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Case Report

# Unusual Multifocal and Extensive Presentation of Air Embolism of Iatrogenic Origin: Cerebral, Pulmonary and Digestive

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## Abstract

Massive air embolism of iatrogenic origin is rarely described in the literature. Classically diagnosed in intensive care patients, it is a rare but potentially fatal complication of medical procedures, especially endovascular surgical interventions. Its pathophysiological mechanism is well known today, possibly of arterial or venous origin. It should be clinically suspected in any patient with neurological impairment following peripheral or central endovascular manipulation. The radiological explorations make it possible to easily establish the positive diagnosis and at the same time makes it possible to assess the extension and complication, in particular ischemic. We report the clinical and radiological observation of a patient aged 3 years and 6 months who presented with an acute disturbance of consciousness after cardiovascular surgery in whom the cerebral and thoraco-abdominal scanner without injection of contrast medium has allowed to make the radiological diagnosis.

***Keywords:*** *Dyspnea; CT; Air Embolism; Iatrogenic Origin; Cerebral; Pulmonary; Digestive*

## Introduction

Iatrogenic air embolism is the passage of air bubbles through the bloodstream after a medical procedure. This air bubble passage can be symptomatic or asymptomatic. It represents a major risk in medical practice with often disabling consequences. Depending on the gas breaking mechanism and the site where the embolus will be lodged, two main categories of gas embolism are differentiated: venous air embolism (entry of air into the venous vascular system) and air embolism arterial (passage of air through the arterial vascular system). The etiologies have varied over time due to technological progress in medicine with the advent of new diagnostic, therapeutic and interventional exploration techniques. The incidence of air embolism is difficult to assess because the clinic is often polymorphic. The great variability of the clinical picture and its frequent occurrence in patients under general anesthesia intraoperatively in intensive care makes its diagnosis difficult, sometimes delayed, while a favorable outcome depends on the speed of implementation of the treatment.

Currently, sectional imaging allows for positive diagnosis and monitoring of complications.

The course is most often formidable because it is crowned with a high mortality rate, hence the need for an early diagnosis, which can improve the prognosis. Knowledge of this pathology remains essential for the prevention of its occurrence and for making an early diagnosis, which guarantees better and rapid patient care.

## Case Observation

It is about a boy aged 03 years and 06 months who presented a respiratory distress with neurological disorder three days postoperative of a cardiovascular surgery for stenosis of the pulmonary artery having benefited from a porto bypass. -cellar. He comes from a family of two children with no particular medical or surgical history. The surgery went without major incident with immediate post-operative consequences without any particularities. The clinical examination was marked by a neurological picture of disturbance of consciousness with a Glasgow score assessed at 10 points. Hemodynamic and respiratory assessment noted polypnea with cardiac arrhythmias and mild cyanosis. The remainder of the clinical exam was unremarkable.

Biologically, he presented an inflammatory and infectious syndrome consisting of hyper-leukocytosis at 19050 ml/mm$^3$ and C-reactive protein at 89 mg/l. The gas assessment noted hypoxemia and metabolic acidosis.

The patient benefited from a CT imaging without injection of iodinated contrast product which had objectified air images within the vascular axes (arterial and venous) in a diffuse manner on the floors: cranio-cervico facial (Figure 1), thoracic (Figure 2) and abdominal (Figure 3) without any other associated anomaly.

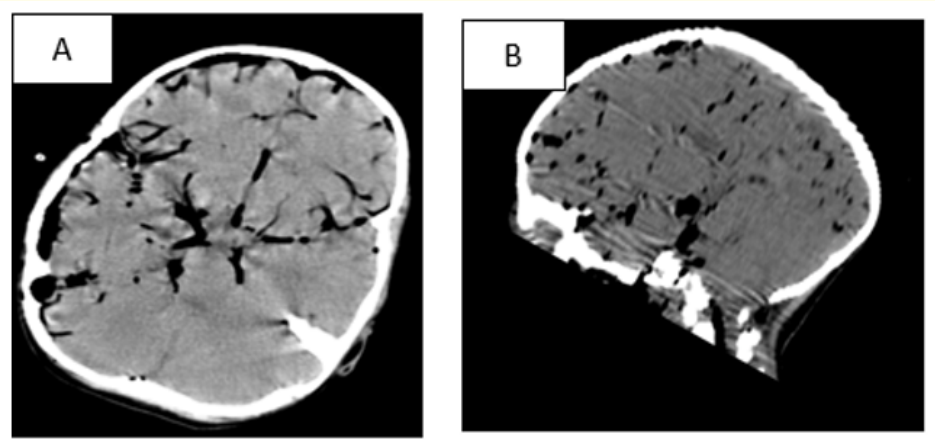


***Figure 1:*** *Brain scan in axial (A) and sagittal (B) sections showing.*

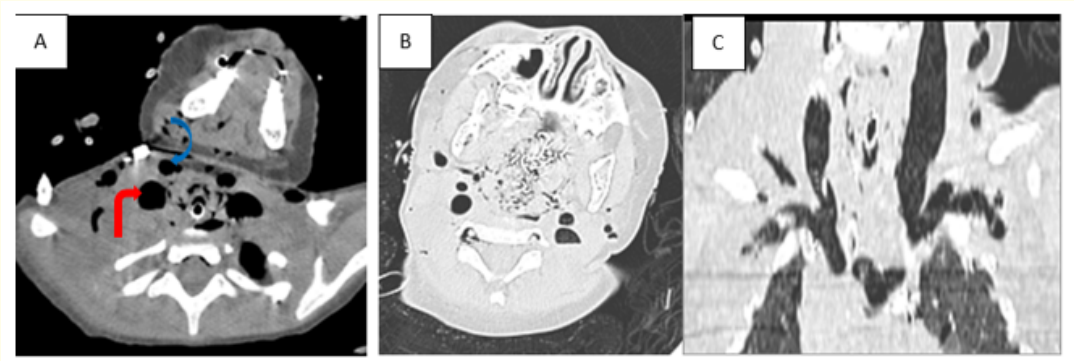


***Figure 2:*** *Cervical CT scan in axial section in mediastinal window (A), pulmonary in axial section (B) and coronal (C). objectifying the presence of air in the vessels of the supraortic trunk: right internal carotid (blue arrow) right jugular vein (red arrow).*

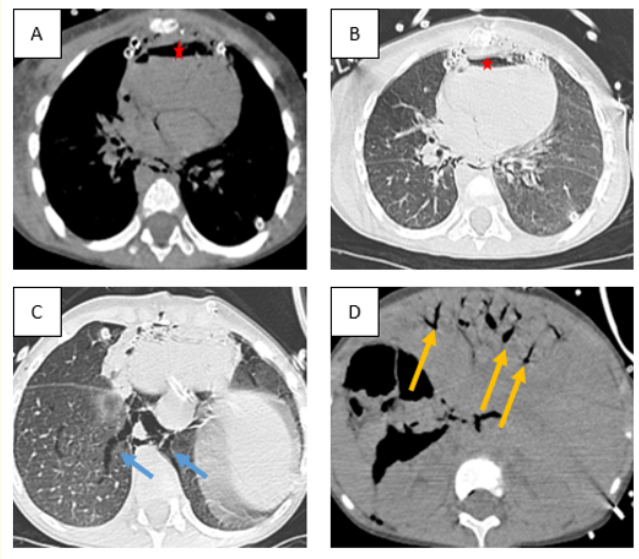


***Figure 3:*** *CT Scan in axial section through mediastinal window (a), pulmonary (b, c) and (d) axial section passing through the upper abdomen showing: A, B and C: showing the presence of air in the heart chambers (red star) and in the pulmonary parenchymal vascular network (blue arrow). D: Images of gaseous arborizations reaching the periphery of the hepatic parenchyma in connection with an airborne (yellow arrow).*

The presence of multiple air bubbles in the hemispherical subarachnoid spaces, base cisterns, interhemispheric fissure, and sylvian valley.

The patient received immediate cardiopulmonary resuscitation, interruption of airflow to the vascular system, adequate oxygenation, and additional antibiotic and anti-inflammatory therapy.

## Discussion

Iatrogenic air embolism can occur when all types of gas pass through the arterial and/or venous system. Its origin can be venous, interfering with distal or arterial flow, constituting an obstacle to the arterioles, thereby causing distal hypoxia. The real incidence of iatrogenic embolism is difficult to assess, as it is often underestimated, linked to diagnostic difficulty due to the great variability of nonspecific clinical signs [1-4].

Currently, complications from central venous catheterization during accidental catheter disconnection are the main cause. Other equally significant sources of accidents are accidents during the establishment of extracorporeal circulation, during cardiac surgery or the practice of neurosurgery in a seated position [5,6]. In our case, the cause was cardiovascular surgery with the placement of a Porto cava bypass.

The clinical signs are polymorphic and a specific, often onset in the form of vegetative disorder, loss of consciousness, motor deficit or comitiality [1]. In our case, the clinical signs were dominated by a disturbance of consciousness, polypneas with slight cyanosis and cardiac arrhythmias. Electrocardiogram abnormalities are non-specific ranging from simple tachycardia to arrhythmias, ischemic lesions or acute heart lung. The blood gas analysis finds hypoxemia or even metabolic acidosis in the event of initial collapse. Clinical diagnosis is essentially based on the association of a risk situation with sudden onset of neurological and cardiovascular manifestations [7].

In current practice, any neurological and/or cardio-respiratory sign in a risk situation should be considered an air embolism until proven otherwise and should require immediate treatment before any other examination, particularly brain imaging [8]. These data from the literature are compatible with our case, where the diagnosis was suspected based on the association of the operating circumstances linked to the type of intervention and the clinical signs presented by the patient. Imaging is essential to make the diagnosis with certainty and makes it possible to assess complications and monitoring, but should not delay treatment [9].

The chest X-ray is most often normal or often may show the presence of clarity in the hepatic veins or in the right chambers of the heart. Urgent trans thoracic echocardiography can confirm the presence of air bubbles**.** Of the right heart [10].

Sectional imaging, including CT scan, shows the presence of air bubbles within the vascular network. It can also indirectly find in the brain edema and multifocal ischemic lesions [11]. In our case, brain CT without injection of iodinated contrast product demonstrated the presence of air bubbles without other signs of complication, particularly ischemic.

Clinical differential diagnoses are made in cases of cardiorespiratory signs and stroke with fibrino-cruoric pulmonary embolism, pneumothorax, acute cardiogenic lung edema, bronchospasm, and metabolic disorders such as hypoglycemia, low cerebral flow in the event of neurological signs [12].

Therapy consists of stopping the gas source and symptomatic resuscitation measures, combining oxygen therapy as a specific treatment and the fight against non-specific biological reactions [1,13]. In our case, the patient received immediate resuscitation, with aspiration of air and stopping the additional air intake.

Air embolism is associated with high morbidity and mortality rates [2,3]. In our case, death occurred 48 hours after diagnosis.

## Conclusion

Iatrogenic air embolism is an often-fatal accident, rarely reported in the literature because it is underdiagnosed. Frequent nowadays with the proliferation of medical, diagnostic, therapeutic and interventional procedures. The clinical diagnosis remains difficult with non-specific signs.

In the majority of cases, sectional imaging, in particular the scanner, makes it possible to establish a definite diagnosis, to assess complications and ensure post-treatment monitoring, but must not at any time delay treatment. Reducing the high rate of morbidity and mortality associated with this condition requires prevention, early diagnosis followed by immediate treatment.

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