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# Atrial-Esophageal Fistula After Catheter Ablation: Diagnosing and Managing a Rare Complication of a Common Procedure

Authors' Contribution:  
Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
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**Conflict of interest:** None declared

**Patient:** Male, 67  
**Final Diagnosis:** Atrial-esophageal fistula  
**Symptoms:** Chills • fever  
**Medication:** —  
**Clinical Procedure:** —  
**Specialty:** Cardiology

**Objective:** Challenging differential diagnosis





**Background:** Atrial fibrillation is considered the most common cardiac arrhythmias in the United States with rate and rhythm control strategies traditionally used for management. If patients are intolerant to class I or class III anti-arrhythmic medications, catheter ablation may be used as a rhythm control strategy. As catheter ablation becomes more commonplace, so too do the procedure-related complications, which include tamponade, total arteriovenous fistula, pulmonary vein stenosis, and atrial-esophageal fistula.

**Case Report:** A 67-year-old male underwent catheter ablation for atrial fibrillation and subsequently presented with complaints of fever and chills. Initial workup for a source of infection included a computed tomography (CT) scan and transesophageal echocardiogram which did not reveal any abnormalities. Antibiotic therapy was initiated, and multiple CT scans were performed; eventually patient was found to have an atrial-esophageal fistula, secondary to thermal injury. The patient underwent thoracotomy and full thickness necrosis of the posterior left atrium and pericardium near the base of the left inferior pulmonary vein was visualized, with a roughly nickel sized orifice, which was repaired. The patient had an uneventful recovery and was doing well on follow-up.

**Conclusions:** Atrial-esophageal fistula is a rare but lethal complication of atrial fibrillation ablation. While imaging modalities have improved and can detect the condition, they can also yield ambivalent findings which can challenge patient care. It is important for clinicians to maintain a heightened awareness of this complication in post-ablation patients and utilize clinical history and not rely solely on imaging to diagnose and treat this complication.

**MeSH Keywords:** Atrial Fibrillation • Delayed Diagnosis • Esophageal Fistula • Postoperative Complications

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## Background

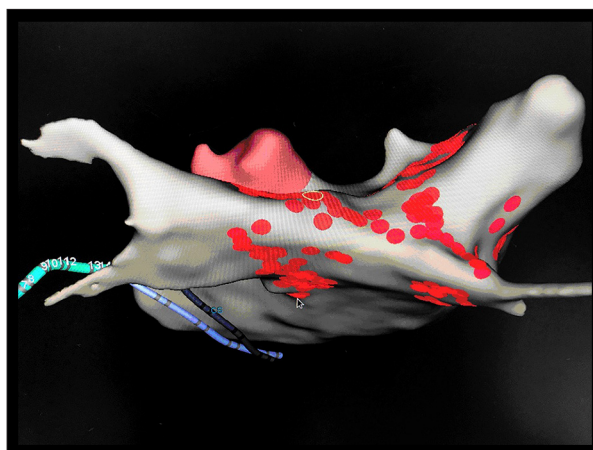
Atrial fibrillation is considered the most common cardiac arrhythmia with an estimated prevalence of 2.7 to 6.1 million patients in the United States [1]. The risk of developing atrial fibrillation increases with age, and other risk factors include hypertension, diabetes, congestive heart failure, left atrial enlargement, and hyperthyroidism [2]. Patients with atrial fibrillation are at an increased risk of experiencing cerebrovascular accidents compared to the general population. Current guidelines for treatment include risk stratification using the CHA<sub>2</sub>DS<sub>2</sub>-VASc score to guide anticoagulation strategy and the use of either rhythm or rate control medications.

When using a rhythm control strategy, class I indication is to use an atrial fibrillation catheter ablation for patients with symptomatic paroxysmal atrial fibrillation who are intolerant to at least one class I or class III anti-arrhythmic medications [3]. Class IIa indications for atrial fibrillation catheter ablation include patients with symptomatic persistent atrial fibrillation that is refractory or intolerant to at least one class I or III anti-arrhythmic medications or patients with recurrent symptomatic paroxysmal atrial fibrillation where catheter ablation as the initial rhythm control strategy before anti-arrhythmic trials [3].

However, as catheter ablation becomes more commonplace, so do the associated complications, some potentially life-threatening, that arise with the procedure. Cardiac tamponade is a major cause of mortality along with transient ischemic attack, total femoral pseudoaneurysm, total arterio-venous fistula, total femoral pseudoaneurysm, valve damage requiring surgery, pulmonary vein stenosis requiring intervention, and pneumothorax [4]. A less common complication that can be devastating is an atrial-esophageal fistula (AEF), which occurs in 0.04% of procedures [4]. AEF is associated with major cerebrovascular accidents and leads to death in 80% of cases [5]. The pathophysiology of this condition is thought to be due to energy delivery during the ablation, although even when the esophageal temperature is kept less than 39°C, 17% of patients were found to have esophageal lesions [6]. Patients can present up to a month after the procedure with chest pain, fever, altered mental status, or tonic-clonic seizures [7,8]. With the advancements in medical imaging technology and improved quality of images, AEF should become easier to diagnose, although that is not always the case. We herein present a not so straightforward case of AEF and identify the clinical challenges associated with diagnosing this rare complication and subsequent management.

## Case Report

A 67-year-old male with past medical history of hypertension and symptomatic atrial fibrillation underwent a comprehensive

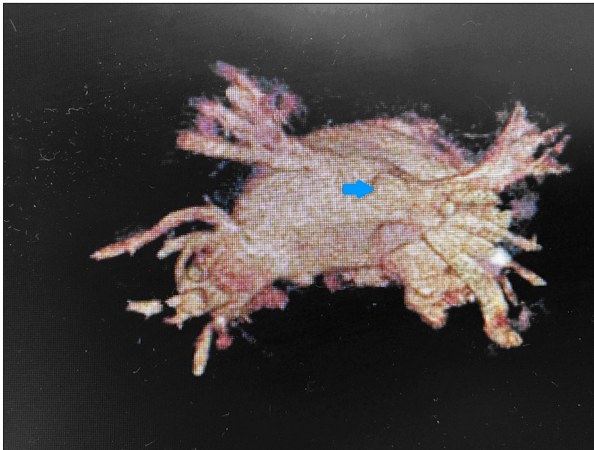


**Figure 1.** Areas of ablation delivery: A 3-dimensional reconstruction from the EnSite™ NavX™ Navigation and Visualization Technology system showing a posterior-anterior view of the left atrium identifying areas where radiofrequency ablation was delivered.

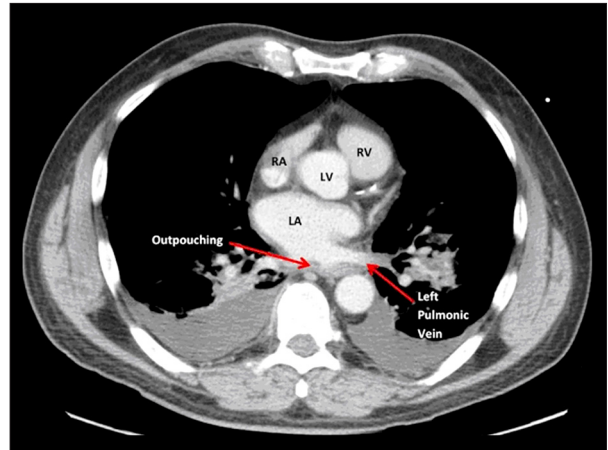
electrophysiology study with ablation and pulmonary vein isolation along with left and right atrial mapping. The patient was sedated and placed under anesthesia at which point a right heart catheterization was performed with fluoroscopy guidance and multiple catheters were placed in the high right atrium, bundle of His, coronary sinus, and the left atrium. A double transseptal technique was utilized to access the left atrium guided by fluoroscopy, pressures, and an intra-cardiac echocardiogram.

Pulmonary vein isolation was confirmed after a circular antral ablation with the absence of pulmonary vein potentials documented by Lasso recording. We documented exit block by pacing distal to the circular lesion site and confirming lack of left atrial capture. A 3-dimensional mapping system, NavX™, was used to reconstruct the left atrium antral regions and pulmonary veins with projection of the mapping and ablation catheters on the image in real time for visualization of the lesions. Continuous deployment of radiofrequency ablation was performed with Tacti Cath ablation catheter (St. Jude) targeting a minimal force of 10 g and maximal force of 20 g, with catheter movement every 400 g/sec force time integral (FTI) with 30 W of power used on the anterior aspect of the left atrium and 25 W on the posterior aspect of the left atrium (Figure 1).

Subsequently, an isoproterenol challenge was performed to find any evidence of premature atrial contraction triggers or for induction of paroxysmal atrial fibrillation with high doses of isoproterenol, but only an accelerated junctional rhythm was visualized with the infusion of isoproterenol. We waited for 10 to 15 minutes after each pulmonary vein isolation to check for any evidence of reconnections. Once isolation of the pulmonary veins was confirmed, the catheters and sheaths were



**Figure 2.** Left atrium outpouching: A 3-dimensional computed tomography reconstruction demonstrating the left atrium in posterior-anterior view showing outpouching superior and medial to the right inferior pulmonary vein.



**Figure 3.** Left atrium outpouching: Computed tomography of the thorax with intravenous contrast significant for outpouching along the posterior wall of the left atrium, thought to be consistent with a pseudoaneurysm or atrial-esophageal fistula.

removed. Intra-cardiac echocardiogram images post ablation did not reveal any evidence of pericardial effusion.

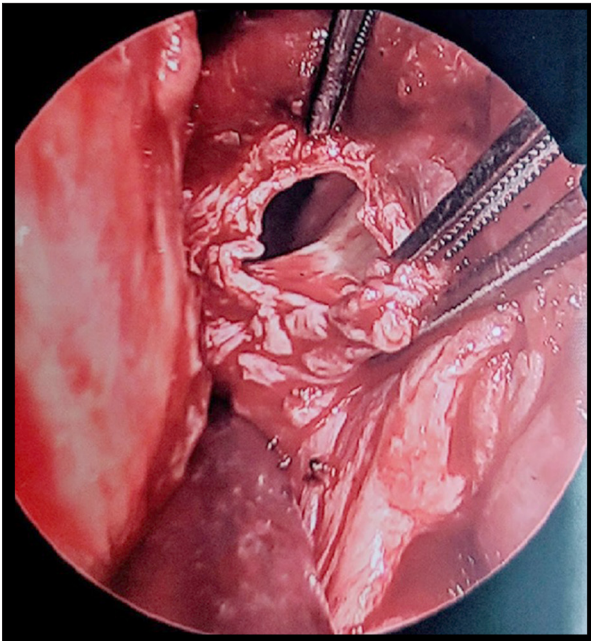
Four weeks after the procedure, the patient had a recurrence of atrial fibrillation and underwent an electrical cardioversion. Two days after the cardioversion, the patient presented to the hospital with complaints of chills, subjective fever, and generalized body aches. The patient was noted to be febrile on admission and the initial chest x-ray did not reveal evidence of pneumo-pericardium. An emergency computed tomography (CT) scan of the chest and abdomen with contrast did not reveal any evidence of a pericardial effusion or distal esophageal fistula. A transthoracic echocardiogram was also performed and did not reveal any acute abnormalities other than a small atrial septal defect. The patient was then started on broad-spectrum antibiotic therapy with vancomycin, cefepime, and metronidazole in addition to fluconazole. A repeat chest x-ray revealed increased right perihilar airspace disease possibly related to pneumonia which was thought to be the cause of the patient's symptoms at the time. A CT scan of the abdomen and chest with contrast was repeated 2 days after admission, and outpouching along the posterior wall of the left atrium at the insertion site of the left inferior pulmonary vein was noted to be consistent with a pseudoaneurysm with a possible fistula (Figures 2, 3), a finding not noted on the initial CT scan 2 days earlier. A third CT scan of the thorax with oral contrast was performed later that day which did not reveal any findings of an esophageal leak or fistula, although there was patchy airspace disease noted bilaterally.

Initial blood cultures were positive for *Streptococcus intermedius*, thought to be a contaminant, and repeat blood cultures were performed. While the blood cultures were pending,

the patient was improving clinically and further evaluation with a transesophageal echocardiogram or endoscopy was not performed due to concerns for a tracheoesophageal fistula. A fourth CT scan of thorax performed on hospital day 7 again revealed a focal outpouching along the posterior wall of the left atrium at the insertion site of the left inferior pulmonary vein that was concerning for pseudoaneurysm, but was stable since the prior study. There was no definitive extravasation of the contrast into the lumen of the esophagus definitive for a fistula although the outpouching was inseparable from the anterior wall of the esophagus. With conflicting findings on multiple CT scans and gastrointestinal tract flora identified on blood cultures with intermittent worsening of symptoms, the decision was made to proceed with an exploratory thoracotomy for further evaluation of a possible thermal injury with rupture and self-containment. The repeat blood cultures had been negative until this point.

An exploratory left thoracotomy was performed and the esophagus posterior to the left atrium and pericardium had very dense adhesions with difficult dissection. An attempt was made to separate the esophagus from the left atrium but there was bleeding and dissection could not be performed safely. A cardiopulmonary bypass was instituted, in the remainder of the dissection, and was carefully performed and the esophagus, the left atrium, and the pericardium were completely separated. There was a full thickness necrosis of the posterior left atrium and pericardium near the base of the left inferior pulmonary vein.

The resultant orifice was noted to be approximately the size of a nickel and an autologous pericardial patch was used to repair this opening (Figures 4, 5). The esophagus was also inspected carefully and there was no obvious opening or injury

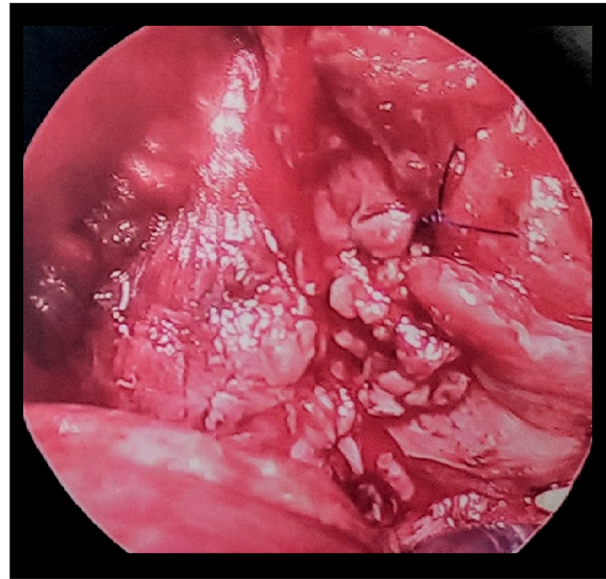


**Figure 4.** Left atrium necrosis: Exploratory left thoracotomy revealed a full thickness necrosis of the posterior left atrium and pericardium near the base of the left inferior pulmonary vein approximately 21 mm in diameter.

that was identified from an external inspection. An intraoperative esophagogastroduodenoscopy (EGD) with insufflation of air while the esophagus was submerged under saline was performed and there was no air leak appreciated. It was noted that there was a small dimple on the anterior surface of the esophagus close to the location of the left atrium, which was likely a remnant from a prior, naturally healed, esophageal fistula. A bovine pericardium was then placed between the left atrium and the esophagus, and the patient was weaned off cardiopulmonary bypass. The patient was then sent to the cardiovascular intensive care unit for further monitoring and continued to recover well from the procedure.

## Discussion

AEFs are a rare and potentially serious complication of atrial fibrillation catheter ablation with a reported incidence of 0.015% to 0.04%, with the rate thought to be underreported due to low response rates on surveys and misdiagnosis [9]. AEF is the second highest cause of mortality associated with procedural complications, with the mortality rate of 40% to 100% thought to be due to a delay in diagnosing the condition and the complicated surgical procedure required to treat the condition [9]. Even when the condition is identified, patients have a high risk of mortality [10]. Interestingly, while mucosal changes such as ulcers and erythema can be visualized on



**Figure 5.** Repaired fistula: Successful repair of the atrial-esophageal fistula with an autologous pericardial patch.

EGD in many cases, in 27% of patients, structural mediastinal changes were only found on endosonography [11]. Clinicians must maintain a high suspicion for this complication when patients present with chest pain, fever, and chills after catheter ablation for atrial fibrillation. However, despite having a high pretest probability, the condition might still be difficult to diagnose, as seen in our case where the patient underwent multiple CT scans with conflicting findings.

This case illustrates the importance of not relying solely on radiographic data to diagnose AEF. The first CT scan for our patient did not reveal any evidence of fistula formation, although the clinicians involved in the patient's care were aware of the possibility of AEF and continued to have AEF in the differential diagnosis. Subsequent CT scans revealed conflicting findings which lead to the physicians using the clinical history and presentation to guide management. The clinical history of a patient's symptoms can add useful information and the microbiological data can help diagnose the complication. In our case, the ambivalent findings on 4 different CT scans likely delayed the diagnosis and, consequently, the treatment. However, we continued to have a high clinical suspicion for the complication and blood cultures eventually revealed bacteremia from gastrointestinal flora, which helped solidify the diagnosis and treatment of the patient surgically, which saved his life.

As novel techniques to treat longstanding diseases are being developed and becoming more commonplace, it is imperative for clinicians to remain cognizant of potential complications of these procedures. Understanding the clinical manifestations of procedural complications helps diagnose these conditions

in a timely manner and results in prompt treatment. While medical imaging has improved significantly, it is imperative for clinicians to not rely solely on imaging to guide decision making, and to maintain a high clinical suspicion of potential complications. However, even with a high suspicion, it is crucial to remain vigilant of less obvious and uncommon manifestations which might help in the diagnosis of these conditions.

## Conclusions

AEF is a rare but lethal complication of catheter ablation for atrial fibrillation, likely mediated by thermal injury. Patients typically present with chest pain, fever, chills, and seizures, and

mortality is greater than 80%. Advances in imaging modalities have helped better detect the condition but can lead to ambivalent findings, as illustrated in our case, and subsequently challenge patient care. Clinicians must maintain a heightened sense of awareness of this complication in patients who have undergone atrial fibrillation ablation. As imaging might not always be reliable or able to unmask this condition, physicians must utilize clinical history and not solely rely on imaging to diagnose and treat this very serious complication of an increasing commonplace procedure.

## Conflicts of interests

None.

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