

## SHORT COMMUNICATION

## Gas in coronary artery: A case of fatal decompression sickness evaluated by computed tomography

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CORRESPONDING AUTHOR: Youichi Yanagawa – [yyanaga@juntendo.ac.jp](mailto:yyanaga@juntendo.ac.jp)**ABSTRACT**

A 54-year-old man suffered a leg cramp while diving in the ocean at a depth of 20 meters. He began to surface, with his ascent based on a decompression table. He lost consciousness at the surface and was rescued by a nearby boat. The boat staff judged him to be in cardiac arrest, so they performed chest compressions. When the boat reached port where an ambulance was waiting, emergency medical technicians confirmed that the patient was in cardiac arrest; his initial rhythm was asystole. Treated with basic life support, the patient was then transported to a rendezvous point, where a physician-staffed helicopter waited. The patient remained in cardiac arrest, so the staff of the helicopter performed tracheal intubation with mechanical ventilation, securing a venous route, infusion of adrenaline, and mechanical chest compression. On arrival at our hospital 100 minutes after collapse, he remained in cardiac arrest. Continued advanced cardiac life support failed to obtain spontaneous circulation. Whole-body computed tomography (CT) at 120 minutes after the collapse showed multiple gas bubbles in the heart, aorta, inferior vena cava, cerebral artery, coronary artery and portal vein with lung edema. This is the first case to show gas in the bilateral coronary arteries on CT. The present case clearly demonstrates that decompression sickness can also induce acute coronary syndrome. ■

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**RESULTS**

On arrival at our hospital 100 minutes after collapse, the patient remained in cardiac arrest. The results of a venous blood gas analysis were as follows: pH 6.564; PCO<sub>2</sub> 170 mmHg; PaO<sub>2</sub> 8.3 mmHg; HCO<sub>3</sub><sup>-</sup> 14.5 mmol/L; base excess -37 mmol/L; and lactate 29 mmol/L.

Continued advanced cardiac life support failed to obtain spontaneous circulation. The results of a biochemical blood analysis on arrival were as follows: white blood cell count 7,800/μL; hemoglobin 15.9 g/dL; platelet count 7.7×10<sup>4</sup>/μL; total protein 7.6 g/dL; albumin 3.9 g/dL; glucose 437 mg/dL; total bilirubin 0.5 mg/dL; aspartate aminotransferase 169 IU/L; alanine aminotransferase 138 IU/L; blood urea nitrogen 20.9 mg/dL; creatinine 1.28 mg/dL; sodium 147mEq/L; potassium 11.1mEq/L; chloride, 102 mEq/L; prothrombin time 21.8 (11.8) seconds; activated partial thromboplastin time 121.0 (26.4) seconds; fibrinogen 45 mg/dL; fibrinogen fibrin degradation product over 960 μg/mL. Whole-body computed tomography (CT) at 120 minutes after the collapse showed multiple gas bubbles in the heart, aorta, inferior vena cava, cerebral artery, coronary artery and portal vein with lung edema (Figure 1).

**INTRODUCTION AND TREATMENT**

A 54-year-old man suffered a leg cramp while diving in the ocean at a depth of 20 meters. He began to surface, with his ascent based on a decompression table but lost consciousness at the surface. He was rescued by a nearby boat. The boat staff judged him to be in cardiac arrest, so they performed chest compressions.

KEYWORDS: air embolism; coronary artery; decompression illness; resuscitation



**Figure 1:** Whole-body computed tomography (CT) at 120 minutes after the collapse. CT shows gas in the heart, aorta and bilateral coronary arteries (arrow).

## DISCUSSION

Decompression sickness and arterial gas embolism, collectively known as decompression illness (DCI), are rare but serious afflictions that can result from compressed-gas diving exposure [1]. The present case demonstrated multiple gas bubbles in the vasculature and heart due to decompression sickness. Unfortunately, there have been no reports of patients able to obtain social rehabilitation after suffering cardiac arrest due to decompression sickness.

## CONCLUSION

This is the first case to show gas in the bilateral coronary arteries on CT. Acute coronary syndrome can occur while diving [2], induced accidentally by plaque rupture [3]. However, the present case clearly demonstrates that decompression sickness can also induce acute coronary syndrome. ■

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## REFERENCES

1. Pollock NW, Buteau D. Updates in decompression illness. *Emerg Med Clin North Am.* 2017;35:301-319.
2. Brauzzi M, Andreozzi F, De Fina L, Tanasi P, Falini S. Acute coronary syndrome and decompression illness: a challenge for the diving physician. *Diving Hyperb Med.* 2013;43(4):229-231.
3. Crea F, Libby P. Acute Coronary Syndromes: The way forward from mechanisms to precision treatment. *Circulation.* 2017; 136(12):1155-1166. ◆