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CORONARY, PERIPHERAL, AND STRUCTURAL INTERVENTIONS

CLINICAL CASE

Retrieval of an Embolized Left Atrial Appendage Occluder From the Aortic Arch Using a Transcatheter Retrieval Device

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ABSTRACT

BACKGROUND Device embolization is a recognized complication of left atrial appendage occlusion (LAAO) procedures, with outcomes depending on the location of the embolized device and patient management.

CASE SUMMARY A 70-year-old male with atrial fibrillation underwent LAAO due to high bleeding risk. Postoperative surveillance revealed an Amplatzer Amulet device embolized in the transverse arch of the aorta. The patient remained asymptomatic, and transcatheter retrieval was planned. A percutaneous approach was used with the ONOCOR system and snare devices with successful retrieval. The patient recovered without complications and remained stable at follow-up.

DISCUSSION Device embolization often presents challenges, with clinical outcomes varying by location and timing of diagnosis. Minimally invasive transcatheter retrieval has proven effective in most cases. We discuss a successful application of the ONOCOR retrieval system for an Amulet device embolization.

TAKE-HOME MESSAGE Transcatheter retrieval is a safe and effective option in most cases of LAAO device embolization. (JACC Case Rep. 2025;30:104557) © 2025 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

HISTORY OF PRESENTATION

A 70-year-old male with atrial fibrillation (AF) underwent left atrial appendage occlusion (LAAO) due to a high risk of bleeding. Baseline transesophageal echocardiogram (TEE) showed a left atrial appendage size of 2.2 × 1.74 cm at the ostium (**Figure 1**). Computerized tomography angiography showed 1.76 × 1.78 cm at the ostium and 2.14 cm in depth (**Figure 2**). The discrepancy between the computerized tomography angiography and TEE occurred due to interoperator variability and hydration status. The choice of LAAO device was based on intraprocedural TEE measurements. He underwent an LAAO procedure with a 25-mm Amplatzer Amulet LAAO device (Abbott Laboratories) (**Figure 3**), and the CLOSE criteria (two-thirds of device lobe distal to the circumflex, device lobe compression, orientation of

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ABBREVIATIONS AND ACRONYMS

AF = atrial fibrillation

LAAO = left atrial appendage occlusion

TEE = transesophageal echocardiogram

device coaxial to left atrial appendage, separation of the disk and lobe, and elliptical shape of the disk) and tug test were performed before the device was released. He returned for surveillance TEE 45 days post-LAAO, which showed an embolized device in the transverse arch of the aorta (Figure 4). The aortic valve had trace aortic regurgitation. The patient denied any symptoms, and the physical exam was unremarkable. A multidisciplinary team discussed the case, including cardiothoracic surgery, vascular surgery, and structural interventional cardiology. The patient was recommended for transcatheter retrieval of the device.

PAST MEDICAL HISTORY

Past medical history was significant for paroxysmal nonvalvular AF status after pulmonary vein isolation, radiofrequency ablations and LAAO, multiple falls, hypertension, and hyperlipidemia.

DIFFERENTIAL DIAGNOSIS

A definitive diagnosis of Amulet device embolization (DE) was made based on TEE.

TAKE-HOME MESSAGES

- Left atrial appendage occlusion device embolization can be incidental or may cause acute symptoms.
- The management strategy depends on patient risk profile for surgery, location of embolization, and structural heart team's transcatheter experience.
- In most cases, a transcatheter retrieval can be successfully employed.

INVESTIGATIONS

A computerized tomography scan confirmed the device embolized to the transverse arch at the takeoff of innominate and left carotid arteries (Figure 5).

PROCEDURE DETAILS

The patient was brought to cardiac catheterization lab, and a baseline TEE was performed under general anesthesia. A micro-puncture kit was used to access the right common femoral artery with fluoroscopy and ultrasound guidance. Subsequently, 2 Perclose

FIGURE 1 Transesophageal Echocardiogram Prior to Left Atrial Appendage Occlusion Deployment

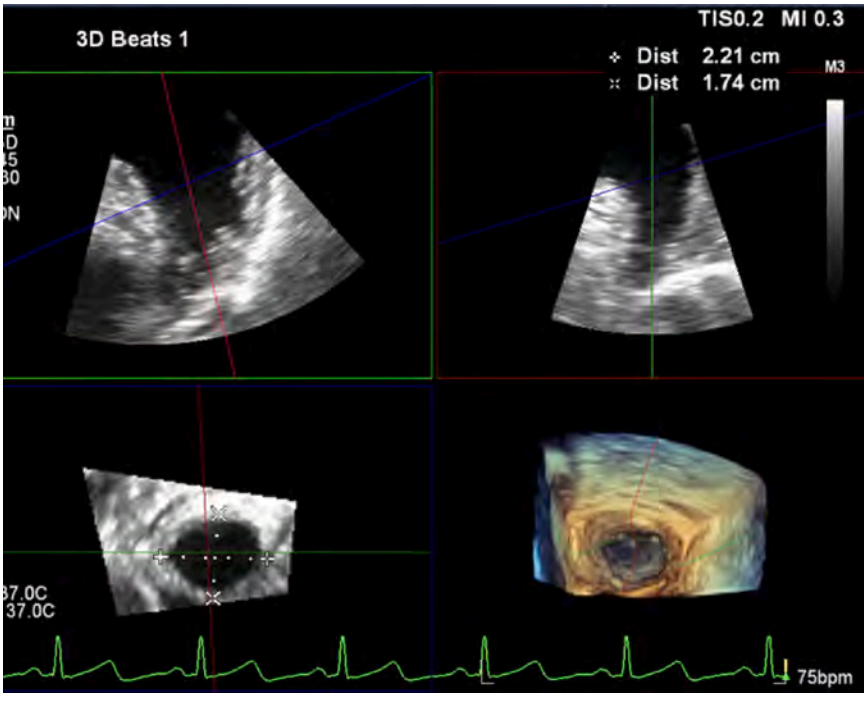


FIGURE 2 **Computerized Tomography Angiography of the Left Atrial Appendage Prior to Left Atrial Appendage Occlusion Procedure**

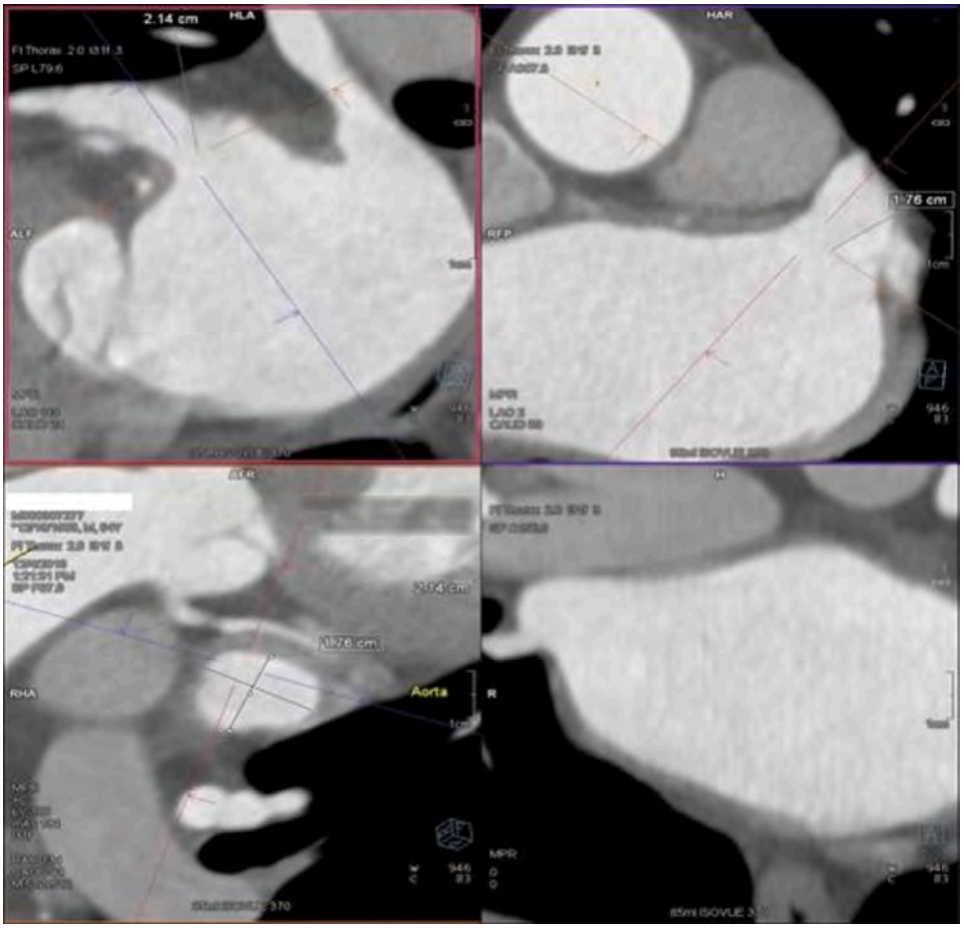
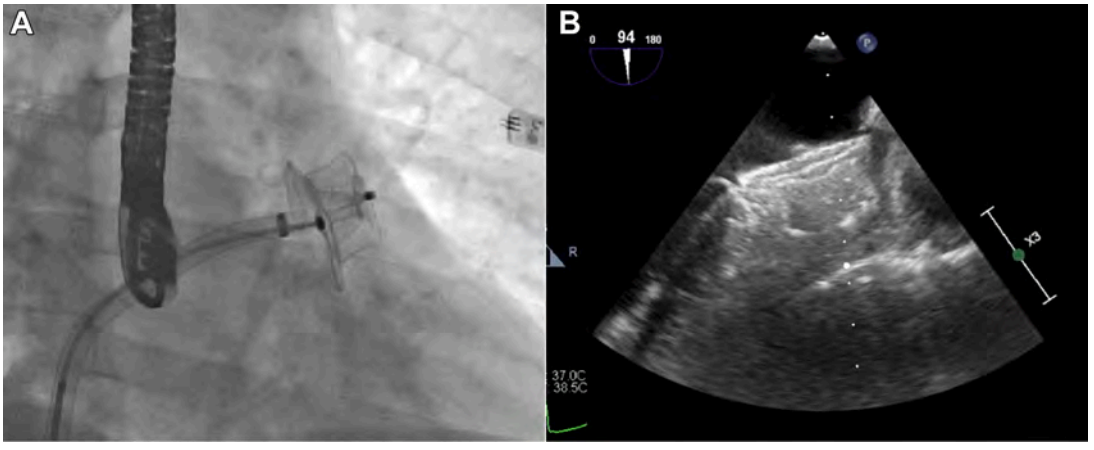
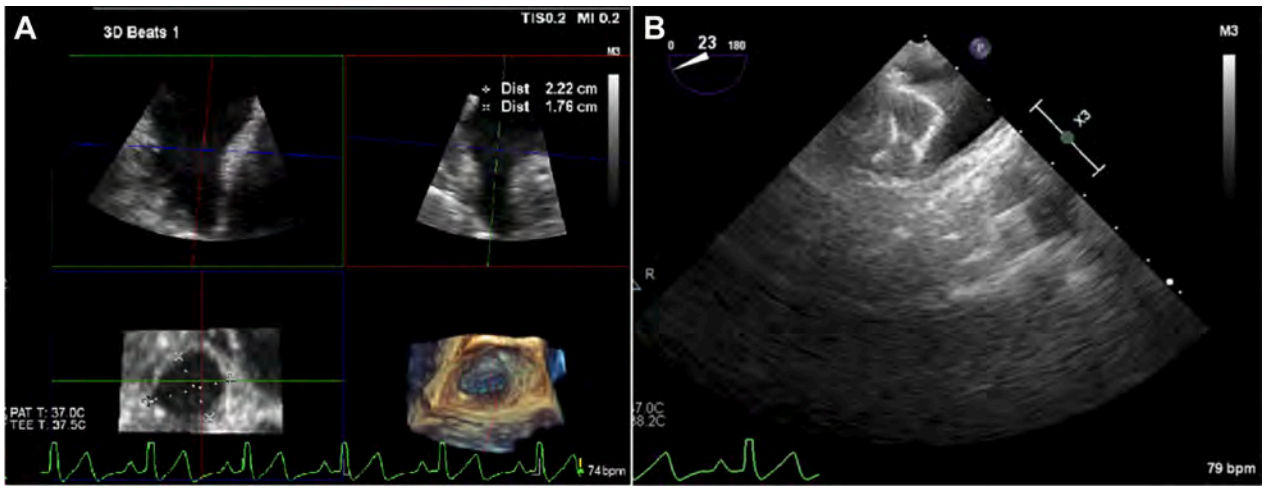


FIGURE 3 **Fluoroscopy and Transesophageal Echocardiography Images Showing Amulet Device Placement**



Fluoroscopic (A) and transesophageal echocardiographic (B) images demonstrating a well-seated Amulet LAAO placement. LAAO = left atrial appendage occlusion.

FIGURE 4 Follow-Up Transesophageal Echocardiogram

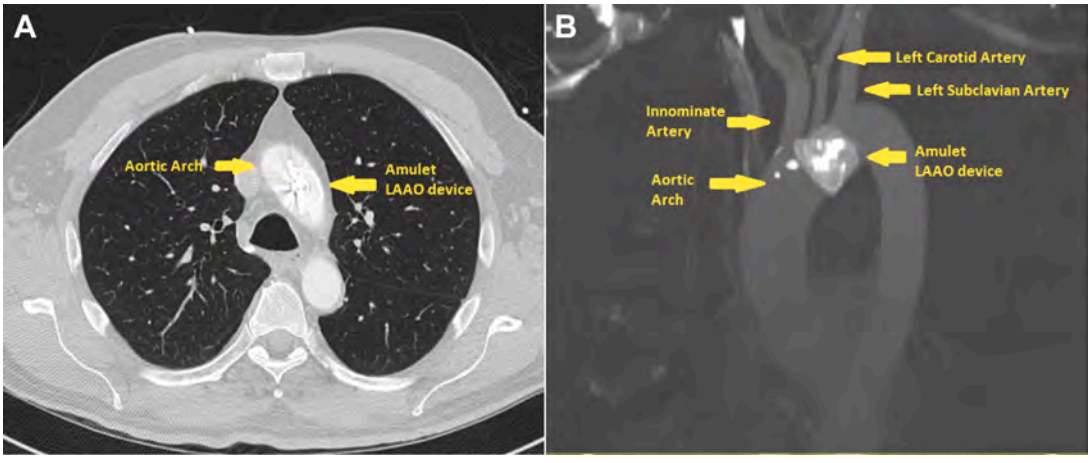


Transesophageal echocardiogram demonstrating the absence of the Amulet LAAO device in the left atrial appendage (A) and embolization to the transverse arch of the aorta (B). LAAO = left atrial appendage occlusion.

sutures (Abbott Laboratories) were placed using a preclose technique, and an 18-F Gore Dryseal sheath (W.L. Gore & Associates, Inc) was inserted. Then a 14-F double-curved Amulet sheath was advanced through it to the site of the embolized device. A 7-F Judkins Right-4 guide catheter was advanced, followed by Ensnare 18/30 mm (Merit Medical). Then the knob of the device located at the lobe was grasped. The device was attempted to be ensheathed into the 14-F sheath without success.

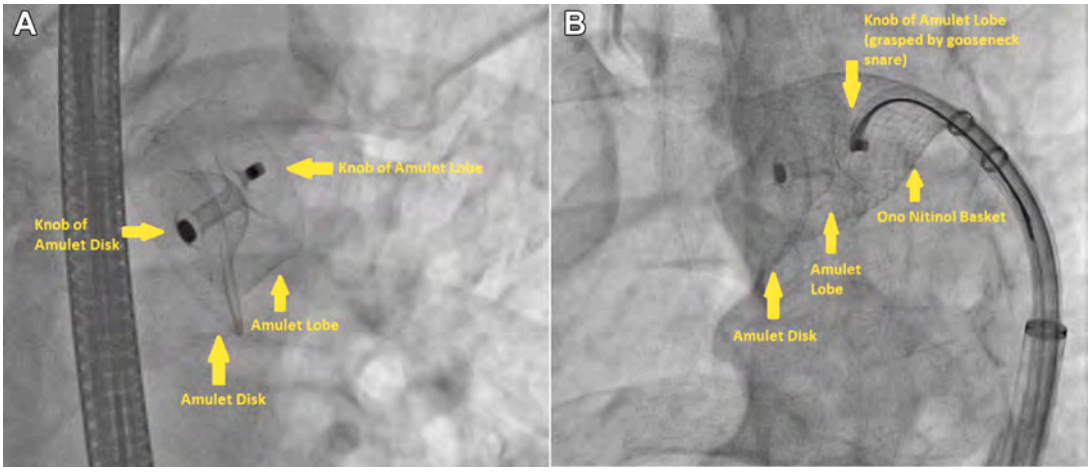
At this point, the ONO transcatheter retrieval system (ONOCOR, LLC) was advanced through a 14-F, double-curve, watchman sheath (Boston Scientific). The 7-F Judkins Right-4 guide catheter was then advanced through the ONO sheath, and a 30-mm gooseneck snare was used to grasp the knob on the

FIGURE 5 Computed Tomography Showing Dislodged Device



CT scan confirming placement of the Amulet LAAO device in the ascending aorta and aortic arch. CT = computed tomography; LAAO = left atrial appendage occlusion.

FIGURE 6 Fluoroscopy Images During Retrieval



Fluoroscopic images demonstrating the Amulet LAAO device in the ascending aorta (A), with an attempt of retrieval with the ONO retrieval and gooseneck snare devices (B). LAAO = left atrial appendage occlusion.

Amulet device. The ONO transcatheter-retrieval system was then used to ensheathe the Amulet device (**Figure 6**). The lobe of the Amulet device collapsed into the ONO basket, which was successfully retrieved into the 18-F sheath (Video 1) and removed from the body (**Figure 7**). All catheters and sheaths were withdrawn, and the pre-deployed Perclose sutures were tightened to achieve hemostasis. The patient was extubated and transferred to the intensive care unit in stable condition.

OUTCOME AND FOLLOW-UP

Postoperatively, the patient was monitored in the intensive care unit and was discharged on the second postoperative day on anticoagulation with apixaban for AF. The patient was seen in the follow-up clinic 2 weeks later without any complaints.

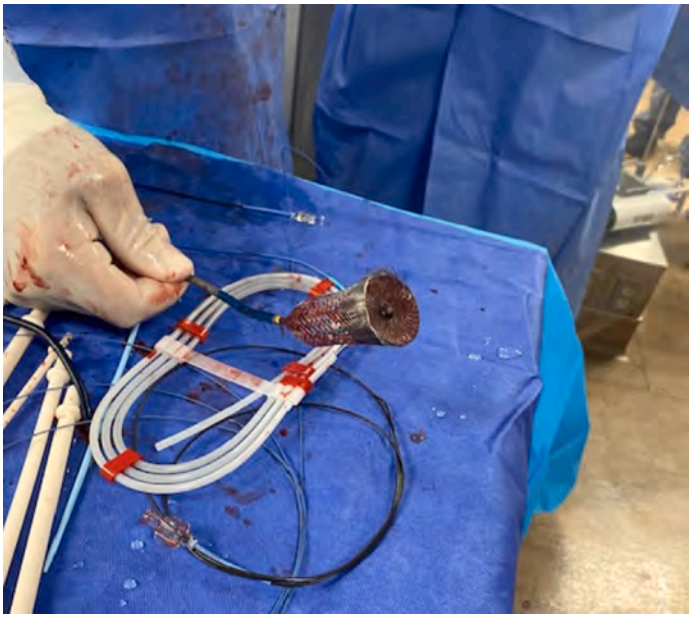
DISCUSSION

DE is a well-established complication of LAAO procedures. The timing and location of the embolization depend on several factors, including left atrial appendage anatomy, which is variable in size and shape.[1,2] The suspicion of DE in this case is from measurement variability in the patient's hydration status. This leads to several challenges when picking the correct type and size of the device.

Clinical manifestations of DE can vary from an incidental finding on imaging to cardiogenic shock or sudden cardiac arrest, depending on the location of embolization.[3] The most common embolization sites are typically the left atrium during the procedure and the descending aorta postoperatively.[4]

Strategies for successful device retrieval depend on multiple factors, including the type, size, and

FIGURE 7 Gross Specimen



Successful removal of the Amulet LAAO device within the ONO retrieval device. LAAO = left atrial appendage occlusion.

location of the embolized device, the timing of diagnosis, and the patient's clinical profile.[2] Transcatheter retrieval with forceps or snares—including with the ONO device—has been utilized in many instances successfully.[1,5] However, when LAAO devices embolize into the left ventricle and engage with the mitral valve apparatus, retrieval is typically more complex, requiring surgical intervention.[4] In this case, the ONOCOR system enclosed the LAAO device, reducing the possibility of the barbs scraping, lacerating, or dissecting the aortic wall.

Our case demonstrates the feasibility of the ONOCOR system with snare devices to retrieve an Amulet LAAO at the transverse arch.

CONCLUSIONS

The percutaneous basket-retrieval approach using ONOCOR provides a safe and effective method to remove an embolized LAAO device.

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The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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KEY WORDS complications, device embolization, endovascular retrieval, percutaneous intervention

APPENDIX For a supplemental video, please see the online version of this paper.