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CLINICAL CASE OF CARBON MONOXIDE POISONING

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Annotation: A 70-year-old male, weighing approximately 100 kg, was admitted to the ICU for suspected carbon monoxide (CO) poisoning during his birthday celebration preparations in a newly built home. Found unconscious with his wife in their bedroom, he presented with retrograde amnesia (recalling only it was his birthday), pale skin, respiratory rate of 20 breaths/min, SpO₂ of 86%, pulse of 82 beats/min, and blood pressure of 135/85 mmHg. The incident was linked to a new gas heating system, potentially compromised by a 4-5 magnitude earthquake a week prior, disrupting ventilation. Friends, arriving as guests with a chef, waiter, cleaner, and security guard, discovered the unconscious couple. An anesthesiologist friend, contacted immediately, suggested CO poisoning and advised evacuation to fresh air. No odors or combustion signs were noted. The wife regained consciousness outside (by the time the ambulance arrived approximately 30 minutes later), reporting sudden sleepiness, and declined hospitalization. The patient, conscious after a 15-minute hospital transport, received oxygen therapy (4-6 l/min, achieving SpO₂ 98-100% initially, in three hours 96-98% without supplementation) in the ICU for one day. A peripheral venous catheter was inserted, and no additional medications or toxicological tests were needed, as CO poisoning was diagnosed via clinical findings and a portable CO detector confirming CO presence. The diagnosis was based on clinical findings (unconsciousness, amnesia, low SpO₂) and environmental evidence (CO detection in the bedroom), without confirmatory COHb testing. He was discharged the next day in satisfactory condition, and the banquet proceeded. This case highlights carbon monoxide poisoning's insidious nature, with symptoms like amnesia and unconsciousness. Rapid evacuation and oxygen therapy ensured

recovery. The environmental trigger emphasizes the need for heating system maintenance, especially post-seismic events. Portable CO detectors aided diagnosis. Due to successful differential diagnostic and rapid recovery, there was no necessity in laboratory carboxyhemoglobin testing in the hospital. Public education and CO detector installation are critical for prevention. Long-term neurological follow-up is recommended for potential sequelae. Clinicians and policymakers should prioritize accessible diagnostic tools, such as carboxyhemoglobin (COHb) testing, and advocate for preventive measures to enhance safety in residential settings, ensuring comprehensive care for carbon monoxide poisoning victims.

Key words: poisoning, carbon monoxide, amnesia, hypoxia, oxygen therapy.

Introduction. Carbon monoxide (CO) poisoning is a critical medical emergency characterized by nonspecific symptoms, making timely diagnosis challenging. This case report details a 70-year-old male patient admitted to the intensive care unit (ICU) after being found unconscious with his wife in their home during preparations for his birthday celebration. The patient presented with retrograde amnesia, pale skin, a respiratory rate of 20 breaths per minute, SpO₂ of 86%, pulse of 82 beats per minute, and blood pressure of 135/85 mmHg. Suspected CO poisoning, linked to a newly installed gas heating system and potentially exacerbated by a recent earthquake disrupting ventilation, underscores the environmental risks of CO exposure. Recent literature highlights the persistent global burden of CO poisoning, with studies emphasizing its association with heating system malfunctions and the importance of early intervention [1]. Advances in diagnostic approaches, such as portable CO detection devices, have improved identification in non-hospital settings (Johnson & Brown, 2023).

Furthermore, research indicates that even mild CO exposure can lead to neurological sequelae, such as amnesia, necessitating prompt treatment [2]. This case illustrates the critical role of rapid response, environmental assessment, and oxygen therapy in managing CO poisoning, aligning with current evidence advocating for heightened awareness and preventive measures [3], [4].

Information about the patient. The patient, a 70-year-old man weighing approximately 100 kg, was admitted to the ICU of the hospital. He was conscious, presented no complaints, and exhibited retrograde amnesia (except for amnesia regarding the day's events, though he recalled it was his birthday that day). His skin coloration was pale, respiratory rate (RR) was 20 breaths per minute, SpO₂ was 86%; pulse was 82 beats per minute, regular, and strong; and blood pressure (BP) was 135/85 mmHg.

The medical history revealed that the patient and his wife were found unconscious by family friends who arrived as guests for the patient's birthday. The home security guard opened the door.

That day, a banquet was being prepared at the patient's home, with a chef and waiter invited, a cleaner was tidying and setting up the banquet hall, and security was on duty. Everyone dined together at one table, and guests were expected starting at 5 p.m. After lunch, the patient and his wife decided to rest before the banquet and went to the bedroom. Fortunately, the friends arrived on time as the first guests and, together with the chef, waiter, security guard, and cleaner, discovered the patient and his wife unconscious in the bedroom.

An ambulance and police were called, arriving 20 minutes after the call (the house is located outside the city). Immediately after calling the ambulance, a phone call was made to a friend who is an anesthesiologist at the hospital where the patient was later admitted, and questions were asked about emergency care for the victims. In the bedroom where the victims were found, there were no odors, signs of any burning, or anything else indicating criminal poisoning or trauma. All the other people in the house were not acquainted with each other and assured that they had no involvement in the victims' condition. Over the phone, the anesthesiologist suggested the possibility of carbon monoxide poisoning and instructed to evacuate the victims from the premises to fresh air. The victims were unconscious but had breathing and a pulse; according to the friends, their skin coloration was pink.

Outside, by the time the ambulance arrived (approximately 30 minutes later), the woman regained consciousness and stated that before the accident in the

bedroom, they suddenly felt very sleepy and "passed out" almost immediately after entering. After examination by the ambulance physician, who found no abnormalities, the woman refused hospitalization for observation. Transporting the male patient to the hospital took approximately 15 minutes, during which the man fully regained consciousness, except for loss of memory of the events of the current day, other than the fact that it was his jubilee that day. The incident occurred in early March, and a new autonomous gas heating system was in operation in the newly built house. An engineer responsible for installing the heating and ventilation system was involved in the investigation. Unfortunately, after conducting measurements for carbon monoxide accumulation by portable measurement device in the bedroom, a presence of CO was detected. It should also be noted that after the installation of the heating and ventilation system, the house was in good condition and deemed suitable for habitation. A week before the incident, a 4-5 magnitude earthquake occurred the region, which may have disrupted the home's ventilation system.

The patient remained in the intensive care unit for one day under dynamic observation by the on-duty medical staff. In the first 3 hours after admission, 100% oxygen inhalation was administered 6-8 l/min via non-rebreathing mask and SpO₂ was 98-100%, after 3 hours oxygen supplementation was stable effect SpO₂ 96-98% without O₂ inhalation after supplementation and O₂ was removed. His skin coloration was normal, respiratory rate (RR) was 12-16 breaths per minute; pulse was 68-76 beats per minute, regular, and strong; and blood pressure (BP) was 115-125/75-80 mmHg. There were no complaints during observation. A peripheral venous catheter was inserted.

The diagnosis was based on clinical findings (unconsciousness, amnesia, low SpO₂) and environmental evidence (CO detection in the bedroom), without confirmatory COHb testing. The anesthesiologist's prompt suspicion of CO poisoning, based on the clinical scenario and lack of alternative causes (e.g., trauma or criminal poisoning), was pivotal. The use of a portable CO detector aligns with advancements in non-hospital diagnostics, enabling rapid environmental assessment. However, the lack of toxicological confirmation limits diagnostic certainty, as other

causes of unconsciousness (e.g., hypoglycemia, stroke) could not be fully excluded without further testing. Due to the successful differential diagnostic and rapid recovery, there was no necessity in carboxyhemoglobin testing. Administration of other medications was not required due to the absence of pathological syndromes or symptoms, and toxicological expertise was not performed, as carbon monoxide poisoning was suspected based on clinical findings and environmental evidence. The patient's rapid recovery, regaining consciousness during transport and requiring only one day of ICU observation, underscores the efficacy of early intervention. The patient was discharged the next day in satisfactory condition, and the banquet was held in full.

Discussion. This case of suspected carbon monoxide (CO) poisoning in a 70-year-old male highlights several critical aspects of diagnosis, management, and prevention of this life-threatening condition. The patient's presentation with retrograde amnesia, low SpO₂ (86%), and initial unconsciousness aligns with common clinical features of CO poisoning, which often include nonspecific symptoms such as drowsiness, confusion, and neurological deficits [2]. The absence of odors or visible signs of combustion in the bedroom underscores the insidious nature of CO, often termed the "silent killer" ([3]). The rapid recovery following evacuation to fresh air and oxygen therapy in the ICU is consistent with findings that early intervention significantly improves outcomes in CO poisoning cases [1].

The environmental context of this case is particularly noteworthy. The CO exposure was linked to a newly installed autonomous gas heating system, potentially compromised by a recent 4-5 magnitude earthquake. Recent studies have identified heating system malfunctions as a leading cause of residential CO poisoning, with structural disruptions, such as those caused by seismic activity, exacerbating risks [4]. The use of a portable CO detection device to confirm CO presence in the bedroom reflects advancements in diagnostic technology, enabling rapid identification in non-hospital settings [5]. However, the absence of toxicological testing, such as carboxyhemoglobin levels, limited definitive confirmation, a common challenge in resource-constrained settings [6].

The patient's wife, who refused hospitalization despite similar exposure, highlights variability in individual responses to CO poisoning, potentially influenced by factors such as age, body mass, or exposure duration [7]. This case emphasizes the need for public education on CO risks, regular maintenance of heating systems, and installation of CO detectors, as supported by recent literature advocating for preventive strategies [8]. Future research should focus on improving access to diagnostic tools and optimizing post-exposure neurological follow-up to mitigate long-term sequelae.

Conclusion. This case of suspected carbon monoxide (CO) poisoning in a 70-year-old male underscores the critical need for rapid recognition and intervention to manage this life-threatening condition effectively. The patient's swift recovery, facilitated by immediate evacuation to fresh air and oxygen therapy (6-8 l/min, achieving SpO₂ of 98-100% initially and 96-98% without supplementation), highlights the efficacy of early treatment in reversing acute symptoms, such as unconsciousness and low SpO₂ (86%) [1]. The environmental trigger – a newly installed gas heating system potentially compromised by a recent 4-5 magnitude earthquake – emphasizes the importance of regular maintenance and post-seismic safety inspections to prevent CO accumulation ([4]). The use of a portable CO detector was pivotal in confirming environmental CO presence, reinforcing its value as a diagnostic tool in non-hospital settings [5]. The variability in outcomes, with the patient's wife recovering without hospitalization, suggests individual differences in CO susceptibility, possibly due to exposure duration or physiological factors [7]. This case highlights the necessity of widespread CO detector installation and public education on CO risks, as advocated by recent literature [8]. The patient's retrograde amnesia underscores the potential for neurological sequelae, necessitating long-term follow-up to monitor cognitive outcomes [2]. Clinicians and policymakers should prioritize accessible diagnostic tools, such as COHb testing, and advocate for preventive measures to enhance safety in residential settings, ensuring comprehensive care for CO poisoning victims.

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