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Echocardiographic detection of anomalous course of the left innominate vein

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Summary

Anomalous course of the left innominate vein beneath the aortic arch is a rare congenital anomaly. We report the case of a 3 year old child in whom this defect was detected by two-dimensional and Doppler echocardiography. The echocardiographic appearance of the anomalous course of the left innominate vein is illustrated and the importance of identifying this rare systemic venous anomaly is discussed.

Two-dimensional echocardiography provides a useful noninvasive technique for the detection of systemic venous anomalies. The echocardiographic appearance of defects such as left superior vena cava draining to the coronary sinus, interrupted inferior vena cava with azygous continuation, and anomalous hepatic venous drainage has been previously described (1–3). Identification of systemic venous anomalies can be especially important in order to (1) plan the appropriate approach to catheterization and cardiac surgery and (2) avoid mistakenly identifying an abnormal systemic vein as another cardiac structure. In this report, we present a case of the left innominate vein coursing anomalously beneath the aortic arch.

Case report

A 3 month old female infant was initially referred for cardiac evaluation because of a murmur and cyanosis with crying. At 5 months of age, the infant had a hypoxic spell and underwent emergency cardiac catheterization. Catheterization revealed tetralogy of Fallot and right aortic arch with mirror image branching. Following catheterization, the infant underwent a left Blalock-Taussig shunt procedure. At 3 years of age, the infant was admitted to the hospital for repeat cardiac catheterization prior to total surgical correction of her cardiac defect.

A two-dimensional sector scan performed prior to catheterization and surgery showed a large perimembranous outlet ventricular septal defect with an overriding aorta. There was hypoplasia of the right ventrical outflow tract with severe subvalvar and valvar pulmonary stenosis. The branch pulmonary arteries were of good size. The suprasternal notch views showed a right aortic arch with mirror image branching. In the suprasternal long axis view, an additional vessel was seen in cross-section coursing under the aortic arch superior to the right

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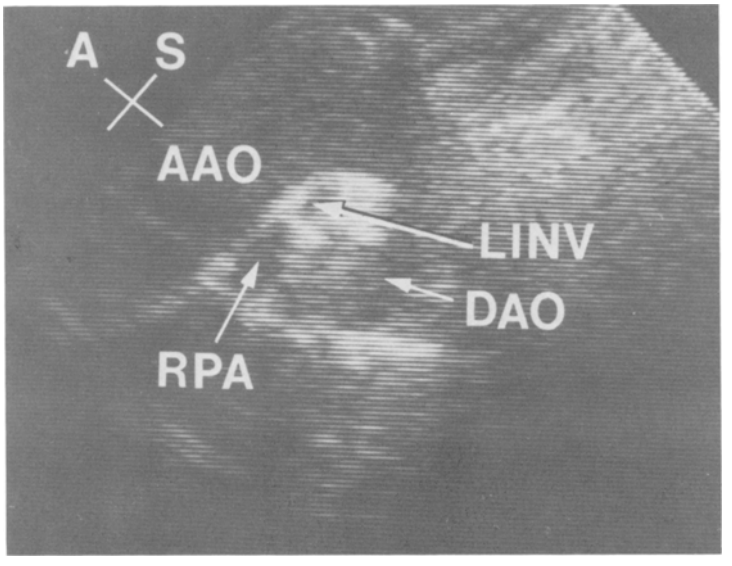

Fig. 1. Suprasternal long axis view of the aortic arch. The left innominate vein (LINV) is seen in cross-section beneath the arch and superior to the right pulmonary artery (RPA). Abbreviations: A = anterior, AAO = ascending aorta, DAO = descending aorta, S = superior.

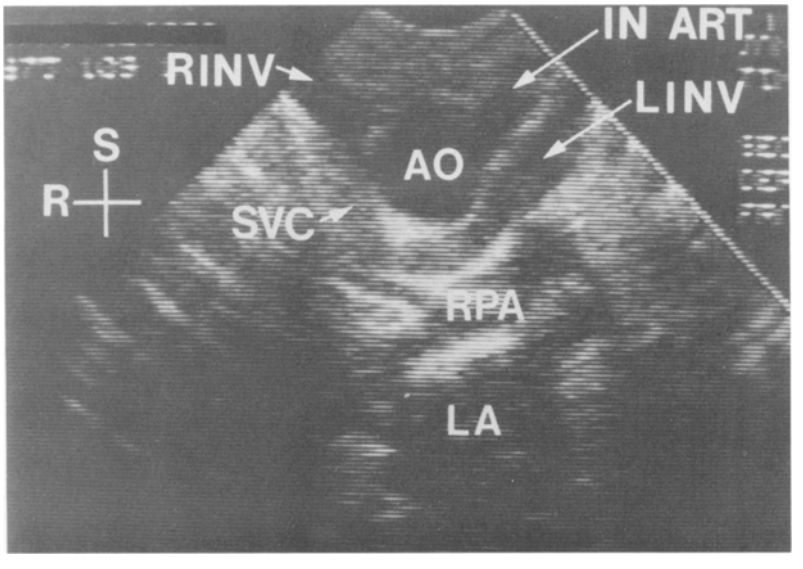

Fig. 2. Suprasternal short axis view of the aortic arch. The first branch off of the aorta (AO) is an innominate artery (IN ART) coursing to the left as is seen in right aortic arch with mirror image branching. The left innominate vein (LINV) is seen in longitudinal section coursing beneath the AO and connecting to the lowermost portion of the superior vena cava (SVC). The right innominate vein (RINV) drains normally. Abbreviations: LA = left atrium, R = right, RPA = right pulmonary artery, S = superior.

pulmonary artery (Figure 1). In the suprasternal short axis view, the additional vessel was seen in longitudinal section below the transverse aorta and above the right pulmonary artery (Figure 2). By tilting the transducer toward the patient's left side, the anomalous vessel could be imaged coursing toward the left arm. By tilting the transducer toward the patient's right side, the anomalous vessel could be seen connecting to the lowermost portion of the superior vena cava. A Doppler tracing re-

corded from the anomalous vessel showed a pattern of venous flow going away from the transducer. A diagnosis of anomalous left innominate vein draining beneath the aortic arch was made. At repeat cardiac catheterization, an angiogram performed with the venous catheter positioned in the left innominate vein and the arterial catheter positioned in the ascending aorta revealed the anomalous course of the left innominate vein beneath the aortic arch.

Discussion

Anomalous course of the left innominate vein beneath the aortic arch is a rare defect which is encountered infrequently and usually as an incidental finding at the time of post-mortem examination (L.H.S. Van Mierop, personal communication). Since the left innominate vein is not routinely entered at the time of cardiac catheterization, this anomaly is usually unrecognized, as was the case in the first catheterization of our patient. In addition, the chest x-ray provides no clues to the diagnosis.

Suprasternal notch echocardiography provides a technique for direct visualization of the size, connections, and course of the left innominate vein. A report of the use of M-mode contrast echocardiography to detect this rare anomaly has been published recently (4). The two-dimensional echocardiographic diagnosis of anomalous course of the left innominate vein can be made only if the suprasternal views are routinely included as a part of the echocardiographic examination and the echocardiographer is aware of the existence of the anomaly.

Anomalous course of the left innominate vein has not been reported to cause cardiac symptoms. The importance of recognizing this defect is to prevent mistakenly identifying the innominate vein as another cardiac structure. Because the innominate vein in this defect is located beneath the aortic arch, it is most likely to be mistakenly identified as the right pulmonary artery. Hence, the potential exists for the echocardiographer to measure the wrong vessel and report an erroneous right pulmonary artery size; and, an even more serious potential exists for the cardiac surgeon to identify the wrong vessel as the right pulmonary artery. For example, when performing a Blalock-Taussig shunt procedure, the surgeon might look under the aortic arch for the right pulmonary artery, see the anomalous vessel carrying desaturated blood beneath the arch, and mistake it for the right pulmonary artery. This case illustrates the importance of detecting the anomalous course of the left innominate vein under the aortic arch and the ease of making this diagnosis by two-dimensional and Doppler echocardiography.

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