Neurological symptoms after glossopharyngeal insufflation (lungpacking) in breath-hold divers suggesting cerebral arterial gas embolism

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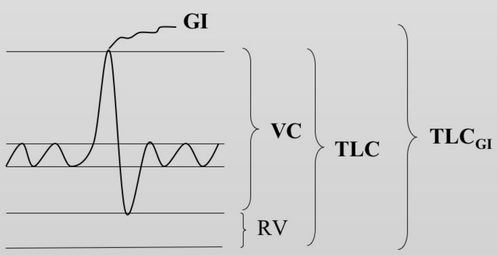
Introduction

This poster describes three cases of neurological signs and symptoms after glossopharyngeal insufflation (lungpacking).

Breath-hold divers use glossopharyngeal insufflation (GI) to increase the volume of air in the lungs above normal total lung capacity (TLC) GI will increase the volume of air up to 50% of that subject's vital capacity (1, 2). The increase in pulmonary gas will cause a drop in arterial blood pressure, an effect that can explain an observation that is often noted among breath-hold divers who use too much GI; that it may cause syncope. Relaxed airway pressures of about 10 kPa (75 mm Hg) have been reported, as well as transpulmonary pressures as high as 8 kPa (60 mm Hg) (2). This pressure is higher than what is clinically regarded as ”safe” and a pneumomediastinum has been reported in one diver (3)

Glossopharyngeal Insufflation (GI)



- TLC : Total Lung Capacity
- VC : Vital Capacity
- RV : Residual Volume
- Fig adapted from ref 1 and 4

Cerebral arterial gas embolism:

Overdistension and overpressurization of the lung is considered as the underlying cause of pulmonary barotrauma and arterial gas embolism. The exact mechanism is not clear (5). When/if this gas affects the cerebral circulation various neurological signs and symptoms appear.

Case reports:

Diver one

performed GI to measure his lung volume. After that manoeuvre he suddenly had problem to speak clearly and to find words for 3 minutes. He also experienced weakness in the right arm and double vision for about 5 minutes. When he arrived at the hospital he was OK. At hospital: Examination with computer tomography of the head or chest x-ray did not show anything. Chest CT was not done.

Diver two

reports using GI as usual in preparation for a 100 m dynamic swim. After swimming about 35m he gradually loses the ability to move, and is assisted by his safety diver. He can hear and see (blurry) but not move or talk for 5 minutes. Within 8 minutes he was able to speak again and the paralysis went away over the following hour. He reported feeling weak and nauseous for the rest of that day. He spent 2 nights at the hospital for observation without any testing except for blood.

Diver three

reports packing for a static apnea. After 5 min (a short duration for this diver, about 60% of max) he aborted the dive due to an uncomfortable feeling. Approx 1 min after end of the dive he experienced a central scotoma of both eyes: He describes that about 1/3 of the visual field was extremely blurred but not completely dark. Symptoms disappeared gradually over 5 hours. He also had a long lasting nausea.

Discussion

These neurological signs and symptoms seem different from transient hypoxia reported in extended breath-holding or lungpacking. All of those divers have previous experience in blackout and loss of motor control from apnea or lungpacking and regard these cases as different. The divers were young and healthy and decompression illness was not possible since there were no diving.

Conclusions

The symptomatology suggests cerebral arterial gas embolism.

References

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