G52 Cerebral Air Embolism: An Uncommon Complication of a Common Procedure

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The goal of this presentation is to describe air embolism which is an uncommon but potentially fatal complication of esophagogastroscopy.

Forensic pathologists should be made aware of this uncommon complication as endoscopy is a commonly performed procedure. Cerebral air embolism can occur in the absence of an obvious right-toleft shunt. Careful review of imaging studies may be helpful in confirming the diagnosis and cause of death.

Esophagogastroscopy is routinely performed at most hospitals and is considered a very safe procedure. The two most common major and potentially life-threatening complications are perforation and bleeding. Another rare and potentially fatal complication of this procedure is cerebral air embolism. We present an example of cerebral air embolism following esophagogastroscopy eventuating in patient death.

The patient, a 71-year-old female, presented to hospital with a history of chronic abdominal and back pain. Investigations revealed a decreased hemoglobin level and her stool tested positive for occult blood. She underwent esophagogastroscopy to try to identify a bleeding source. Several abnormalities were identified including three small linear ulcers at the distal esophagus, a prepyloric ulcer, and an abnormal inflamed area within the duodenal cap. Biopsies of the stomach and duodenum revealed chronic active gastritis and duodenitis. Fragments of hepatic parenchyma were also present in the duodenal biopsy.

Immediately following the procedure, the patient develped an acute decline in her level of consciousness. She did not respond to verbal or painful stimuli. Her pupils were equal and pinpoint. She had a bilateral positive Babinski sign.

An emergency CT scan of her head demonstrated air within the arterial and venous cerebral vasculature. The cranial bones were normal. Bifrontal cortical infarcts involving the middle cerebral and the anterior cerebral artery territory were identified on a repeat CT scan performed 3 days later.

The patient's condition did not improve and she expired 6 days after endoscopy. Autopsy confirmed the presence of a 3 cm duodenal ulcer with penetration into the liver and associated peritonitis. Bilateral, hemorrhagic, frontal, recent infarcts were evident grossly and confirmed microscopically. Examination of the heart did not reveal a right-to-left shunt. Bilateral bronchopneumonia, involving all lung lobes, was identified in the lung tissue sections.

Given her large duodenal ulcer that penetrated into her liver, we suspect that air, introduced at endoscopy under insufflation pressure, entered into the venous circulation, either through an exposed vein or through dissection into the hepatic sinusoids. The air then likely ascended to the right atrium, followed by the right ventricle, the lungs, through an unidentifiable pulmonary shunt, the left atrium, the left ventricle, the cerebral arterial circulation with resultant infarcts in the territories of the middle and anterior cerebral arteries.

Only a few cases of cerebral artery air embolism following esophagogastroscopy have been previously documented. In the absence of an intracardiac shunt, proposed alternative mechanisms for paradoxical air embolism include intrapulmonary shunts and transcapillary routes, both of which will likely be unidentifiable at autopsy. As intravascular air is rapidly absorbed, the obtainment of emergency head CT images is critical to the diagnosis and, in this case, the determination of the proximate cause of death. Delays in imaging would likely result in a failure of diagnosis and possibly a wrong or undetermined cause of death.

Cerebral arterial air embolism is a rare, potentially fatal complication of esophagogastroscopy and can occur in the absence of intracardiac shunts. Keys to diagnosis are awareness of this complication and the early obtainment of good quality head CT images following symptom development.

Embolism, Esophagogastroscopy, Fatality

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