Carbon monoxide poisoning

Sitaram Shrestha
Professor, Department of General Practice and Emergency Medicine, Patan Academy of Health Sciences, Lalitpur, Nepal

ABSTRACT

Carbon monoxide (CO) poisoning may be suicidal, homicidal and in many cases it is accidental. Poisoning is due to formation of carboxyhaemoglobin, which interferes transfers of oxygen and leads to appearance of symptoms.[1] Which are not specific and may similar to COVID19. Symptoms depends upon concentration of CO in surroundings. Antidote of CO is oxygen.

Keywords: carbon monoxide, poisoning, toxicity

CORRESPONDENCE
Dr. Sitaram Shrestha
Department of General Practice and Emergency Medicine, Patan Academy of Health Sciences, Lalitpur, Nepal
Email: sitaram2051@gmail.com

INTRODUCTION

Carbon monoxide (CO) Is known since ancient time which is tasteless, colour less, odour less and non-irritating gas. It is sometimes termed a silent killer. As the specific gravity of CO is 0.97, it is slightly lighter than air. This gas is mainly produced by incomplete combustion of organic compounds.[2] Carbon monoxide consists of one carbon atom and one oxygen atom, connected by a triple bond that consists of a net two pi bonds and one sigma bond.. It is the simplest oxocarbon and is isoelectronic with other triply-bonded diatomic species possessing 10 valence electrons, including the cyanide anion, the nitrosonium cation, boron monofluoride and molecular nitrogen. In complexes the carbon monoxide ligand is called carbonyl. Worldwide, the largest source of carbon monoxide is natural in origin, due to photochemical reactions in the troposphere that generate about 5*10^12 kilograms per year.[3]

Carbon Monoxide Sources in the Home

- Water heaters
- Fireplaces, both gas and wood burning
- Gas stoves and ovens
- Motor vehicles
- Grills, generators, power tools, lawn equipment
- Wood stoves
- Tobacco smoke

Pathology

The precise mechanisms by which the effects of carbon monoxide are induced upon bodily systems, are complex and not yet fully understood.[4] Known mechanisms include carbon monoxide binding to hemoglobin, myoglobin and mitochondrial cytochrome c oxidase and restricting oxygen supply, and carbon monoxide causing brain lipid peroxidation.

Symptoms[5]

- Breathing problems, including no breathing, shortness of breath, or rapid breathing
- Chest pain (may occur suddenly in people with angina)
- Coma
- Confusion
- Convulsions
- Dizziness
- Drowsiness
- Fainting
- Fatigue
- General weakness and achiness
- Headache
- Hyperactivity
- Impaired judgment
- Irritability
- Low blood pressure
- Muscle weakness
- Rapid or abnormal heartbeat
- Shock
- Nausea and vomiting
- Unconsciousness
- Delayed poisoning

The sequelae may vary from mild to severe headache, seizures, alteration in consciousness, lethargy, concentration problems, cognitive disturbances, emotional liability, personality changes, amnestic syndromes, dementia, psychosis, gait disturbances, movement disorders (e.g., parkinsonism), chorea, apraxia, agnosia, inaction, peripheral neuropathy, urinary incontinence, and even vegetative state. Delayed CO intoxication is diagnosed by the presence of a clinically silent period or lucid interval lasting for 2–40 days after acute intoxication followed by recurrent neuropsychiatric symptoms.[6] There is no effective treatment for delayed post hypoxic demyelination resulting from CO intoxication. Serious CO intoxication is treated only with oxygen therapy. Hyperbaric oxygen therapy acts to increase oxygen partial pressure in the blood, decrease COHb tension, and improve tissue oxygenation.[6] Hyperbaric oxygen at three times atmospheric pressure reduces the half-life of carbon monoxide to 23 (~80/3 minutes) minutes, compared to 80 minutes for oxygen at regular atmospheric pressure.[7]

Complications

Depending on the degree and length of exposure, carbon monoxide poisoning can cause:[8]

- Permanent brain damage
- Damage to your heart, possibly leading to life-threatening cardiac complications
- Fetal death or miscarriage
- Death

REFERENCES

1. Weaver LK. Clinical practice. Carbon monoxide poisoning. N Eng J Med. 2009;360(12):1217-25.
2. Bleecker ML. Carbon monoxide intoxication. Handb Clinl Neurol. 2015;131:191-203.
3. Weinstock B, Niki H. Carbon monoxide balance in nature. Science. 1972;176(4032): 290-2.
4. Hardy KR, Thom SR. Pathophysiology and treatment of carbon monoxide poisoning. Journal of Toxicology. 1994;32(6):613-29.
5. Sokal JA. The effect of exposure duration on the blood level of glucose, pyruvate and lactate in acute carbon monoxide intoxication in man. Journal of Applied Toxicology. 1985;5(6):395-97.

6. Sönmez BM, İşcanlı MD, Parlak S, Doğan Y, Ulubay HG, Temel E. Delayed neurologic sequelae of carbon monoxide intoxication. Turkish journal of emergency medicine. 2018 Dec 1;18(4):167-9.
7. Leach RM, Rees PJ, Wilmshurst P. ABC of Hyperbaric oxygen therapy. BMJ. 1998;317(7166): 1140-3.
8. Chen Z, Venkat P, Seyfried D, Chopp M, Yan T, Chen J. Brain-heart interaction: cardiac complications after stroke. Circ Res. 2017;121(4):451-68.