

## CORONARY, PERIPHERAL, AND STRUCTURAL INTERVENTIONS

### HOW WE DID IT

# Percutaneous Removal of Left Atrial Appendage Occlusion Device With a Dedicated Retrieval System



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### ABSTRACT

**OBJECTIVE** Successful use of a novel percutaneous retrieval system (ÖNÖ retrieval system, ÖNÖCOR) to remove a significantly dislodged left atrial appendage occlusion device (Watchman FLX, Boston Scientific).

**KEY STEPS** First, a 17-F Bayliss VersaConnect and TruSteer catheter was advanced through a 20-F DrySeal sheath (Gore Medical). Then, the ÖNÖ retrieval system was advanced and positioned against the Watchman FLX device. Through this system, a 2.4-mm Raptor forceps (Steris) was advanced to grab one of the struts on the Watchman device. Slow traction on the Raptor forceps and simultaneous advancement of the ÖNÖ basket was performed to dislodge the Watchman device from the left atrial appendage.

**POTENTIAL PITFALLS** Device embolization, left atrial appendage avulsion, and pericardial effusion are some of the potential complications of the Watchman retrieval procedure.

**TAKE-HOME MESSAGE** Embolization of a left atrial appendage occlusion device is a rare but potentially devastating complication, and percutaneous retrieval with the ÖNÖ system may provide a safer alternative to surgical removal. (JACC Case Rep. 2025;30:104751) © 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/>).

Percutaneous left atrial appendage (LAA) closure has been shown to be noninferior to vitamin K antagonists in preventing stroke in patients with atrial fibrillation who are at high thromboembolic risk but are unable to tolerate long-term systemic anticoagulation.<sup>1</sup> Although the procedure is generally considered safe, rare complications such as device embolization, pericardial effusion, and device thrombosis have been described.

Embolization of LAA occlusion (LAAO) devices is a rare complication and is associated with significant

morbidity. The overall incidence of device embolization is about 0.07% according to data from the LAAO registry of the National Cardiovascular Data Registry.<sup>2</sup> However, international registries and systematic reviews have estimated the incidence of device embolization to vary between 0% and 3.9% per 100 person-years.<sup>3-6</sup> The most common location for embolization is the aorta, followed by the left ventricle and the left atrium. LAAO device embolization is associated with significant morbidity and even mortality. Although the majority of the patients

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**ABBREVIATIONS  
AND ACRONYMS****ICE** = intracardiac  
echocardiography**LAA** = left atrial appendage**LAAO** = left atrial appendage  
occlusion

remain asymptomatic when device embolization is detected, hemodynamic instability, acute pulmonary edema, ventricular arrhythmias, mitral valve dysfunction, and several neurologic symptoms have been reported.<sup>3-6</sup>

LAAO device embolization often requires either percutaneous or surgical retrieval.

Percutaneous device retrieval with snares (single loop, double loop, or biopsy biptome) has been described, with variable success rates; it often requires a second attempt or even surgical bailout.<sup>6</sup> Here, we describe a case of successful percutaneous removal of a significantly dislodged Watchman FLX device (Boston Scientific) using a novel percutaneous retrieval system (ÖNÖ retrieval system, ÖNÖCOR).

**CASE SUMMARY**

A 68-year-old woman with a history of nonalcoholic liver cirrhosis with portal hypertension, morbid obesity, sick sinus syndrome status after permanent pacemaker placement, iron deficiency anemia with gastrointestinal bleeding, thrombocytopenia with hepatosplenomegaly, and paroxysmal atrial fibrillation underwent LAA closure with a 31-mm Watchman FLX device under intracardiac echocardiography (ICE) guidance 1 year earlier at an outside facility. While being evaluated for severe aortic stenosis, she was found to have significant LAAO device dislodgement (Figure 1A), with color Doppler assessment showing flow into the LAA (Figure 1B). Cardiac computed tomography angiography demonstrated minimal device attachment to the anatomy and a high risk of embolization (Figure 1C). During a multidisciplinary heart team evaluation, she was deemed at high risk for surgical retrieval owing to her underlying comorbidities, including cirrhosis and portal hypertension, and was recommended for a percutaneous approach.

**PROCEDURAL STEPS**

The ÖNÖ retrieval system, consisting of a 7.5-F flexible, trackable catheter compatible with 7-F snare catheters, features a 35-mm basket at its distal end. The patient was placed under general anesthesia, and the procedure was guided by transesophageal echocardiography. Bilateral venous access was obtained. Through the right femoral vein access, a 20-F DrySeal sheath (Gore Medical) was inserted, and through this sheath, a 17-F Bayliss VersaConnect and TruSteer catheter system was advanced into the left atrium after an inferior-posterior transseptal puncture. Through this sheath,

**TAKE-HOME MESSAGES**

- LAAO device embolization is a rare but potentially devastating complication often requiring open surgical or percutaneous transcatheter device retrieval.
- Percutaneous retrieval approaches with single-loop or double-snare techniques have been reported with variable success, often needing surgical bailout or repeat transcatheter procedures.
- Dedicated device retrieval systems such as the ÖNÖ (ÖNÖCOR) may provide safer alternatives while improving procedural success rates.

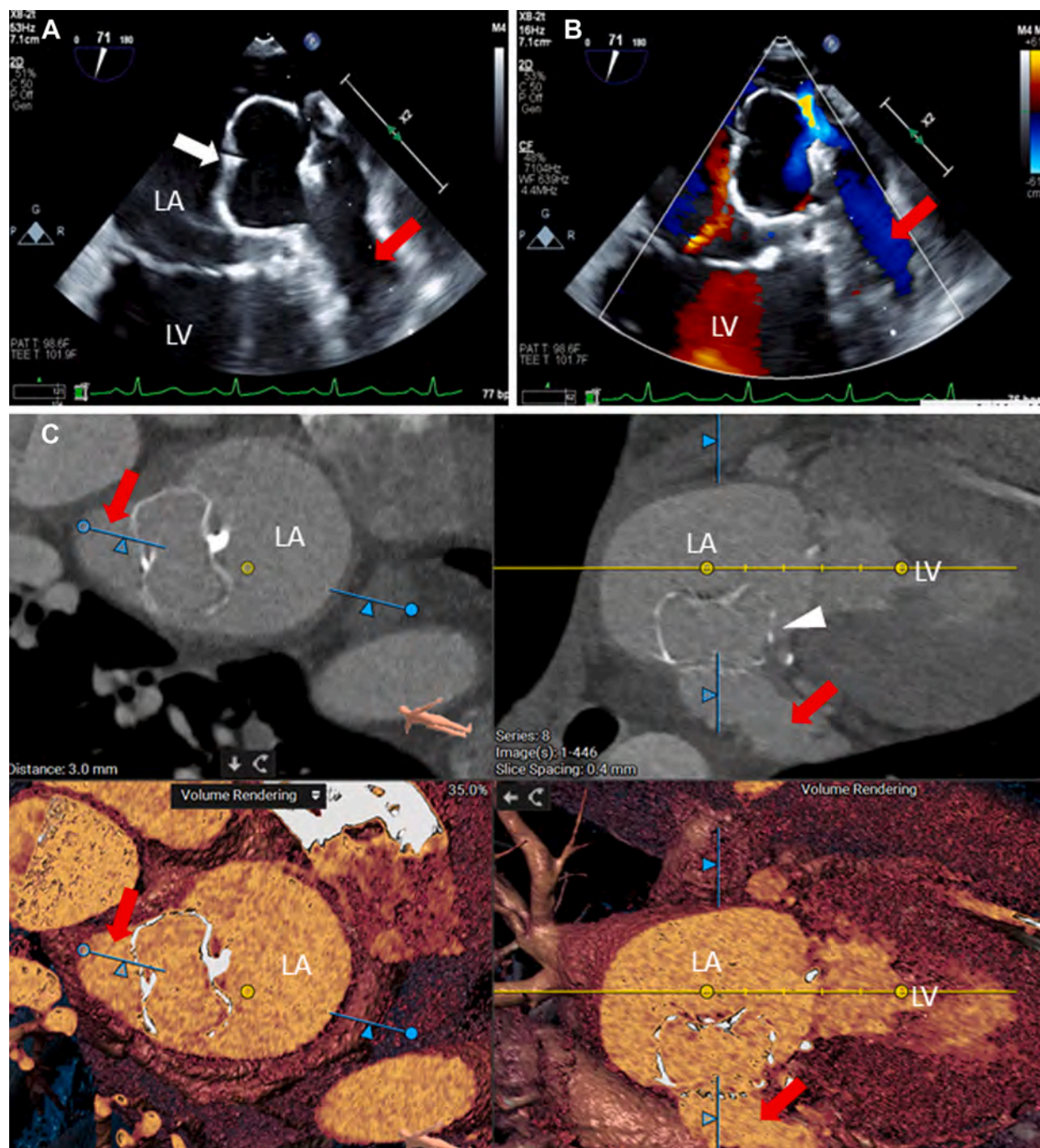
the ÖNÖ retrieval system was advanced and positioned against the Watchman FLX device (Figures 2A and 2B). A 2.4-mm Raptor forceps (Steris) (Figures 2C to 2F) was advanced through the system to facilitate device grabbing. The Raptor forceps was used to grab one of the wires instead of the fabric on the device, and by slow traction with simultaneous advancement of the ÖNÖ basket, the device was dislodged into the basket, which was then jointly removed through the sheath (Figures 3A and 3B). Once pericardial effusion was ruled out, we then proceeded with the placement of a 31-mm Watchman FLX Pro in a deeper location within the LAA (Figures 3E and 3F). Final images showed a well-seated Watchman FLX Pro device without any evidence of peridevice leak.

The patient tolerated the procedure well and was discharged home the following day. Echocardiogram before discharge showed no evidence of pericardial effusion or device embolization.

**POTENTIAL PITFALLS**

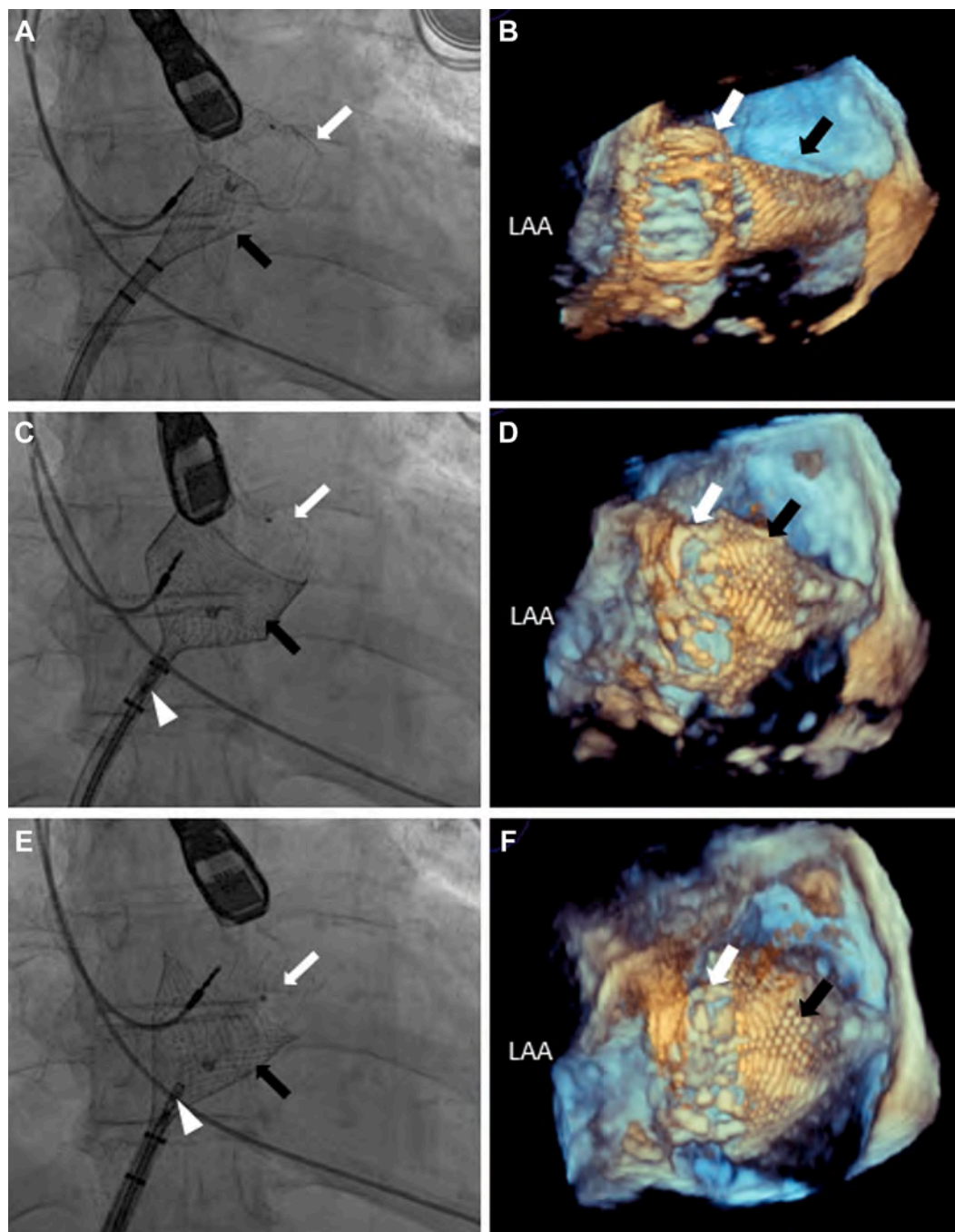
**DEVICE EMBOLIZATION.** In our case, the first Watchman FLX device was significantly dislodged from the LAA. Review of the intraprocedural images (ie, ICE) suggested incorrect position of the first device during initial placement as the most likely mechanism for device failure. Sizing of the device (31 mm) was felt to be adequate, and in fact, we placed the same size device after retrieval with a satisfactory result. Although the use of ICE guidance is increasing, in a large multicenter experience, LAAO with ICE guidance was associated with increased risk of pericardial effusions and other complications.<sup>7</sup> Of note, the majority of operators had performed <10 ICE-guided procedures overall.<sup>7</sup> Similar to other procedures, a learning curve phenomenon is plausible.

**FIGURE 1** Multi-Modality Imaging Prior to Device Retrieval



(A) Transesophageal echocardiogram showing near-complete dislodgement of the Watchman FLX device (white arrow). (B) Color Doppler assessment demonstrating flow into the left atrial appendage (red arrow). (C) Three-dimensional computed tomography demonstrating device attachment predominantly at the inferior edge of the left atrial appendage ostium (white arrowhead). LA = left atrium; LV = left ventricle.

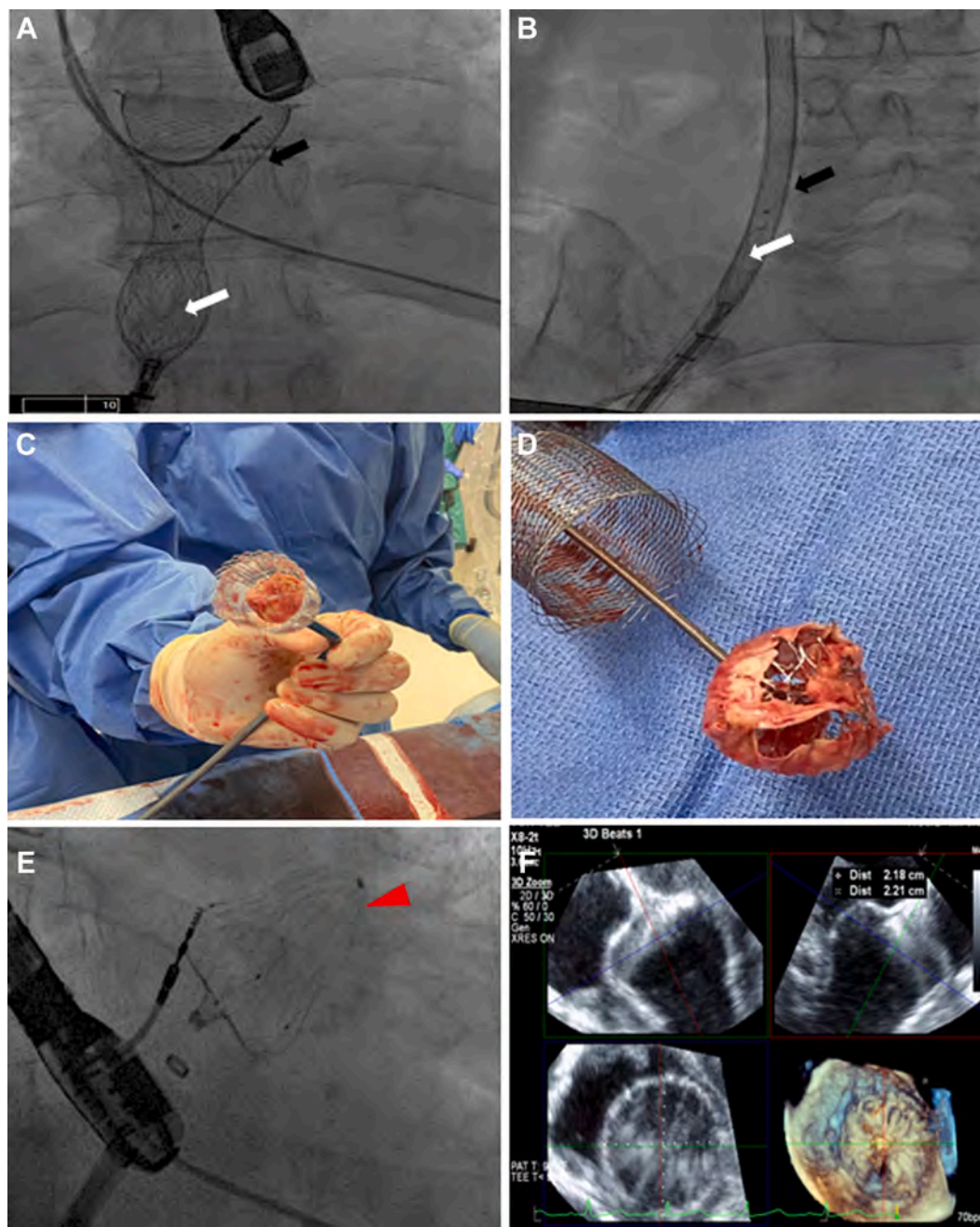


**FIGURE 2** Intraprocedural Images

Fluoroscopic images (A, C, and E) and corresponding transesophageal echocardiograms (B, D, and F) demonstrating the removal of the Watchman FLX (white arrows) with the ÖNO retrieval system (black arrows), facilitated by the 2.4-mm Raptor forceps (white arrowheads). LAA = left atrial appendage.



**FIGURE 3** Compression and Removal of Watchman Device Followed by New Device Implantation



(A) The Watchman FLX (white arrow) fully retrieved into the ONO basket (black arrow). (B) The Watchman FLX (white arrow) and ONO basket (black arrow) jointly removed through the sheath. (C and D) Fully retrieved Watchman FLX. (E and F) Reimplantation of a new 31-mm Watchman FLX Pro device (red arrowhead) under fluoroscopy and transesophageal echocardiography guidance.

**LAA AVULSION AND PERICARDIAL EFFUSION.** Pericardial effusion during LAAO device retrieval has been reported previously.<sup>6</sup> In our case, the device was attached to the ostium of the LAA by the distal

anchors. Aggressive traction on the device with the Raptor forceps could potentially avulse the LAA and cause pericardial effusion or even tamponade. Slow traction on the device with the Raptor forceps while

advancing the  $\bar{O}\bar{N}\bar{O}$  basket may help minimize this complication, as demonstrated in our case. Advanced transesophageal echocardiography and computed tomography angiography play a crucial role in preprocedural planning and intraprocedural guidance.

## CONCLUSIONS

This case illustrates the importance of dedicated device retrieval systems such as the  $\bar{O}\bar{N}\bar{O}$  in managing

the rare but potentially life-threatening complication of LAAO device dislodgement/embolization.

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**KEY WORDS** embolization, left atrial appendage, left atrial appendage closure, ONOCOR, percutaneous retrieval