Successful catheter-based occlusion of persistent left-sided superior vena cava draining into the left atrium

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A 46-year-old woman presented with progressive fatigue. Her past history was remarkable for partial atrio-ventricular septal defect repair at the age of 9 years. Physical examination was notable for obesity, positional desaturation (\( \text{PaO}_2 = 92\% \) standing vs. 88% supine) and Grade 2/6 apical pansystolic murmur. Trans-thoracic echocardiography showed an intact atrial septum and mild mitral regurgitation. Saline contrast injection from the left arm showed prompt filling of both atria with bubbles consistent with a significant extracardiac right-to-left shunt and suggesting communication at the caval level (see Supplementary data online, Video S1). Cardiovascular magnetic resonance (CMR) demonstrated a persistent left superior vena cava (LSVC) draining into the superior left atrium with a significant right-to-left shunt (flow = 18 mL/beat, Qp:Qs = 0.7). A right SVC (RSVC) connected normally into the right atrium (Figure 1A and B; see Supplementary data online, Video S2). Unfortunately, the patient declined contrast during the CMR study. A subsequent contrast-enhanced cardiac computed tomography (CCT) confirmed the CMR findings and, additionally, a bridging brachiocephalic vein connecting both RSVC and LSVC at the level of the aortic arch was distinguished (Figure 1C). Cardiac catheterization confirmed the diagnosis (see Supplementary data online, Video S3A and B). Angiographic measurements demonstrated the segment of the LSVC between the bridging vein and the left atrium to be 15 mm in diameter. A 22 mm Amplatzer Vascular Plug II (AGA Medical Corporation, Golden Valley, MN, USA) was successfully deployed in this segment (see Supplementary data online, Video S4A and B). This allowed the venous return from the cerebral circulation to drain through the bridging vein into the RSVC and hence the right atrium.

Compared with echocardiography, CMR and CCT offer a wider field of view independent of acoustic windows and provide superb image quality permitting precise detailed assessment of cardiac and extracardiac anatomy including venous structures.

Supplementary data are available at European Journal of Echocardiography online.

Figure 1 (A) Cardiovascular magnetic resonance coronal view showing the left superior vena cava (white arrow) draining into the left atrium. The right superior vena cava (yellow arrow) is visualized as well (see text for details). (B) Cardiovascular magnetic resonance sagittal view showing the left superior vena cava (white arrow) draining into the left atrium. The left atrial appendage (yellow arrow) is visualized as well. (C) A curved maximum intensity projection image from a gated cardiac computed tomographic study through the chest demonstrates intravenous contrast within the left subclavian vein extending into the left superior vena cava, a patent bridging brachiocephalic vein, and the right superior vena cava. Contrast was injected into the left antecubital vein. LSVC, left superior vena cava; RSVC, right superior vena cava.