Cerebral Arterial Air Embolism Associated with Esophageal Carcinoma

Key words: self-expanding metal stent, esophago-pulmonary venous fistula, pneumocephalus

Figure 1. The cranial CTs revealed small, round spotty foci of distinct low density in the watershed areas between the territories of the middle cerebral and anterior cerebral / posterior cerebral arteries. No brain edema was associated.

Figure 2. The repeated CTs 24 hours later showed diffuse cerebral swelling, obscuring the sulci.
An 82-year-old woman, treated for Parkinson disease for the previous 8 years, developed carcinoma of the esophagus 3 years earlier. Following radiation therapy, two self-expanding metal stents were inserted into the mid-esophagus. She suddenly developed the loss of consciousness and quadriplegia just after she drank a glass of water. When brought to the emergency ward, she was in a coma with central neurogenic hyperventilation. Blood pressure was 99/59 mmHg, heart rate 105/min, and body temperature 39.2°C, and, ten minutes later, the blood pressure fell to 52/27 mmHg. The cranial CTs showed spotty foci of low density in bilateral frontal, parietal, and occipital lobes (Fig. 1). The repeated CTs 24 hours later showed a profound diffuse cerebral swelling by which the cerebral sulci were obscured (Fig. 2). She never regained consciousness, and two days later she died of central herniation and DIC. The blood culture on admission was positive for unidentified aerobic and anaerobic Gram-positive bacilli and Candida glabrata. An autopsy was not performed.

The cerebral arterial air embolism is rarely encountered. The brittle carcinomatous tissue of the esophagus dilated with stents might have formed a small esophago-pulmonary venous fistula. The esophageal intraluminal pressure at rest (−5—10 mmHg) is lower than the pulmonary venous pressure (6—10 mmHg). The intraluminal pressure upon swallowing was likely elevated to 20—30 mmHg, and thus the fistula permitted air and tissue debris to enter into the systemic circulation via the heart, giving rise to the cerebral air embolism and septic shock. In a literature survey, no similar case was found in which the esophageal stenting for the cancer was a route of entry of air into the general circulation and thus the cause of cerebral air embolism.

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