon monoxide poisoning in a family of six: Diagnosis and treatment challenges in a resource limited setting

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Abstract

Carbon monoxide poisoning occurs worldwide; it is produced from incomplete combustion of fuel and the clinical features vary with the severity and severe cases may present with loss of consciousness as was seen in a family of six children who slept in an overcrowded room, polluted with burning charcoal which was meant to generate heat for warmth. Definitive diagnosis and management may be challenging in a resource limiting setting with limited facilities; however, they all responded to 100% oxygen with facemask without any complication.

Key words: Carbon monoxide, Charcoal, Children, Poison

INTRODUCTION

Carbon monoxide (CO) is a colorless, tasteless, odorless dangerous gas produced from incomplete combustion of fuel; such as from generator sets, coal, stoves, and home heating systems. CO poisoning occurs worldwide, there is an estimated 50,000 emergency room treated cases of CO poisoning in the United States of America annually;[1] while in the United Kingdom, there are more than 50 mortalities from accidental CO poisoning with 200 severe cases each year.[2] Though there have been several case reports in Nigeria,[3,4] its exact incidence is unknown.

Charcoal which is obtained from burnt wood has been a source of energy for cooking and room heating especially during the harmattan period and rainy season in most rural Nigerian communities; similarly individuals often use "mosquito coil" insecticide in enclosed space oblivious of the health hazards associated with them.[5] We, therefore, report the case of a family of six persons who became unconscious due to CO poisoning following indoor burning of charcoal.

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CASE REPORTS

A family of six children presented to the referral hospital deeply unconscious; they slept together in an enclosed room measuring about 12 by 10 feet with two windows that were shut. They had lighted a locally constructed room heater powered by charcoal and this also generated fume. They inhaled the fume resulting in loss of consciousness. However they all had their usual regular dinner before retiring to bed. The y were all found deeply unconscious in the morning and were rushed to peripheral health facility. They had oxygen given by face-mask for about 3 h before referral to our hospital, and they made remarkable improvement before referral to our health facility.

The first case was a 3-year-old male; he had a Glasgow coma score of 11/15; the pupils were equal, 7 mm and slowly reactive to light; he had normal tone; the cardiovascular and respiratory systems examination were not remarkable (oxygen saturation of 95% on oxygen). He improved on oxygen via face-mask and by 20-h he had regained full consciousness and was discharged without any sequel.

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The second case was 4-year-old boy; he had a GCS of 12/15; pupils were equal slowly reactive to light and were 6 mm dilated; the respiratory and cardiovascular examinations were not remarkable; (O_2 saturation of 94% on oxygen). He was continued on oxygen therapy, and he regained full consciousness at about 24-h later.

The third case was a 7-year-old female; she had a Glasgow coma score of 12/15, with normal tones but the pupils were equal and 6 mm dilated; the cardiovascular and respiratory systems examinations were not remarkable (oxygen saturation of 92% on oxygen). Her random blood sugar was 4.8 mmol/L and was continued on oxygen by face mask at 5 L/min which she progressively improved regaining full consciousness about 24-h later. She was subsequently discharged without any complication.

The fourth case was 8-year-old boy; he was admitted with GCS of 11/15, the pupils were equal and 7 mm dilated; other systemic examinations were not remarkable; he also improved on oxygen by face mask and was discharged 24-h later with no complication.

The fifth case was a 13-year-old male; he came conscious at presentation at our facility but was kept for observation and later discharged 6-h later.

The sixth case was a 16-year-old female; she was unconscious with GCS of 10/15; her pupils were also equal but 6 mm dilated; other systemic examinations were not remarkable; she also improved on oxygen therapy and was discharged 24-h later.

The parents were counseled and educated on the hazards associated with indoor use of charcoal.

DISCUSSION

Carbon monoxide poisoning is described as a "silent killer",[6] and "a disease of a 1000 faces"[7] highlighting the fact that it could mimic many other diseases therefore a high index of suspicion should always be entertained when evaluating patients who are at risk; this is most important in resource limited settings where supportive laboratory facilities are limited.

Carbon monoxide combines with haemoglobin, forming carboxyhaemoglobin that has a high affinity for oxygen depriving tissues of aerobic metabolism; therefore, more lactic acid is formed resulting in lactic acidosis. The clinical presentation depends on the severity of exposure. It may be mild with complaints of headache, abdominal pains and in severe exposure presenting as loss of consciousness or even death. Our cases were unconscious depicting the severity of exposure even though facilities for blood gas analysis and carboxyhemoglobin assay were not available. They also had varied severity that had no relationship with their age; the eldest was worst affected, this was attributed to her proximity to the burning charcoal. Therefore she had greater exposure. The number of occupants in the room was also a possible risk factor for poisoning because of competition for oxygen among the occupants leaving less oxygen for combustion resulting in CO production.

They all had normal oxygen saturation on admission that was attributed to the initial oxygen therapy from the referral center. Furthermore, they all made remarkable improvement with 100% oxygen only without residual neurologic sequel; which further highlights the fact that the optimal treatment remains controversial.[8]

Preventing these events will require public enlightenment on the dangers and health hazards associated with not only generator smokes but also indoor usage of burning charcoal and sleeping in an overcrowded room remains a health concern.

CONCLUSION

Carbon monoxide poisoning is a health concern and a high index of suspicion should be entertained in making the diagnosis in at risk persons especially in a resource limited setting with limited diagnostic facilities; furthermore 100% oxygen is efficient in treating severe cases.

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