G4 Small Cell Carcinoma of the Lung Contributing to Pulmonary Barotrauma With Air Embolism in a Recreational Diver: A Case Report

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The goal of this presentation is to review the pathophysiology of pulmonary barotrauma in the setting of SCUBA diving fatalities and to discuss the potential contribution of local bronchial obstruction to the development of pulmonary barotrauma.

This presentation will impact the forensic community and/or humanity by demonstrating how divers would benefit from consulting a qualified medical professional about the risks of diving with an intrinsic lung disease prior to engaging in this sport.

SCUBA diving is a popular sport in the United States and approximately 90 deaths are reported each year, mostly from coastal states. Drowning is the leading cause of death in diving related fatalities but a host of injuries unique to diving may contribute. This presentation will impact the forensic community and/or humanity by increasing awareness of the potential danger of recreational SCUBA diving in those with obstructive pulmonary processes.

A 45-year-old man was SCUBA diving with a partner in seawater at a spot familiar to both of them. He was an experienced rescue-certified diver with over 450 dives. The dive lasted approximately 29 minutes with a maximum depth of 84 feet of seawater. During the decompression stop the divers became separated in murky water. The partner surfaced then resubmerged and recovered the decedent from the bottom approximately 25 feet below the surface. The decedent was removed from the water and resuscitation was attempted in the field prior to the pronouncement of death. No central lines or other procedures invasive to the central vascular bed or chest were attempted.

The SCUBA gear was examined by a Diving Safety Officer. All components were in good condition and in working order with adequate unadulterated air in the tank. The diving computer was interrogated and a depth/time histogram was produced. At approximately 23 minutes into the dive the histogram has a spike-like irregularity after which the depth remains steadily at approximately 25 feet until the data terminates.

Prior to autopsy an anterior-posterior radiograph of the chest in the left lateral decubitus position was obtained. Air fluid levels in the right and left sides of the heart, gas in the central vascular structures of the chest and neck, and pneumomediastinum were observed. Opening the myocardium under water produced a gush of bubbles. No gas emboli were grossly apparent in the coronary or cerebral arteries. There was no substantial heart disease.

A 3.0 centimeter white subcarinal mass, histologically confirmed as small cell carcinoma, extended into the hilum of the left lung. It caused subtotal obstruction of the left upper lobe bronchus and encased the pulmonary artery. The pulmonary parenchyma distal to the obstruction was hemorrhagic and atelectatic. Metastases were present in the mediastinal lymph nodes and liver.

Medical records revealed that the decedent had been diagnosed with metastatic lung cancer approximately six months before his death. He underwent chemotherapy with shrinkage of his metastatic lesions. Chronic cough caused him to undergo bronchoscopy approximately one month prior to his death, which revealed partial obstruction of the left upper lobe bronchus by the neoplasm. He received two fractions of palliative radiation to that area, the last on the morning of the fatal dive.

We hypothesize that 1) the presence of a carcinoma obstructing a bronchus resulted in fatal barotrauma in an experienced diver, and 2) filling of the central vascular bed by gas resulted in unconsciousness while submerged, in the absence of cerebral and coronary artery gas emboli.

Divers would benefit from consulting a qualified medical professional about the risks of diving with an intrinsic lung disease prior to engaging in this sport.

Scuba Diving, Air Embolism, Postmortem Radiograph

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