Persistent Left Superior Vena Cava With Retrograde Drainage From the Left Atrium Into the Left Brachiocephalic Vein

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A 61-year-old female with no cardiac history presented with progressive right heart failure. Severe aortic stenosis, moderate mitral stenosis, and a markedly dilated right ventricle were found on transthoracic echocardiography and confirmed by cardiovascular magnetic resonance (CMR) imaging (A, Online Video 1). Phase-contrast imaging revealed a left-to-right shunt ratio of 2.4. Contrast-enhanced 3-dimensional MR angiography demonstrated an anomalous vein in the left hemithorax connecting the left brachiocephalic vein to the left atrium (B and C, Online Video 2). Time-resolved MR angiography (Online Video 3) and phase-contrast imaging (D) showed blood in this anomalous vein to flow cranially. Flow in this rare type of left superior vena cava is usually cranial-to-caudal and is associated with an unroofed coronary sinus. Our patient had otherwise normal anatomy; the flow was reversed due to elevated left atrial pressure secondary to significant mitral and aortic stenosis. The findings were confirmed at valve surgery (E, Online Video 4), during which the anomalous vessel was also ligated. LA = left atrium; RA = right atrium; SPV = superior pulmonary vein; SVC = superior vena cava. Asterisk = left SVC; triangle = SPV.