A 76-year-old man presented with acute breathlessness, cyanosis (oxygen saturation 75%), and biventricular failure. Left and right heart catheterization confirmed an occluded right coronary artery and raised right atrial (RA) pressure (17 mmHg). To exclude pulmonary embolus, computed tomography pulmonary angiogram (CTPA) with contrast injected into the left arm revealed persistent left superior vena cava (LSVC) draining not as expected into the RA via coronary sinus but into the left atrium (LA; Panel A, arrows). Computed tomography pulmonary angiogram was reattempted with a right arm injection. The majority of the contrast passed down the right SVC to the right heart chambers. Due to raised RA pressure, some contrast was shunted from right to left through the left brachiocephalic vein (#) and down the LSVC into the LA (Panel B, arrows). After diuretic therapy, CTPA performed 1 week later revealed cessation of right-to-left shunting with no contrast passing down the LSVC to the LA (Panels C and D) and normalization of RA pressure to 7 mmHg. This was further confirmed by agitated saline bubble study on echocardiography confirming right-to-left shunting prior to therapy and the absence of shunting following treatment (Panels E and F; see Supplementary material online, Videos S1 and S2). His cyanosis resolved with oxygen saturation improving to 96%.

Persistent LSVC is the most common thoracic venous congenital anomaly with a reported prevalence of 0.4%. In almost all cases, the persistent LSVC drains to the RA via the coronary sinus and is of no haemodynamic consequence. The presence of persistent LSVC draining into the LA is most often asymptomatic but with haemodynamic changes and raised RA pressure, it can cause dynamic right-to-left shunting and hypoxia. In our patient, this was detected serendipitously during late adult life after acute myocardial infarction with cessation of right-to-left shunting occurring following diuretic therapy and normalization of RA pressure.

Supplementary material is available at European Heart Journal online.