Case Report

Atrioesophageal Fistula After Atrial Fibrillation Ablation: A Case Report

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ABSTRACT

Atrioesophageal fistula (AEF) formation is an extremely rare complication, with an incidence of 0.03% and mortality of up to 93% without surgical treatment. Even with surgical intervention, mortality can be as high as 20%. Patients with AEF present with a broad array of symptoms but typically develop neurologic symptoms, fever, and hematemesis 1-6 weeks after ablation, with rapid deterioration. Therefore, prompt diagnosis and referral for surgery is of utmost importance to reduce mortality stemming from this serious complication.

CASE

A 57-year-old man with history of atrial fibrillation (AF) ablation is a treatment option for symptomatic refractory AF. Atrioesophageal fistula (AEF) formation is an extremely rare complication, with an incidence of 0.03% and mortality of up to 93% without surgical treatment. Even with surgical intervention, mortality can be as high as 20%.

Patients with AEF present with a broad array of symptoms but typically develop neurologic symptoms, fever, and hematemesis 1-6 weeks after ablation, with rapid deterioration. Therefore, prompt diagnosis and referral for surgery is of utmost importance to reduce mortality stemming from this serious complication.

On day 2 of hospitalization, the patient became confused and lethargic, and developed new left-sided hemiparesis. He was febrile to 40°C and tachycardic to 180 beats per minute. A repeat electrocardiogram showed persistent atrial flutter. Repeat lab tests showed leukocytosis of $15 \times 10^9$/L, and a lactic acid level of 4 mmol/L. Given his clinical deterioration despite sepsis treatment, and history of recent ablation, AEF was suspected. A chest CT with oral and intravenous contrast showed contrast extravasation from the esophagus into the left atrium, confirming a diagnosis of AEF (Fig. 1). An initial CT scan of the brain showed no acute parenchymal disease, but a repeat scan showed diffuse right cerebral infarcts. The patient subsequently became hypotensive, requiring vasopressors and intubation for airway protection. Antibiotic coverage was broadened, and an amiodarone drip was started. The patient was emergently transferred to a cardiothoracic surgery center where he underwent a 2-stage surgery for left atrial (LA) wall repair with pericardial pledgets and esophageal wall repair with a vascularized serratus anterior muscle flap. The patient was...
extubated on postoperative day 1 and remained in stable condition. He was discharged 3 weeks later to a rehabilitation facility, with persistent left-sided weakness.

**Discussion**

AF ablation is a widely performed procedure for symptomatic, refractory AF. The 2 technologies currently used for ablation are cryoballoon and radiofrequency ablation, both of which have similar efficacy and safety profiles.1

AEF is a highly concerning complication of ablation that can occur from thermal damage to the esophagus that occurs during ablation of the posterior LA wall. One study reports that the risk of AEF may be associated with the use of general anesthesia, non-brushing ablation technique, and higher-energy settings.2 Additional publications, however, have reported a decreased temperature elevation of the esophagus and less esophageal injury, which may be protective against AEF formation if a high-power short-duration approach is used rather than a low-power long-duration ablation technique.3

AEF formation is believed to occur from esophageal ulceration secondary to thermal damage that leads to formation of a 1-way valve fistula from the esophagus to the left atrium.4 Methods of esophageal protection, including periprocedural proton-pump inhibitor use and mechanical displacement of the esophagus away from the catheter tip, did not reduce esophageal injury. Intracardiac echocardiography and esophageal temperature monitoring are methods that may reduce the likelihood of esophageal injury, but only limited data support use of one method over the other. The only variable that reliably confirms esophageal protection is minimizing catheter energy during ablation, but this approach can reduce efficacy of the procedure. Higher catheter energy but a shorter duration has also been shown to be more protective than a longer duration with lower catheter energy.5

Moreover, a novel technique known as pulsed field ablation uses a nonthermal approach for pulmonary vein isolation, and a recent study showed promising outcomes relating to safety and efficacy with this method.6

Symptoms of AEF typically manifest 2-4 weeks after ablation, and they are variable, but infectious and/or neurologic symptoms are common. Hematemesis may also be present in AEF; however, in these cases, esophagogastroduodenoscopy should be avoided due to the risk of air embolism during insufflation. Any patient who has undergone ablation should in fact avoid all insufflation, including bronchoscopy, gastroscopy, and inadvertent esophageal intubation within the 5-week postablation window, due to the risk of AEF. Our patient presented with infectious symptoms and rapidly developed neurologic symptoms, presumably from embolic phenomena, which prompted further investigation of AEF. In retrospect, reviewing the initial CT angiogram of the chest suggests that a small air pocket is near the left atrium; however, this study had significant motion degradation, and not all radiologists reviewing the imaging can determine whether this finding was an artifact or was diagnostic. Because AEF is rare and initially presents as sepsis, prompt diagnosis can be challenging. Therefore, a crucial need is for clinicians to maintain a high index of suspicion for this deadly complication in all patients with recent ablations who present for infectious symptoms, even if fever is absent.8

AEF workup should include CT of the chest, with oral and intravenous contrast. (A) Sagittal view showing contrast extravasation from the esophagus to the left atrium (arrow). (B) Cross-sectional view showing oral contrast extravasation (yellow arrow) and extraluminal air (white arrow).
to the suspected defect prior to administering oral contrast, suggesting that the left side of the lesion was the likely culprit (Fig. 2). Also crucial is that oral contrast be administered immediately prior to the scan, due to the short esophageal transit time. Contrast extravasation from the esophagus is diagnostic.

Once AEF is diagnosed, early referral to cardiothoracic surgery is necessary to reduce morbidity and mortality. Surgical repair involves resecting the fistula tract and patching of the esophageal and LA defects. Prior to surgery, broad-spectrum antimicrobials are warranted and should cover oral flora as well as fungi, given the esophageal content exposure.

In conclusion, AEF is a serious, potentially fatal complication of AF ablation. We emphasize early imaging to exclude AEF in all patients who have undergone recent AF ablation and present with infectious or neurologic symptoms. Surgery is the only definitive treatment, and every effort should be made to expedite diagnosis and referral for surgical repair.

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![Figure 2. Anteroposterior chest X-ray showing the tip of the nasogastric tube in the proximal esophagus (arrow).](image-url)