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Simple new method to accelerate clearance of carbon monoxide

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Comments

This comparatively simple and potentially portable technique appears to be safe and efficacious in the treatment of carbon monoxide (CO) poisoning. The authors argue that the potential deleterious effects of hypocapnia in CO poisoning (being a rightward shift in the oxygen dissociation curve as well as cerebral vasoconstriction) could be prevented by this technique. In addition, the enhanced clearance of CO achieved should reduce the duration of hypoxia and the direct intracellular toxic effects of CO. This well conducted study justifies a clinical trial of this technique, especially in the pre-hospital environment.

Introduction

CO inhalation is the leading cause of fatal poisoning in the industrialised world. Current therapy consists of either the administration of 100% oxygen, or, where available, hyperbaric oxygen. Inhaled carbon dioxide (CO₂) (5%) therapy as an adjunct to oxygen was advocated in the 1920s but fell from routine use due to its poor tolerability. Similarly, hyperpnea, despite enhancing CO elimination, provokes a respiratory alkalosis with consequent aggravation of already impaired cerebral oxygen delivery. Fisher and colleagues have previously demonstrated the efficacy of a novel breathing circuit in dogs which provokes normocapnic hyperoxic hyperpnea producing a > 50% reduction in CO half life. This study investigated the efficacy of the same method in healthy human volunteers.

Methods

- A randomised crossover trial design seven male healthy volunteers

- Volunteers were connected to non-rebreathing circuit. The inspiratory side of the circuit consisted of a water spirometer and a fresh gas supply
- Following a baseline period in which room air was inspired and minute volume measured, CO was administered until a blood level of 10-12% carboxyhaemoglobin (COHb) was achieved
- Subjects were randomised to receive either, 100% O₂ resting minute volume maintained or, a CO₂/O₂ oxygen mixture and set a minute volume of between two and six times their resting minute volume, with the carbon dioxide concentration set to maintain their arterial PaCO₂ within 3 mmHg of their resting level
- The protocol was repeated the following day, with subjects receiving the treatment they hadn't had the previous day
- COHb levels were monitored in order to establish the elimination kinetics associated with the two methods

Results

After 60 min COHb levels decreased from $10.6 \pm 0.4\%$ to $6.2 \pm 1.1\%$ in subjects breathing 100% oxygen, and from $11.0 \pm 0.9\%$ to $3.0 \pm 1.0\%$ during normocapnic hyperoxic hyperpnea. A surrogate measure of myocardial oxygen consumption did not change throughout. All subjects maintained hyperpnea for 90 min without difficulty.

References

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