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IMAGE | ENDOSCOPY

Cerebral Air Embolism After Endoscopic Variceal Band Ligation

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CASE REPORT

A 73-year-old woman with a history of portal hypertension secondary to mixed primary biliary and alcoholic cirrhosis presented with multiple episodes of hematemesis. In the emergency department, she was hemodynamically stable with a hemoglobin of 10 mg/dL. She was started on proton pump inhibitor and octreotide infusions with the plan to perform esophagogastroduodenoscopy (EGD). The EGD was carried out under monitored anesthesia care with intravenous propofol without an airway, using room air for insufflation. This revealed Grade III esophageal varices with active bleeding in the lower third of the esophagus (Figure 1). Three bands were placed, resulting in deflation of varices and cessation of bleeding (Figure 2). No evidence of ulceration or erosion was found in the stomach or duodenum, and no intraoperative complications were noted. The patient's vital signs were stable throughout the procedure. Electrocardiogram showed normal sinus rhythm.

However, during the postoperative period, the patient was difficult to arouse and could not move her left side. On examination, there was left-sided facial weakness and no left arm or left leg movement. Emergent cranial computed tomography (CT) showed right parietal lobe infarction with air emboli in the same distribution (Figure 3). Cranial and cervical CT angiography was unremarkable. The patient was transferred urgently for hyperbaric oxygen therapy, of which she received 2 sessions in 24 hours. Magnetic resonance imaging of the brain revealed marked cortical diffusion restriction in the right frontal, temporal, and bilateral occipital regions concerning for venous infarcts with 7-mm midline shift. A transthoracic echocardiogram with bubble study showed no right-to-left

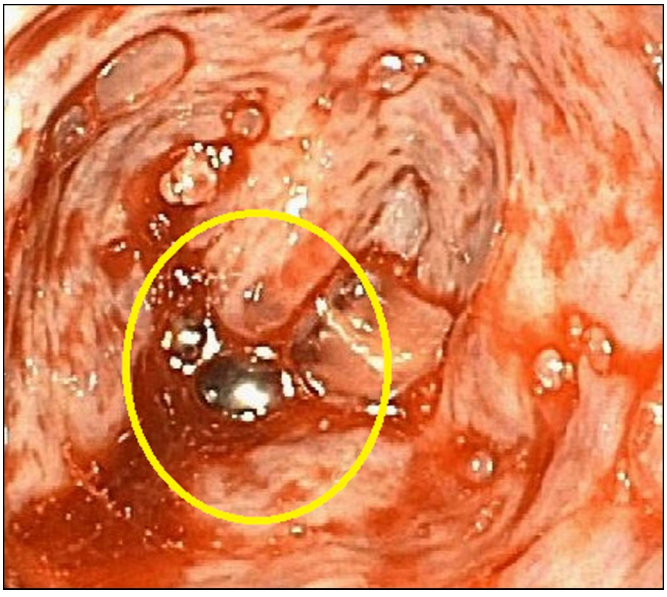

Figure 1. Endoscopic images showing actively bleeding esophageal varix (yellow circle) before variceal band ligation.

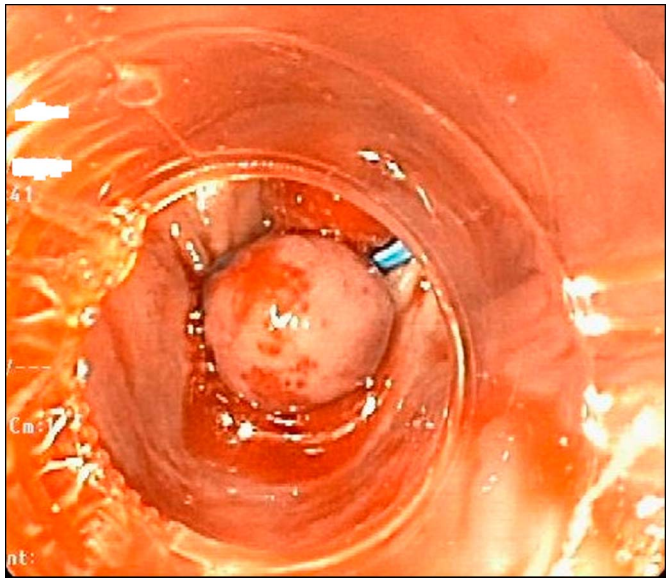

Figure 2. Endoscopic images showing cessation of variceal bleed after endoscopic variceal band ligation.

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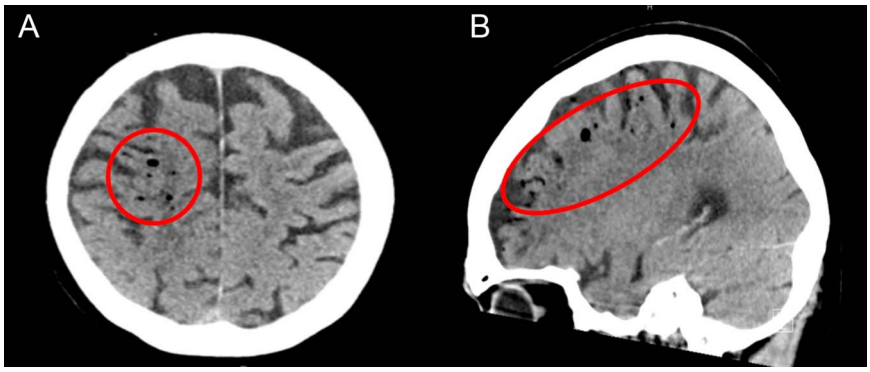

Figure 3. (A) Axial and (B) sagittal views of cranial computed tomography showing diffuse foci of air (red circles) in the right parietal lobe.

shunt with injection of agitated saline. Goals of care discussions were held with her family, and she was discharged to hospice with residual left hemiparesis and dysarthria.

There are several reported cases of cerebral air embolism (CAE) after endoscopy, most often after endoscopic retrograde cholangiopancreatography.[1] To our knowledge, this is only the second case of CAE in a patient with esophageal varices after band ligation.[2] López et al described various postulated mechanisms including the presence of a communication between the air source and vasculature in the setting of a high-pressure gradient during insufflation.[3] Air insufflators generate positive pressure as high as 45 kPa, much higher than variceal pressures; as such, one can envision air embolization if there is a venous bleeding defect.[2,4] Venous (portal or hepatic) air may then travel from the superior vena cava, in a retrograde fashion, to the cerebral venous system or gain entry to the arterial circulation via a shunt (eg, patent foramen ovale or arteriovenous malformation) or by merely traversing the pulmonary capillary bed.[1,2,5] This ultimately leads to vascular occlusion causing cerebral infarction. In our case, air insufflation was set on low pressure, and appropriate suction was applied while banding varices.

Failure to emerge from anesthesia or the presence of focal neurological deficits should prompt consideration of this complication. Emergent cranial CT should be obtained because diagnostic yield declines with time because of reabsorption of air from cerebral arterioles.[3] Hyperbaric oxygen therapy remains the cornerstone of treatment for CAE, with the best prognosis if initiated within the first 5 hours, although benefit has been demonstrated up to 30 hours.[1,3] In conclusion, although EGD is a common and safe procedure, a rare yet fatal complication can be CAE. For any neurological change after endoscopic intervention, CAE should be kept in the differential diagnosis.

DISCLOSURES

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