Scuba diver deaths due to air embolism: two case reports

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SUMMARY
Barotraumas and decompression sickness are the two most well-known complications of diving. First presented case was 32 year-old male with recreational diver, who was found floating prone position on the bottom of sea in a depth of 33 m. He had been carried to the surface in a controlled ascent. Second case was a 39 year-old male experienced dive instructor in a diving school, after following an uneventful duration of dive was found unconscious with a floating supine position in a depth of 30 m and there were no signs of life when they were transported to the hospital. Extensive subcutaneous emphysema of the extremities was detected by palpation of the skin. In the autopsy diffuse gas bubbles like beads were seen in the coronary arteries and in ventricles, basilar artery and all of the cerebral arteries. The cause of death was attributed due to gas embolism and drowning.

Keywords: barotraumas – diving – air embolism – autopsy

Smrt potápěče v důsledku vzduchové embolie: dvě kazuistiky

SOUHRN
Barotrauma a dekompresní nemoc patří mezi dvě nejznámější komplikace potápění. Prezentujeme případ muže ve věku 32 let, rekreačního potápěče, který byl nalezen v poloze na břiše na dně moře v hloubce 33 metrů. Muž byl vyzvednut na břeh s kontrolou času vynořování. Ve druhém případě se jedná o muže stáří 39 let, instruktora potápění, který byl po ponoru nepřesahujícím běžnou délku času nalezen v bezvědomí v poloze na břiše v hloubce 30 m.
Oba muži byli bez známek života transportováni do nemocnice. Palpačně byl patrný výrazný podkožní emfyzém končetin. Při pitvě byla zjištěna přítomnost drobných bublinek plynu v koronárních arteriích, srdečních komorách, bazilární arterii a všech cerebrálních arteriích. Příčinou smrti byla stanovena plynová embolie a utonutí.

Klíčová slova: barotrauma – potápění – vzduchová embolie – pitva

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Barotraumas and decompression sickness are the two most well-known complications of diving (1). A diver is breathing gas at increased pressure after descending, which often leads to tissue gas super saturation (2,3). When the ambient pressure decreases quickly following uncontrolled ascent to the surface, barotraumas and excessive formation of gas bubbles, which can enter into circulation, occurred in supersaturated tissues (2,3). Another form or unavoidable consequence of the decompression sickness is air embolism which is caused by breach of a vascular wall that allows entering of air to circulation (2). The gas bubbles, presented in the venous system, can enter the systemic arterial circulation by several different mechanisms such as intracardiac right-to-left shunt (usually patent foramen ovale) or pass through the pulmonary capillary due to pulmonary barotraumas or intrapulmonary passage after massive bubble formation and directly into arterial circulation (2,4-9). We presented two cases of diving fatality due to arterial air embolism and discussed with a review of the literature.

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CASE REPORTS

Case 1

A 32 year-old male with unknown signicant medical history was a recreational diver. He was found floating on prone position on the bottom of sea in a depth of 33 m. He had been carried to the surface in a controlled ascent. There was no vital signs when he arrived to the hospital. Despite resuscitation attempts, he did not revive. There was no information about his equipment. Post-mortem external examination showed hemorrhagic foams around the mouth and nostrils. Extensive subcutaneous emphysema of the extremities was detected by skin palpation. Except these findings no significant injuries were observed on external examination. X-ray