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BEGINNER

CASE REPORT: CLINICAL CASE

Left Atrial Appendage Closure in a Patient With a Patent Foramen Ovale Septal Occluder Device

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ABSTRACT

Left atrial appendage closure (LAAC) has evolved as a safe alternative to oral anticoagulation therapy for stroke prophylaxis. However, the presence of a patent foramen ovale (PFO) occluder device is considered a relative contraindication. Here we report a successful case of LAAC in the presence of a PFO occluder device. (**Level of Difficulty: Beginner.**) (J Am Coll Cardiol Case Rep 2021;3:508–11) © 2021 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 72-year-old woman was seen in our clinic for consideration of left atrial appendage closure (LAAC). She had an acute right parietal stroke 4 years earlier and underwent patent foramen ovale (PFO) closure using a 30-mm Amplatzer septal occluder device (Abbott, Abbott Park, Illinois) at an outside facility; cryptogenic stroke was the suspected underlying cause. Shortly after undergoing PFO closure, she reported episodes of palpitations and received a diagnosis of paroxysmal atrial fibrillation noted on an event monitor. She was managed with flecainide (50 mg, 2 times a day) for rhythm control and was started on oral anticoagulation therapy with warfarin (CHA_2DS_2-VASc score of 5: age, previous stroke, female sex, hypertension). Three years later, the patient received a diagnosis of chronic peptic ulcer disease evident on upper gastric endoscopy and had occult gastrointestinal bleeding (HAS- BLED score of 4: age, stroke, receiving anticoagulation therapy, previous major bleeding or predisposition to bleeding). Given her high risk of cardioembolic stroke and contraindication to anticoagulation, she was referred to our structural heart clinic for elective LAAC. On examination, she was afebrile, with a blood pressure of 127/60 mm Hg, a heart rate of 91 beats/min, a respiratory rate of 18 breaths/min, and oxygen saturation of 96% on room air. She had normal heart sounds, no murmurs, normal jugular venous pressure, and no peripheral edema.

LEARNING OBJECTIVES

- To understand the role of LAAC as an acceptable alternative to anticoagulation in nonvalvular atrial fibrillation patients who have bleeding complications that develop during anticoagulation therapy and who have a prior history of a PFO septal occluder device.
- To emphasize on the role of ICE in performing precise transseptal puncture in the presence of a septal occluder device.

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

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PAST MEDICAL HISTORY

Her past medical history consisted of stroke, PFO, atrial fibrillation, and chronic peptic ulcer disease.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis was ischemic stroke secondary to atrial fibrillation versus PFO.

INVESTIGATIONS

She underwent a transesophageal echocardiogram (TEE), which showed normal left ventricular systolic function with a well-seated PFO closure device. The left atrial appendage displayed a "windsock" morphology. A shared decision-making discussion was made, and the patient elected to proceed with LAAC.

MANAGEMENT

During the procedure, it was difficult to visualize the inferior part of the interatrial septum below the Amplatzer device by using the TEE, and we therefore decided to use an intracardiac echocardiogram (ICE). Multiple images were obtained, and they confirmed the presence of an adequate area inferior and posterior to the Amplatzer device (**Figure 1**, Video 1). Using ICE, TEE, and fluoroscopy, transseptal puncture was successfully performed. The needle was then removed and exchanged for a ProTrack Pigtail Wire (Baylis Medical, Austin, Texas), which was then advanced into the left atrium (**Figure 2**, Video 2). The dilator and sheath were then removed and exchanged for a HeartSpan MRO transseptal sheath (Merit Medical, South Jordan, Utah), which was advanced into the left atrium. The dilator and sheath were then removed and exchanged for a 14-F double-curve Watchman Access System (Boston Scientific, Marlborough, Massachusetts), which was advanced over the ProTrack Pigtail Wire into the left atrium (**Figure 3**). A pigtail catheter was advanced into the sheath, and the latter wire was removed. We then advanced the 14-F Watchman Access System into the left atrial appendage over the pigtail catheter (**Figure 4A**, Video 3) and carefully removed the latter from the body while making sure to keep the catheter in position. A 27-mm Watchman left atrial appendage device attached to the Watchman delivery system was advanced through the sheath. The device was then deployed carefully under fluoroscopic (**Figure 4B**) and echocardiographic guidance using the standard technique. The device was released in the standard fashion after meeting the PASS (position, anchor, size, and seal) criteria.

DISCUSSION

Atrial fibrillation is prevalent in the United States and is a common cause of thromboembolic events. The risk of thromboembolism increases with older age, female sex, and the presence of comorbidities. Oral anticoagulation agents are widely used to prevent stroke in patients with nonvalvular atrial fibrillation (1). However, these agents can cause bleeding complications in patients with older age, history of bleeding or falls, malignant disease, chronic renal and liver disease, alcohol abuse, thrombocytopenia, and concurrent use of antiplatelet agents. The left atrial appendage accounts for 90% of thrombi formed in the heart (2). The newer technique of LAAC is growing as a safe alternative option to anticoagulation. Studies have shown that it is noninferior to vitamin K antagonists in stroke risk reduction (3,4). Precise transseptal puncture is an essential limiting step for successful deployment of the LAAC device. The presence of a previous PFO closure device makes it challenging because it would reduce the operator maneuverability of access systems and safe deployment of the device in the left atrial appendage (5,6). Currently, there are 2 U.S. Food and Drug Administration-approved devices in the United States: the Amplatzer device by Abbott and Gore Cardioform Septal Occluder by Gore Medical (W. L. Gore and Associates, Newark, Delaware). The

ABBREVIATIONS AND ACRONYMS

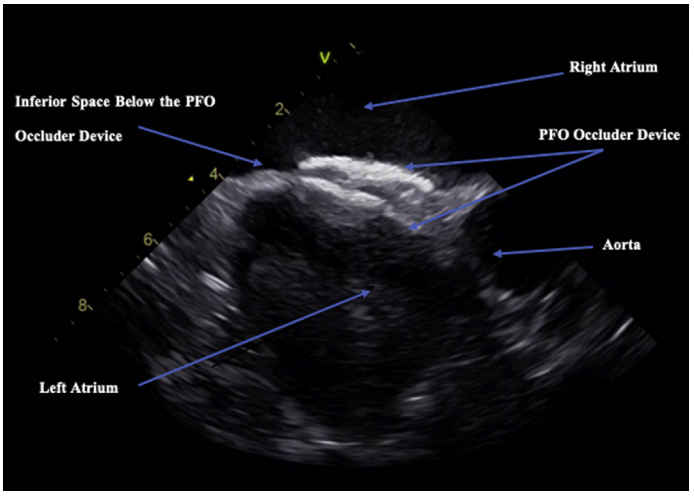
ICE = intracardiac echocardiogram

LAAC = left atrial appendage closure

PFO = patent foramen ovale

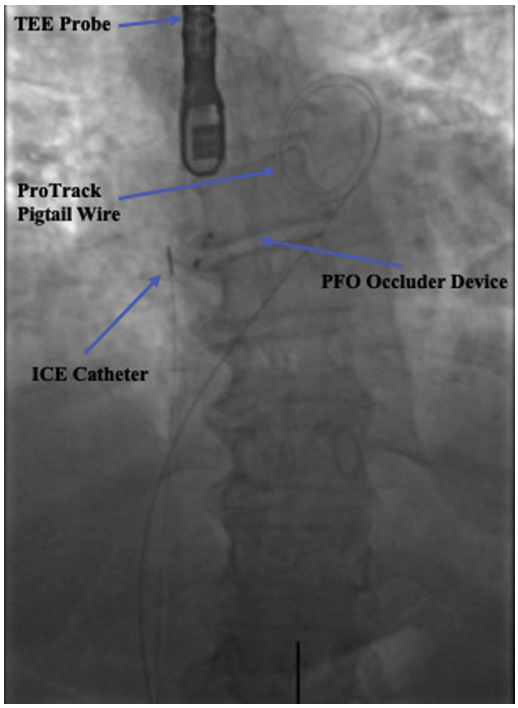
TEE = transesophageal echocardiogram

FIGURE 1 Intracardiac Echocardiogram Image Showing the Small Inferior Septal Space Below the PFO Occluder Device



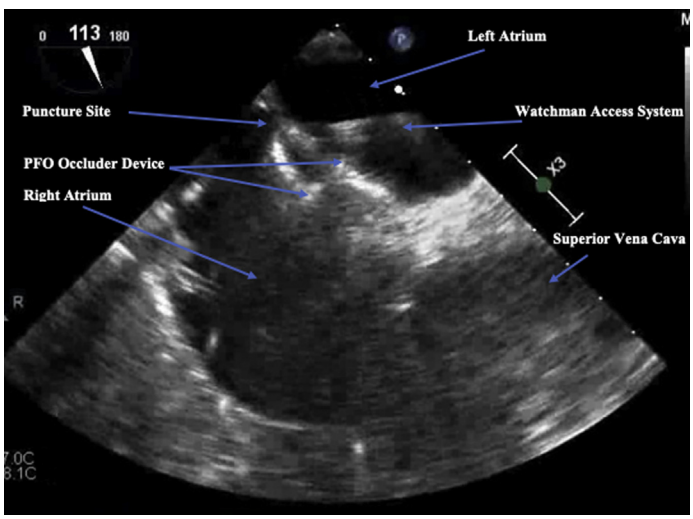
PFO = patent foramen ovale.

FIGURE 2 Fluoroscopy Image Showing Transseptal Puncture Inferior to the PFO Occluder Device in the AP View and the ProTrack Pigtail Wire (Baylis Medical, Austin, Texas) in the Left Atrium



AP = anteroposterior; TEE = transesophageal echocardiogram; other abbreviations as in Figure 1.

FIGURE 3 TEE Image at the Midesophageal Level Showing the Transseptal Puncture Site and the Watchman Access System (Boston Scientific, Marlborough, Massachusetts) Below the PFO Occluder Device



Abbreviations as in Figures 1 and 2.

Amplatzer device is made of 2 discs connected by a bond bridge. Each disc consists of a nitinol wire mesh that makes it more difficult to puncture. In contrast, the Gore Cardioform Septal Occluder device is made of polytetrafluoroethylene fabric on a nitinol framework and offers a more favorable medium to puncture (7,8). To our knowledge, only 2 cases of LAAC in patients with previous septal occluder device implantation have been published. Nadel et al. (5) have reported a successful transseptal puncture inferior and anterior to the device, whereas Gafoor et al. (6) have reported successful LAAC after PFO occlusion through an inferior and posterior approach. In our case, we used ICE because it was difficult to visualize the inferior part of the interatrial septum below the PFO occluder device when using only the TEE. Of note, computed tomography imaging may be performed to complement TEE imaging; however, this could not be used in our particular case secondary to potential artifact caused by the device. An inferior and posterior approach was used and proved to be a very satisfactory position despite the large size of the device. To our knowledge, this is the first case of ICE use to facilitate transseptal puncture in patients with an existing PFO closure device.

FOLLOW-UP

A TEE was performed after 6 weeks, and it showed a well-seated device in the left atrial appendage with a nonsignificant 2-mm peridevice leak. There was no thrombus or residual interatrial shunt, and warfarin was discontinued. She was subsequently maintained on dual antiplatelet therapy for 4.5 months and on aspirin 325 mg daily thereafter.

CONCLUSIONS

LAAC is a good alternative in patients with nonvalvular atrial fibrillation who are at high risk for thromboembolism and have a contraindication to anticoagulation. A previous history of atrial septal closure should not preclude proceeding with LAAC. By using appropriate imaging techniques, including ICE, transseptal puncture can be safely performed.

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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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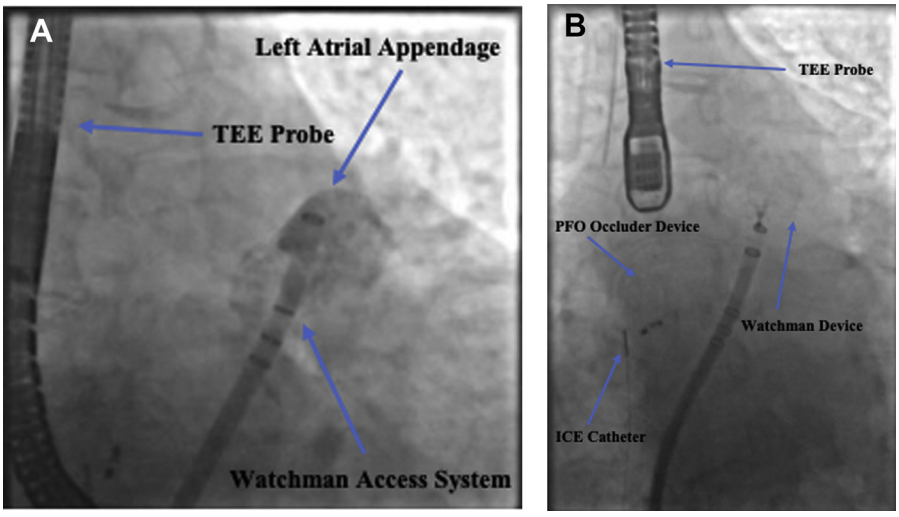
FIGURE 4 **Fluoroscopy Imaging Showing the Delivery Sheath and Watchman Device (Boston Scientific, Marlborough, Massachusetts)**



(A) Fluoroscopy image in the RAO caudal view confirming the position of the delivery sheath in the left atrial appendage. **(B)** Fluoroscopy image in the AP caudal view showing the Watchman device in the left atrial appendage. AP = anteroposterior; RAO = right anterior oblique; other abbreviations as in **Figures 1 and 2**.

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KEY WORDS anticoagulation, atrial fibrillation, electrophysiology, interventional cardiology, left atrial appendage closure, patent foramen ovale

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