

## Case of carbon monoxide poisoning after smoking shisha

Beng Leong Lim · Ghee Hian Lim · Eillyne Seow

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**Abstract** Carbon monoxide poisoning has been reported as a result of exposure to various sources of smoke, such as car exhaust fumes, home water heaters and tobacco smoke. We describe a case of symptomatic, moderately severe carbon monoxide (CO) poisoning in a young Mediterranean man after smoking a waterpipe, or shisha. This case highlights the importance of considering carbon monoxide exposure in patients presenting with non-specific neurological symptoms to the emergency department (ED).

**Keywords** Carbon monoxide · Shisha

### Introduction

The use of the waterpipe, or shisha, for smoking tobacco is an old tradition in the Eastern Mediterranean region that goes back centuries [1].

This habit is relatively rare in Singapore, a country with a predominantly Chinese population.

Carbon monoxide (CO) poisoning can be notoriously deceptive and non-specific in its initial presentation to the emergency department (ED) [2]. This can lead to a delay in diagnosis of this eminently treatable condition. Its correct diagnosis and eventual management require a high level of suspicion on the part of the emergency physician (EP).

Our case report highlights a rare case of CO poisoning in Singapore.

### Case report

Our patient was a 19-year-old gentleman of Saudi descent who was a student in Singapore and had no past medical history of note.

He presented to our ED following a fall. He had been having dinner with a friend at a restaurant 4 h prior to presentation and had been smoking shisha at that time.

Collateral information from his friend revealed that he had been smoking shisha with three other friends and had hit his occiput after a fall. He had retrograde amnesia subsequently. There was no syncope, but he complained of dizziness.

His vital signs revealed a temperature of 36.7°C, blood pressure of 108/61, pulse rate of 99/min and pulse oximetry reading of 99% on room air. Physical examination revealed that he was alert and orientated to time, place and person. He demonstrated amnesia of the events surrounding the fall. There were no focal neurological signs or cranial nerve deficits.

Bedside capillary blood sugar was 5.1 mmol/l, and the baseline electrocardiogram was normal.

The initial working diagnosis was that of stable head injury and a few other possible explanations for the dizziness, including cardiac arrhythmias, transient hypoglycemic episode, viral illness and substance overdose. He was scheduled for computed tomography (CT) of the brain. However, a carboxyhemoglobin (COHb) level was taken in view of the shisha smoking. The COHb level was 27.8%.

He was immediately transferred to the critical monitoring area and put on 100% oxygen via a non-rebreather mask.

A bedside arterial blood gas on high flow oxygen revealed respiratory alkalosis with pH of 7.441, pCO<sub>2</sub> of 37.3 mmHg and PO<sub>2</sub> of 501 mmHg.

B. L. Lim (✉) · G. H. Lim · E. Seow  
Tan Tock Seng Emergency Department,  
11, Jalan,  
Tan Tock Seng, Singapore 308433  
e-mail: Beng\_Leong\_Lim@ttsh.com.sg

He was admitted to the medical High Dependency Unit (MDU) for further monitoring and management.

He was placed on 100% oxygen for the next 4–6 h while he was in the MDU, and his dizziness resolved. His COHb level 8 h later dropped to 1.1%.

CT scan of the brain revealed no intracranial hemorrhages or skull fractures.

He was discharged 2 days post-admission with a follow-up date for psychometric testing and neurological review at the outpatient clinic.

## Discussion

This case highlights the challenge to emergency physicians regarding the timely diagnosis of CO poisoning, a highly treatable condition. The non-specific neurological complaints can mimic many illnesses, such as viral illness or stable head injury.

CO is a cellular poison. It binds to hemoglobin 200–300 times more tightly than oxygen, forming COHb. As such, it inhibits the release of oxygen from hemoglobin to peripheral tissues, causing tissue hypoxia. The half life of COHb is 4 to 5 h in a person breathing room air and changes to 60 min in the presence of 100% oxygen at sea level [3]. As such, our index patient would have been symptomatic for a prolonged period of time if the initial suspicion of CO poisoning had not been made and he had been managed as a person with stable head injury.

Shisha smoking is one form of waterpipe smoking among others, including hookah, nargileh and arguileh.

Shisha smoking is relatively rare in Singapore, but is common in the Mediterranean regions, according to a

WHO report [4]. The report stated that the overall prevalence of shisha smoking in Egypt was estimated at 10% from a national survey in 2002 focusing on hypertension, obesity and diabetes in such smokers.

It is known that waterpipe smoking produces more smoke than cigarette smoking. It has been estimated that smoke exposure could be as much as 100–200 cigarettes per session [5].

CO poisoning is difficult to diagnose in the ED as its presenting symptoms are usually non-specific. Undoubtedly, a history of potential CO exposure is the most reliable indicator of poisoning. EPs should have a high index of suspicion, even though the exposure can be exotic, as in this case. It is important to realize that when dizziness occurs in CO poisoning, it usually corresponds to a carboxyhemoglobin level of 20% and above [2], a level considered to be at least moderately severe. Making a diagnosis in a timely fashion can expedite the management of such patients.

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