Anomalous connection of the inferior vena cava to the left atrium diagnosed using three-dimensional echocardiography

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Routine transoesophageal echocardiography (TOE) was performed on a 3-year-old boy, following diagnosis of a secundum atrial septal defect (ASD), to assess suitability for device closure. His parents had noted some increasing shortness of breath on exertion over the preceding months, otherwise he remained well. Saturations at rest were normal (97%) and cardiovascular clinical findings were consistent with an ASD.

In addition to a 17 mm secundum ASD, the TOE images demonstrated partial anomalous pulmonary venous connection (with the right upper pulmonary vein draining to the right atrium) and, furthermore, longitudinal views (obtained at 90°) suggested the possibility of abnormal drainage of the inferior vena cava (IVC) (Panel A). Transthoracic 3D echocardiographic images were then obtained with a high-frequency matrix probe (X7-2 probe, IE33 Ultrasound system, Philips, MA, USA). These images clearly demonstrated anomalous connection of the IVC to the inferior aspect of the left atrium (Panel B).

Further invasive imaging was not felt necessary, and the anatomy was confirmed during subsequent successful surgical correction.

Anomalous connection of the IVC to the left atrium is a rare congenital cardiac abnormality. Associated cardiac defects (most commonly an ASD) are present in just over half the patients and the majority have some degree of systemic cyanosis. Previously reported cases have confirmed the diagnosis with angiography, but advances in non-invasive imaging techniques such as 3D echocardiography can now facilitate accurate diagnosis.