

A new pathophysiological mechanism behind drownings in breath-hold divers; arterial gas embolism after glossopharyngeal insufflation.

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Conclusion

These neurological signs and symptoms suggest that the diver suffered an arterial gas embolism affecting the brain with partial loss of function similar to a transient ischemic attack. Without rescue this diver would have drowned.

We suggest that arterial gas embolism should be considered as a possible cause of drowning if a breath-hold diver (known to use lungpacking) drown.

Introduction

Glossopharyngeal Insufflation (GI, lungpacking), is used by apnea divers to overinflate the lungs prior to diving and as a stretching maneuver for the chest. This technique can increase the transpulmonary pressure to around 7-8 kPa, suggesting a risk of pulmonary barotrauma. Prior abstracts and publications suggest at least 4 cases of suspected arterial gas embolism in connection with lungpacking and another 2 are known by the authors. There are also publications showing mediastinal emphysema in connection with this maneuver. All these cases, including the present one have recovered without any residual detectable damage on clinical examination.

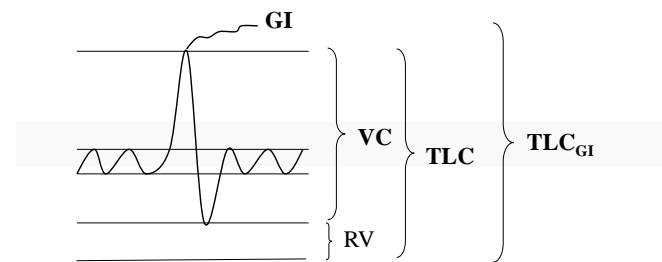
Results

The breath-hold diver filled his lungs with GI prior to a dynamic apnea swim, he then swam about 50m (normally able to perform up to 200m). He reports developing paraesthesias after swimming 25m, and tried to surface and hold on to the ladder at 50m. He became tetraplegic and could not ascend/hold on to the ladder. He fell to the bottom and most likely aspirated some water before was rescued in about 60 seconds. He was tetraplegic for 15 min at the poolside, gradually resuming ability to move. He describes remaining conscious throughout the event. When the ambulance arrived he had normal neurological function but arterial desaturation. At the hospital bilateral infiltrates were shown on chest x-ray (water aspiration). Neurological examination was normal. He remained in hospital for the night requiring supplemental oxygen.

Methods

One of the authors witnessed this non-fatal drowning event during dynamic apnea. This subject had been tested on a separate occasion for pulmonary pressures and volumes prior to the accident. He was then shown to be able to lungpack to a relaxed airway pressure of more than 100 cmH₂O

Glossopharyngeal Insufflation (GI)



- TLC : Total Lung Capacity
- VC : Vital Capacity
- RV : Residual Volume



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See also plenary session on Saturday