

# Cerebral air embolism after central vein catheter removal

Mariana Malheiro, Ana Joao Pissarra, Ana Placido, Ana Martins

## CASE REPORT

A 57-years-old male with metastatic colon cancer and metastatic squamous cell carcinoma of the salivary gland was presented to the emergency department with dizziness, nausea and cervicgia for one week. Magnetic resonance imaging scan of brain showed a secondary lesion in the left cerebellar hemisphere, excised without interferences in the immediate postoperative period.

For purposes of therapeutic administration, a central venous catheter was introduced, in the right subclavian vein, before surgery. One week after, when the central venous catheter was withdrawn, the patient presented with involuntary movements, loss of consciousness and left hemiparesis. On neurological examination, he presented with psychomotor lithification, paresis of horizontal conjugated look to the left, discrete pupillary asymmetry, and left members paresis. He was hemodynamically stable, with no sign of other organs damage. Computed tomography scan of brain revealed a bilateral frontoparietal diffuse cortical acute ischemic cerebral stroke, secondary to air embolism (Figure 1).

The patient was immediately placed in Trendelenburg position and a high amount of oxygen was administered. He kept hemodynamically stable, with no further deficits and was then transferred to the neurology department where he begun a physical rehabilitation process with progressive recovery of the neurological deficits.

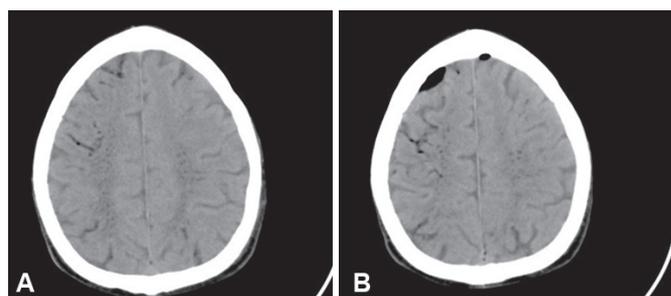


Figure 1: (A, B) Computed tomography scan of brain showing bilateral frontal-parietal diffuse cortical acute ischemic cerebral, secondary to air embolism.

## DISCUSSION

Air embolism is a rare, usually iatrogenic condition, that can happen following the removal of central venous catheter [1, 2]. It is a preventable, often undiagnosed but potentially treatable cause of ischemic stroke with a high morbidity and mortality.

Symptoms may be unspecific including seizures, loss of consciousness, altered mental status, and hemiparesis/hemiplegia [3]. There are three mechanisms described. First, there can be a Patent Foramen Oval or an atrial septal defect that could facilitate a paradoxical air embolism into the cerebral arterial tree [1]. Second, it can enter the systemic arterial circulation due to incomplete filtering of the air in the normal pulmonary capillaries or in the presence of pulmonary arterial-venous malformation. Third, and the most probable cause in this patient, a retrograde venous cerebral air embolism, that refers to air in the central venous circulation moving in the opposite direction of the venous blood flow, eventually reaching the cerebral vasculature [1, 2].

There are some preventable procedures when removing catheters. It is recommended to keep the patient in a supine position or with their head down or in a Trendelenburg position. The venotomy place should be below the level of the heart to ensure adequate central venous return. The removal of catheter should be performed during active expiration. The exit site must be covered with impermeable dressing and pressure applied for 5–10 min. The patient should remain supine for 30 minutes, after central venous access removal [3, 4].

Mariana Malheiro<sup>1</sup>, Ana Joao Pissarra<sup>1</sup>, Ana Placido<sup>1</sup>, Ana Martins<sup>1</sup>

**Affiliation:** <sup>1</sup>MD, Medical Oncology Department, Hospital Sao Francisco Xavier, Lisbon, Portugal.

**Corresponding Author:** Mariana Malheiro Rodrigues Lisbon, Portugal, 1400-145; Email: marianamalheiro@gmail.com

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Treatment consists in preventing further air entry, reducing the volume of air entrained, and hemodynamic support. The patient should be placed in a Trendelenburg position. If a central vein catheter is present, aspiration should be applied in an attempt to remove air. The administration of supplemental oxygen with a high fraction of inspired oxygen (FiO<sub>2</sub>) is critical. Hyperbaric oxygen therapy (HBO) is not routinely administered in patients with air embolism but is useful in severe cases, often those with arterial air embolization. When available, it should be administered to patients with hemodynamic or cardiopulmonary compromise, with neurologic deficits, or other evidence of end-organ damage. The use of anticoagulation and glucocorticoids is controversial [5–7]. Morbidity and mortality, which ranges from 48–80%, is directly related to volume of air entrainment, rate of accumulation of air, and position of the patient [7].

## CONCLUSION

Vascular air embolism is a rare and preventable medical event. It can be often fatal and attention to the interventional procedures must be taken. The treatment goal is to prevent the event and there are several measures when disconnecting a central venous catheter. When there is a suspicion of embolic air event immediate treatment should be provided in order to reduce morbidity and mortality.

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**Keywords:** Cancer, Cerebral air embolism, Iatrogenic, Stroke

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Mariana Malheiro – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising

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## Guarantor

The corresponding author is the guarantor of submission.

## Conflict of Interest

Authors declare no conflict of interest.

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