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Single-Session Percutaneous Left Atrial Appendage Occlusion and Atrial Septal Defect Closure Guided by Balloon Occlusion Testing in an Elderly Patient with Recurrent Gastrointestinal Bleeding Under Non-vitamin K Antagonist Oral Anticoagulants Therapy

CASE REPORT

INTRODUCTION

The coexistence of atrial fibrillation (AF) and a secundum atrial septal defect (ASD) in the elderly poses a therapeutic paradox: late closure may unmask left ventricular diastolic dysfunction (LVDD) once the shunt is abolished, making balloon occlusion testing a decisive pre-procedural step.[1-3] These patients also need lifelong anticoagulation, yet recurrent bleeding under non-vitamin K antagonist oral anticoagulants (NOACs) often necessitates percutaneous left atrial appendage occlusion (LAAO).[4] Single-session LAAO and ASD closure is feasible, but in an elderly bleeding patient with pulmonary hypertension, it has rarely been reported.[5-7] Here, such a case is presented.

CASE REPORT

A 74-year-old man presented with exertional dyspnea (New York Heart Association II–III) and peripheral edema. He had chronic AF, hypertension, non-obstructive coronary disease, and a secundum ASD diagnosed 3 years earlier. On edoxaban 30 mg daily (reduced for an estimated glomerular filtration rate of 44 mL/min/1.73 m^2), he had 2 episodes of major gastrointestinal bleeding requiring transfusion and anticoagulation withdrawal (CHA^2DS^2-VASc 4, HAS-BLED 3).

Transesophageal echocardiography (TEE) showed dilated right chambers, a 23 × 27 mm secundum ASD with prominent left-to-right shunting (Figure 1A; Supplementary Video 1), left atrial dilation (56 mm), enlarged left ventricle [left ventricular end-diastolic diameter (LVEDD) 56 mm], and reduced left ventricular ejection fraction (LVEF) (40%); pulmonary artery systolic pressure was 55 mm Hg. Cardiac computed tomography excluded intra-appendage thrombus and quantified the appendage (32.60 cm^3; Figure 1B).

Under general anesthesia with TEE guidance, catheterization confirmed a Qp/Qs of 3.1 with a pulmonary vascular resistance (PVR) of 1 Wood unit; the large shunt with preserved PVR indicated flow-related, not fixed, pulmonary hypertension, supporting operability. A 35-mm sizing balloon was inflated across the defect (Figure 1C); left ventricular end-diastolic pressure (LVEDP) rose only from 12 to 14 mm Hg and mean pulmonary artery pressure from 28 to 30 mm Hg, confirming safe accommodation of the redirected venous return.

A combined single-session strategy was undertaken. Left atrial appendage occlusion was performed first, using the native ASD as a transseptal conduit. A 31-mm Amplatzer Amulet device (Abbott Vascular, Santa Clara, CA, USA) was deployed in the chicken-wing appendage; tug test and TEE confirmed complete sealing (Figure 1D; Supplementary Video 2).

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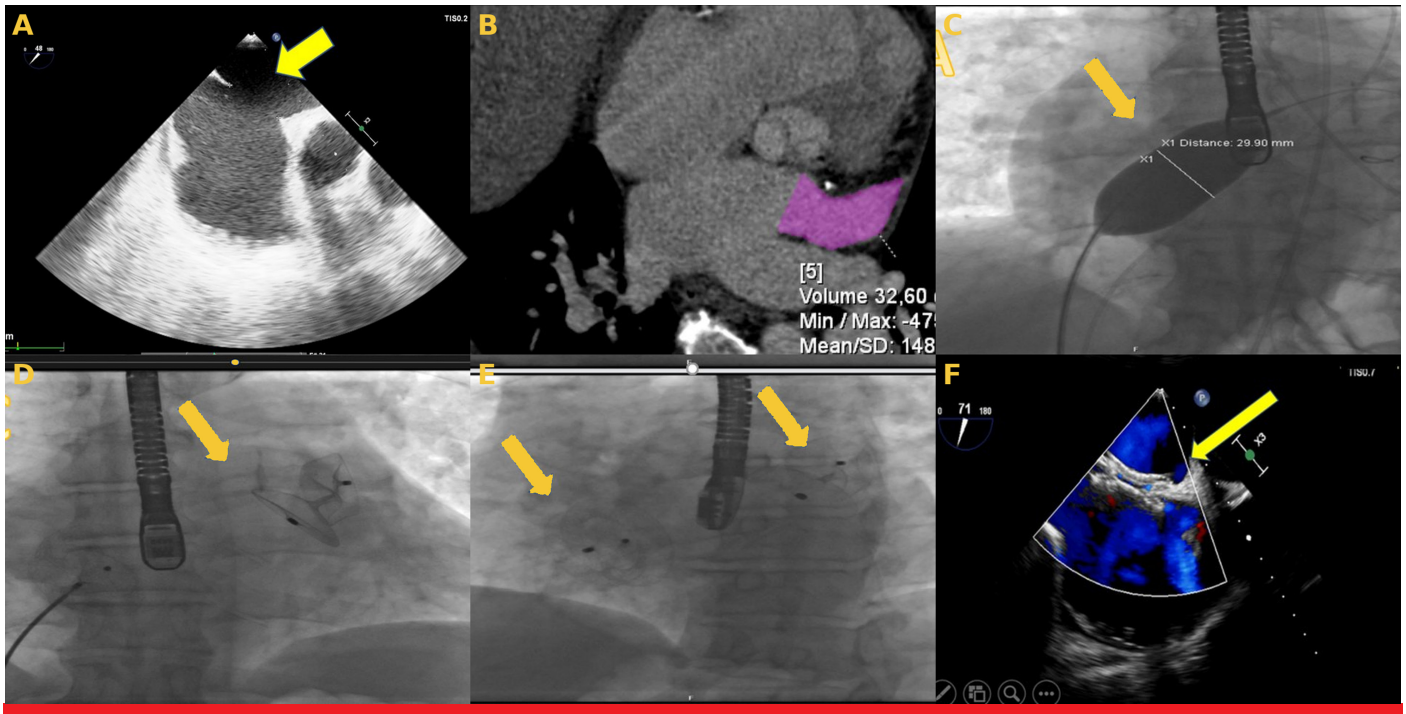

Figure 1. Diagnosis and single-session procedure. (A) Two-dimensional TEE of the secundum ASD (yellow arrow), 23 × 27 mm. (B) Cardiac CT with left atrial appendage volumetric segmentation (magenta; 32.60 cm³). (C) Fluoroscopic ASD sizing balloon, stop-flow waist 29.9 mm (yellow arrow). (D) Amplatzer Amulet device deployed in the appendage while the septal occluder is advanced (yellow arrow). (E) Final fluoroscopy after release of both devices (yellow arrows). (F) Color Doppler confirming abolition of the interatrial shunt (yellow arrow). ASD, atrial septal defect; CT, computed tomography; TEE, transesophageal echocardiography.

A 32-mm Amplatzer Septal Occluder was then advanced through the same access; a Minnesota maneuver confirmed stability, and TEE showed complete abolition of the shunt (Figure 1E, 1F). Both devices were released uneventfully. Given the high bleeding risk (2 prior major hemorrhages, advanced age, reduced renal function), dual antiplatelet therapy was avoided; the patient was discharged on clopidogrel monotherapy.

Echocardiography at 1 and 3 months showed stable devices and no residual shunt, with resolution of edema. Transesophageal echocardiography at 6 months confirmed stable devices, no peri-device leak, and no thrombus (Figure 2; Supplementary Video 3). The patient remained asymptomatic.

DISCUSSION

This case illustrates 3 points. First, sequencing LAAO before ASD closure exploited the native defect as a transseptal conduit; access after septal occluder implantation is markedly more difficult.[8] The Amulet disk-and-lobe design allowed deployment without protruding into the septum, leaving adequate margin for the occluder.[5,6]

Second, balloon occlusion testing was decisive and should be considered mandatory before ASD closure in elderly patients. The aged left ventricle is often stiff, and abrupt closure can precipitate pulmonary edema by unmasking occult LVDD.[1,2] Transient occlusion with simultaneous LVEDP and pulmonary pressure monitoring is the most reliable bedside method to confirm the left ventricle can tolerate the redirected venous return; a significant pressure rise should prompt deferral.[3] In this study's patient, pressure stability justified definitive closure.

Atrial fibrillation ablation was not pursued because advanced age, severe left atrial dilation, and reduced systolic function predict low rhythm-control success; rate control with mechanical stroke prevention was chosen.

Third, recurrent NOAC-related bleeding precluded anticoagulation, while the thromboembolic risk of AF, magnified by the ASD,[9] remained substantial; LAAO offered a definitive alternative.[4,10] To the authors' knowledge, single-session LAAO plus ASD closure guided by balloon occlusion testing in an elderly bleeding patient with pulmonary hypertension has rarely been described.[5-7]

Limitations include the single-patient design; the first TEE at 6 months rather than earlier was supported by reassuring transthoracic studies at 1 and 3 months.

CONCLUSION

Combined single-session LAAO and ASD closure, guided by balloon occlusion testing, was safe and effective in an elderly patient with concurrent thromboembolic and bleeding risk. Balloon occlusion testing should be regarded as an essential safeguard before shunt closure in this population.

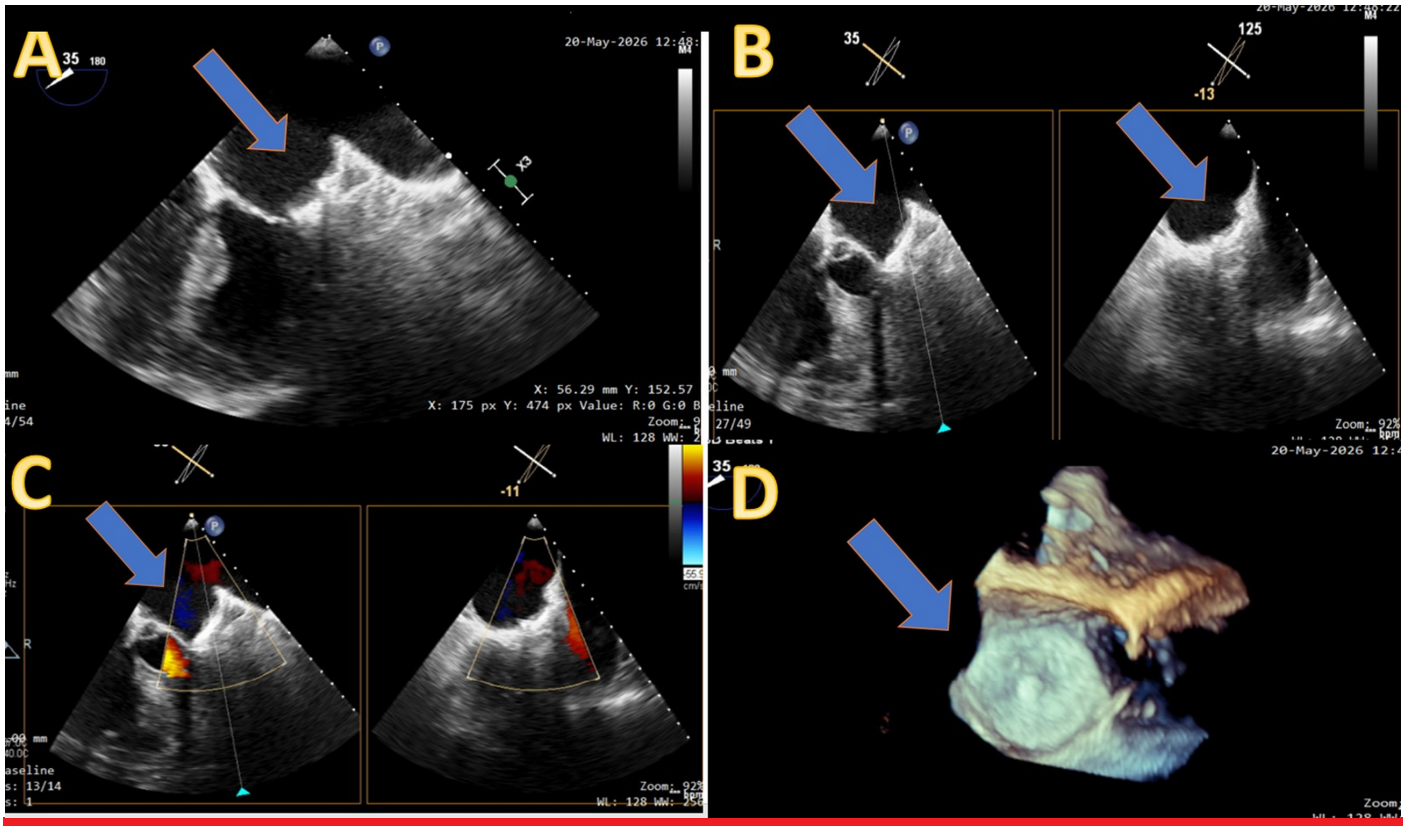

Figure 2. Six-month follow-up TEE. (A) Two-dimensional view of the Amulet device in the appendage, no leak (blue arrow). (B) Biplane imaging at 35° and 125° confirming stable position (blue arrows). (C) Color Doppler showing no peri-device flow (blue arrow). (D) Three-dimensional reconstruction of the device disc (blue arrow). TEE, transesophageal echocardiography.

Informed Consent: Written informed consent was obtained from the patient.

Declaration of Interests: The authors have no conflicts of interest to declare.

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Supplementary Video 1. Pre-procedural TEE of the secundum ASD: two-dimensional, three-dimensional, and color Doppler imaging of the left-to-right shunt.

Supplementary Video 2. Intraprocedural fluoroscopy: Amulet deployment in the appendage, balloon sizing of the defect, and release of the septal occluder.

Supplementary Video 3. Six-month follow-up TEE: stable position of both devices, with no peri-device leak and no device-related thrombus.