

IMAGING VIGNETTE

INTERMEDIATE

CLINICAL VIGNETTE

# Closure of Iatrogenic Atrial Septal Defect After Placement of Left Atrial Appendage Closure Device



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## ABSTRACT

An 86-year-old woman experienced hypoxia with right-to-left flow across an iatrogenic atrial septal defect after deployment of a left atrial appendage closure device. Emergent closure of the defect was performed with an atrial septal occluder device with resolution of hypoxia. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2022;4:1053-1055)  
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An 86-year-old woman with persistent atrial fibrillation and recurrent admissions for gastrointestinal bleeding presented for placement of a left atrial appendage closure (LAAC) device. The patient had a 2-year history of pre- and post-capillary pulmonary hypertension in the setting of heart failure and respiratory failure due to pulmonary fibrosis while she was receiving oxygen. The patient had been using sildenafil for 2 years after right heart catheterization showed a mean pulmonary artery pressure of 55 mm Hg with pulmonary capillary wedge pressure of 25 mm Hg.

Preprocedure echocardiography showed bowing of the interatrial septum to the left, which suggested elevated right atrial pressure. During the procedure, transseptal puncture with a radiofrequency puncture system under fluoroscopic and transesophageal echocardiography (TEE) guidance was performed. A 14-F outer diameter access sheath was advanced into the left atrium over a guidewire. A 35-mm WATCHMAN FLX left atrial appendage closure device was successfully deployed without evidence of peridevice or transdevice leak. After the sheath was pulled back into the right atrium, the patient became hypoxic, with an oxygen saturation of 75%. The right atrial pressure was measured at 27 mm Hg and the mean left atrial pressure at 15 mm Hg. TEE images (**Figures 1A and 1B**) showed a small iatrogenic atrial septal defect (iASD) at the site of the transseptal puncture, with continuous right-to-left flow by color Doppler. The septum was re-crossed by use of an ablation catheter to temporarily occlude the shunt (**Figure 1C**). Owing to acute hypoxia in the setting of right-to-left shunting, the patient was given intravenous epoprostenol. Emergent closure of the iASD was performed with a 10-mm Amplatzer atrial septal defect closure device. The device position was confirmed by TEE (**Figures 1D and 1E, Video 1**). The patient's oxygen saturation improved to 95% after closure of the iASD, and she remained in clinically stable condition until discharge.

Among patients who undergo LAAC via transseptal puncture, iASD is detected in 87% of patients post-procedurally. However, 90% of these defects demonstrate left-to-right shunting, and the majority resolve

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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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**ABBREVIATIONS  
AND ACRONYMS**

**ASD** = atrial septal defect

**iASD** = iatrogenic atrial septal defect

**LAAC** = left atrial appendage closure

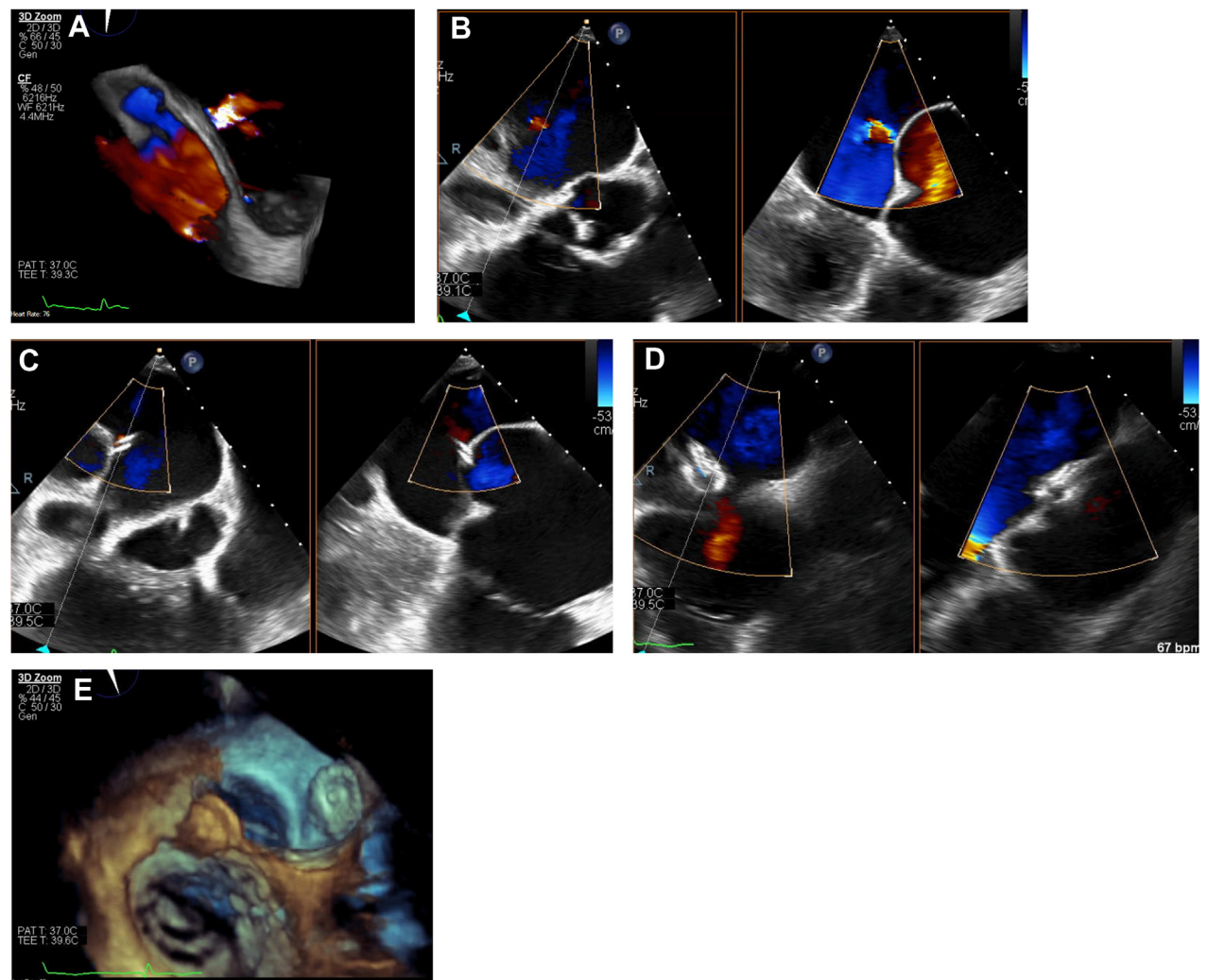
**PFO** = patent foramen ovale

**TEE** = transesophageal echocardiography

within 45 days of the procedure.<sup>1</sup> Oxygen desaturation related to right-to-left shunting, however, is a strong indication for urgent iASD closure.<sup>2</sup> Patients with underlying pulmonary hypertension can be susceptible to right-to-left shunting caused by elevated right atrial pressure. In this case, the causal relationship between the hypoxia and the iASD was supported by the improvement in oxygenation with occlusion of the defect. The use of existing patent foramen ovale (PFO) or atrial septal defect (ASD) has been shown to be effective for transeptal access for LAAC.<sup>3,4</sup> In these reported cases, Amplatzer LAAC devices were used, and the same sheath could be used for PFO or ASD closure. Although that was done for elective reasons in these reports, this approach of LAAC and simultaneous PFO or ASD closure did not increase the rates of procedural complications.

When LAAC platforms of different brands are used, as in this case, maintaining left atrial access across the iASD with a long wire before sheath removal should be considered in patients at risk for right-to-left shunting, such as those with severe pulmonary hypertension. Detection of right-to-left

**FIGURE 1** Intraprocedural TEE



**(A)** 3-dimensional color view and **(B)** multiplane view of interatrial septum with right-to-left flow. **(C)** Catheter across iatrogenic atrial septal defect (ASD) occludes right-to-left flow. **(D)** Multiplane image of interatrial septum showing ASD closure device with no residual shunt. **(E)** 3-dimensional image of left atrium showing positioning of ASD closure device (**solid arrow**) and left atrial appendage closure device (**dashed arrow**). TEE = transesophageal echocardiography.

iASD flow and oxygen desaturation would prompt consideration for closure, and the retained wire would speed delivery of care. This would avoid the difficulty and delay of re-crossing the defect with a new wire.

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**KEY WORDS** 3-dimensional imaging, atrial septal defect, echocardiography, pulmonary hypertension

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