

Isolated Coronary Sinus Atresia with Unusual Dual Drainage Misdiagnosed as Patent Foramen Ovale: A Case Report with Anatomical Insights

Isolated coronary sinus atresia (CSOA) is an extremely rare congenital malformation with an incidence <0.1%, characterized by complete occlusion of the coronary sinus ostium in the absence of other major cardiac defects. Most cases drain via a persistent left superior vena cava, while direct cardiac venous-left atrial communication is uncommon and may cause right-to-left shunt, chronic headache, or paradoxical embolism.

We report a 57-year-old female with a 20-year history of exertional and stress-induced headaches. Initial transcranial Doppler bubble test and Transthoracic contrast echocardiography demonstrated grade 3 atrial-level right-to-left shunt, leading to a misdiagnosis of patent foramen ovale (PFO) (Figure 1A and B). Transesophageal echocardiography subsequently confirmed an intact atrial septum (Figure 1C). Cardiac computed tomography angiography identified isolated CSOA with the great cardiac vein bifurcating into 4.3 mm left atrial and 1.9 mm right atrial branches, with no associated anomalies (Figure 1D and E). Cardiac computed tomography angiography (CTA) with three-dimensional reconstruction confirmed isolated CSOA (Figure 1F).

The patient underwent successful surgical correction, with complete resolution of headaches and no residual shunt at 6-month follow-up. This rare dual drainage variant should be considered in the differential diagnosis of right-to-left shunt when PFO is excluded, and cardiac CTA is essential for definitive anatomical characterization.

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E-PAGE ORIGINAL IMAGE

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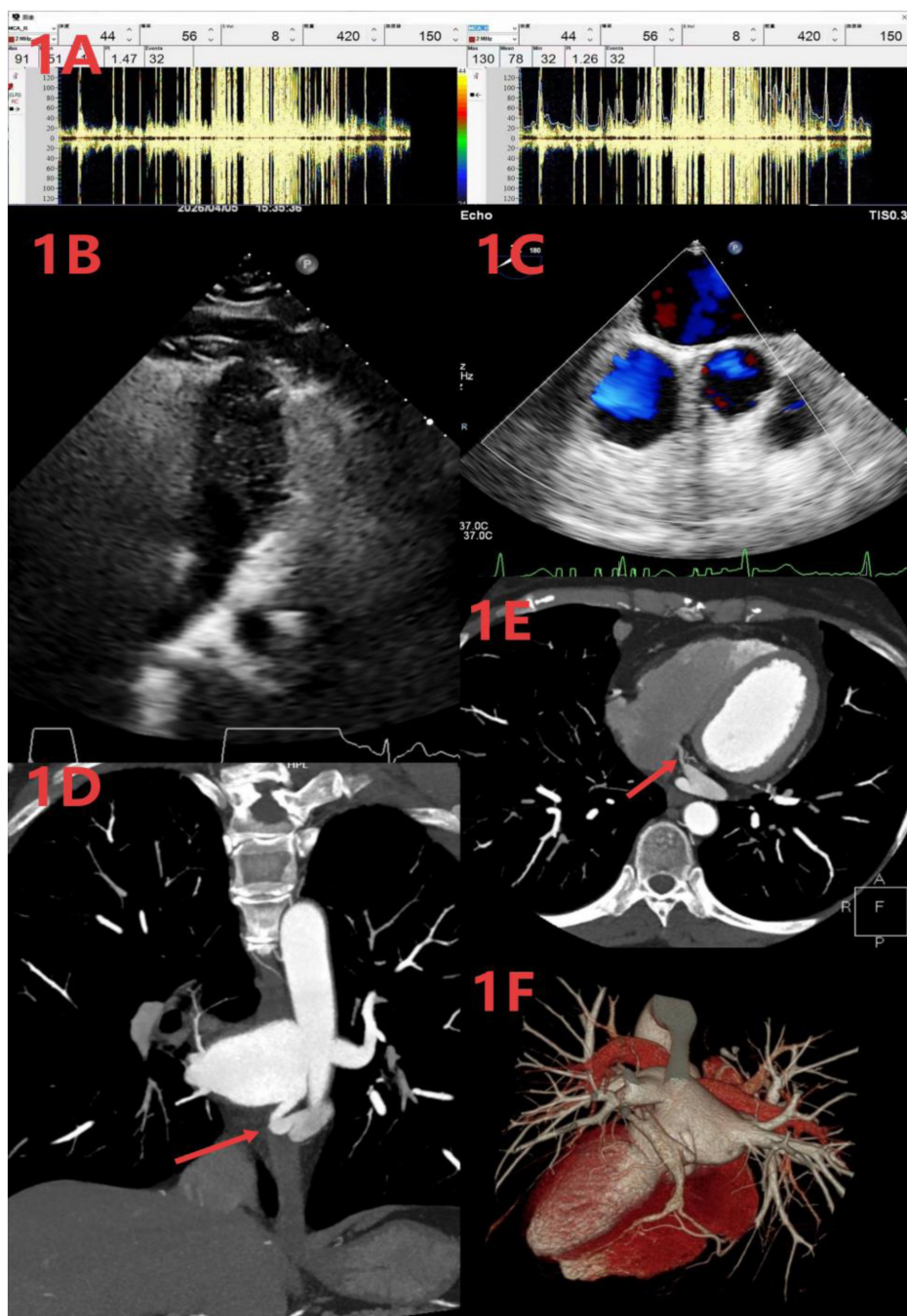


Figure 1. Multimodal imaging of isolated coronary sinus atresia. A: Transcranial Doppler bubble test (positive right-to-left shunt); B: Transthoracic contrast echocardiography: Abundant microbubbles (>30 per frame) in left atrium and left ventricle, indicating grade 3 right-to-left shunt; C: Color Doppler (no interatrial shunt); D: Coronal computed tomography (CT) (atretic coronary sinus ostium, arrow); E: Axial CT (great cardiac vein-left atrial branch, arrow); F: 3D CT reconstruction.