

Case Report

## Another Idiopathic Case of Pneumocephalus: Spontaneous or Retrograde?

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### Abstract

**Introduction:** Pneumocephalus is a rare phenomenon, typically resulting from traumatic or non-traumatic causes. It could however occur spontaneously, in the absence of an underlying condition or from manipulation of a venous catheter resulting in retrograde movement of air against the direction of blood flow causing fatality. It occurs in less than 3 per 100,000 hospitalizations. This case reports possible etiologies of a rare case of pneumocephalus resulting in a stroke. **Materials and Methods:** A review of chart and verbal consent from patient's family prior to reporting case. **Results and Discussion:** We present a 76-year-old African American female with End Stage Renal Disease who presented to the ED for altered mental status, following an episode of bleeding during a hemodialysis (HD) completed via the internal jugular vein through a tunneled dialysis catheter. Neurological examination revealed signs of a massive stroke including a right lateral gaze, with 3+ reflexes in the upper extremities bilaterally. Head CT scan revealed moderate amounts of air within the right frontoparietal sulci, minute intraparenchymal foci of gas within the venous structures; interval gray-white loss involving the right frontoparietal lobe and right centrum semiovale, with watershed involvement. Echo cardiogram revealed no wall or valvular defect. She was not deemed appropriate for Hyperbaric oxygen and discharged to a palliative care facility by family. **Conclusions:** While some causes of pneumocephalus have previously been documented in literature, unusual etiology can lead to diagnostic dilemma and calls for a high level of suspicion by healthcare providers

**Keywords:** Traumatic, Stroke, Pneumocephalus

### 1. Introduction

Pneumocephalus is a rare phenomenon, typically resulting from traumatic or non-traumatic causes. It can occur spontaneously, in the absence of an underlying condition, or due to manipulation of a venous catheter, resulting in retrograde movement of air against the direction of blood flow and causing potentially fatal outcomes [1–4]. The condition occurs in less than 3 per 100,000 hospitalizations [5]. We present a rare case highlighting the diagnostic challenges of pneumocephalus resulting in stroke.

### 2. Materials and Methods

We conducted a review of the patient's chart and obtained verbal consent from the patient's family prior to reporting the case.

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### 3. Results and Discussion

A 76-year-old African American female with End Stage Renal Disease presented to the Emergency Department with altered mental status following an episode of bleeding during hemodialysis via a tunneled internal jugular vein catheter. Neurological examination revealed signs of a massive stroke, including a right lateral gaze and 3+ reflexes in the upper extremities bilaterally.

Head CT demonstrated moderate amounts of air within the right frontoparietal sulci and minute intraparenchymal foci of gas within venous structures. Interval gray-white loss was noted in the right frontoparietal lobe and right centrum semiovale, with watershed involvement. Echocardiography revealed no wall or valvular defects. The patient was deemed inappropriate for hyperbaric oxygen therapy and was discharged to a palliative care facility per family decision.

While pneumocephalus is most often linked to trauma, neurosurgical procedures, or infection, spontaneous or retrograde cases remain exceedingly rare [6,7]. Our case underscores the importance of maintaining a high index of suspicion for pneumocephalus in patients with neurological deterioration after venous catheter manipulation. Early recognition is crucial, as delayed diagnosis may lead to irreversible neurological deficits or fatality [8].

### 4. Conclusions

Although some causes of pneumocephalus are documented, unusual etiologies, such as retrograde air embolism from dialysis catheters, can create diagnostic dilemmas. Clinicians should be aware of these rare presentations to initiate timely management and improve patient outcomes.

### Author Contributions

Conceptualization: A.O., B.W.; Data curation: A.O.; Writing – original draft: A.O.; Writing – review & editing: B.W.; Supervision: B.W. All authors have read and agreed to the published version of the manuscript.

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### Institutional Review Board Statement

Not applicable.

### Conflicts of Interest

The authors declare no conflict of interest.

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