An atrioesophageal fistula is a rare but lethal complication that develops a week to several weeks after the pulmonary vein isolation for atrial fibrillation. Because the thermal injury resulting from radiofrequency energy application peaks within a few days, the ischemic or gastric reflux injury that progresses during the following weeks was assumed to play a pivotal role in the delayed development of this complication. However, no report has ever precisely described the nature of the ischemic injury. Here, we report a case of an esophageal ulceration that developed after an early endoscopic surveillance that was assumed to be the result of the ischemic injury observed in patients receiving extensive pulmonary vein isolation for atrial fibrillation.

A 55-year-old man with a symptomatic paroxysmal atrial fibrillation underwent extensive pulmonary vein isolation under conscious sedation. After a simultaneous pulmonary vein angiogram and esophagogram (Figure 1A), the extensive pulmonary vein isolation was carried out with an open-irrigation-tip catheter (ThermoCool, Biosense, Webster, Diamond Bar, CA). A maximum of 15 to 20 W with a duration of 20 to 30 seconds was delivered on the left atrial posterior wall (Figure 1B), and 50-second intervals were used to avoid temperature stacking. The extensive pulmonary vein isolation was accomplished uneventfully, and a prophylactic proton pump inhibitor was initiated from the day of the procedure. On postablation day (PAD) 1, bloating of the stomach appeared, and periesophageal nerve injury was suspected. On PAD 4, an endoscopy was scheduled to exclude the possibility of an esophageal ulceration. The stomach was filled with retained food as a result of the periesophageal nerve injury (Figure 1C), but neither an esophageal ulceration nor reflux esophagitis was present (Figure 1D and 1E). Because a gastric cancer-like lesion was detected (Figure 1C), the endoscopy was rescheduled on PAD 14. The cancer-like lesion resolved, but the development of an esophageal ulceration was detected in the anterior portion of the esophagus (Figure 2A). Because
no progression of the gastric reflux injury was observed with the proton pump inhibitor (Figure 2B), ischemic injury was suspected as the mechanism. After another 14 days (PAD 28) without any signs of fever or chest discomfort, an endoscopy was performed with careful CO₂ insufflation (Figure 2C). The esophageal ulceration improved, and the patient was discharged with a proton pump inhibitor. The scar resolved gradually and was still visible by PAD 55 (Figure 2D).

To the best of our knowledge, this is the first clinical case report to describe the nature of the ischemic injury associated with an esophageal ulceration. The specific features of this injury were both the delayed development and the delayed healing resulting from the compromised blood flow. Many previous studies have described the prevalence in or characteristics of patients with thermal injury detected by early endoscopic surveillance, but the nature of the ischemic injury remained unknown. This case reminds us that early endoscopic surveillance performed within a few days after the extensive pulmonary vein isolation could miss the development of the ischemic injury. Our observation strongly supports the 2-hit phenomenon hypothesis as a mechanism of an atrioesophageal fistula formation.\(^3\) When the thermal injury was accompanied by ischemic injury, the recovery of the lesion volume due to thermal injury became delayed and lesion volume became even greater during the several weeks that followed, leading to an atrioesophageal fistula formation.

A gastric reflux injury had been proposed as another mechanism of a delayed atrioesophageal fistula formation.\(^4\) However, the prophylactic use of a proton pump inhibitor in our case had prevented the development of gastric reflux injury even in the presence of periesophageal nerve injury. Therefore, ischemic injury was assumed to be the key pathogenesis of the atrioesophageal fistula formation.

**Disclosures**

None.

**References**

Ischemic Esophageal Ulceration That Developed After an Early Endoscopic Surveillance in a Patient Receiving Catheter Ablation for Atrial Fibrillation
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