

Brief Report

A tunnel from the left sinus of Valsalva to the right atrium

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Abstract We describe an individualised approach in the rare situation of a tunnel between the left aortic sinus of Valsalva and the junction of the superior caval vein with the right atrium. It is necessary, in this rare anomaly, to identify the origin of the left coronary artery prior to intervention.

Keywords: Aorto-right atrial tunnel; left coronary artery; congenital heart disease

IN CONTRAST TO AN AORTO-VENTRICULAR TUNNEL,¹ which has its aortic termination above the sinu-tubular junction, we describe here an anomalous channel taking origin from the sinus of Valsalva below the sinutubular junction and draining to the right atrium. Rupture of an aneurysmal sinus of Valsalva to the right atrium is well described, but tubular communications arising from a sinus of Valsalva and connecting with the right atrium are rare, and have usually been described as aorto-right atrial tunnels,^{2–5} albeit that Al-Ata et al.⁶ termed one example of such a structure a fistula from the left coronary artery to the superior caval vein, despite the presence of a normal left coronary artery. Children with this anomaly are usually asymptomatic,^{2,3,7} although adults may develop symptoms.⁸

Case report

A 6-month-old asymptomatic girl was referred because of a cardiac murmur. On examination, she was well grown, with normal pulses, a normal cardiac impulse, and normal heart sounds. There was an apical ejection click, and a soft continuous murmur heard under the right clavicle. Her electrocardiogram and chest X-ray were normal. Cross-sectional echocardiography showed usual atrial arrangement, with concordant

atrioventricular and ventriculoarterial connections. The atrial and ventricular septums were intact. The aortic valve was eccentric but trifoliate, and there was no gradient across it. Right and left ventricular function was normal. A tubular structure was noted arising from the left aortic sinus of Valsalva, which passed posterior to the left atrioventricular junction, terminating at the junction between the superior caval vein and the right atrium. Because we could not determine the precise relationship of the left coronary artery to the tunnel with echocardiography, we proceeded to angiography. The haemodynamics were essentially normal. A root aortogram excluded aortic regurgitation, and showed a dilated tubular structure arising from the left sinus of Valsalva (Fig. 1a). A left coronary artery of normal size, which divided into left anterior descending and circumflex vessels, arose approximately 1 centimetre from its origin. This tubular structure then passed posteriorly and to the right, becoming more tortuous and dilated, and looped round on itself to enter the superior cavo-atrial junction (Fig. 1b). The right coronary artery was not involved, and angiography demonstrated a normal origin of the artery supplying the sinus node.

We deemed surgical intervention to be necessary because of the risk of rupture of the aneurysmal vessel. The chest was opened via a vertical sternotomy, and the origin of the tunnel was dissected. As it was not possible to distinguish between this and the origin of left anterior descending and circumflex arteries, cardiopulmonary bypass was instituted, and the patient cooled to 32 degrees Celsius. The aorta was cross-clamped, and the right atrium was opened.

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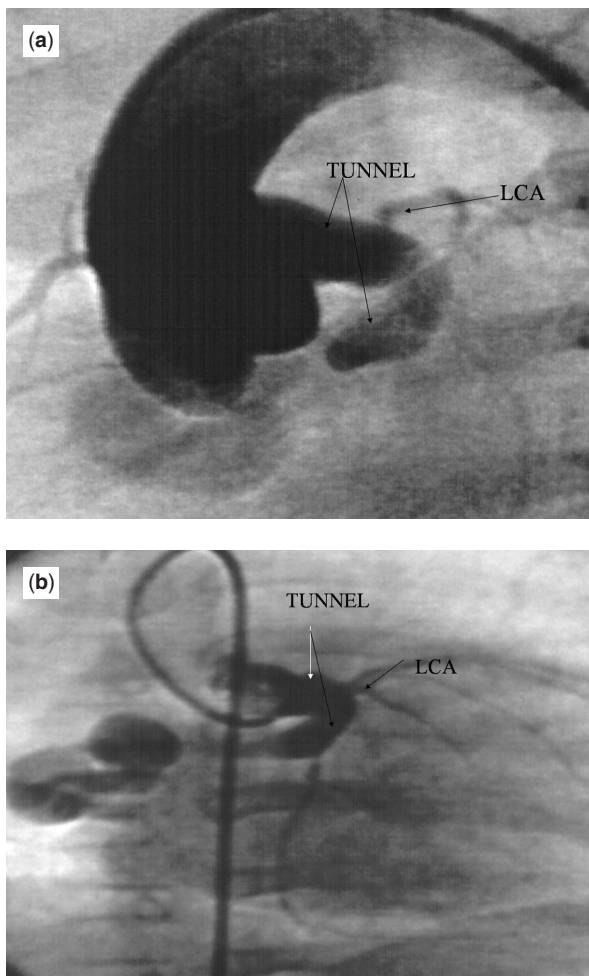


Figure 1.

An injection into the aortic root (a) shows origin of the tunnel from the left sinus of Valsalva. The left coronary artery (LCA) arises approximately 1 centimetre from the mouth of the tunnel. Selective injection into the mouth of the tunnel (b) proximal to the origin of the left coronary artery (LCA) shows that the tunnel passes posteriorly and to the right, becoming tortuous and dilated.

The right atrial end of the tunnel, which was windsock-like (Fig. 2a), was oversewn. Cardioplegia was then administered, the surface of the heart was cooled with ice slush, and an oblique incision was made in the aorta. This revealed a dilated tunnel arising from the left sinus of Valsalva. The left coronary artery was identified, and the tunnel was dissected out. Having traversed the posterior wall of the left atrium, it passed across to the lateral wall of the right atrium before entering just distal to the termination of the superior caval vein. The vessel was ligated distal to the origin of the left coronary artery (Fig. 2b). The child made an uncomplicated post-operative recovery. She was discharged from hospital on the fourth post-operative day, and at follow-up was normal to clinical examination. The post-operative

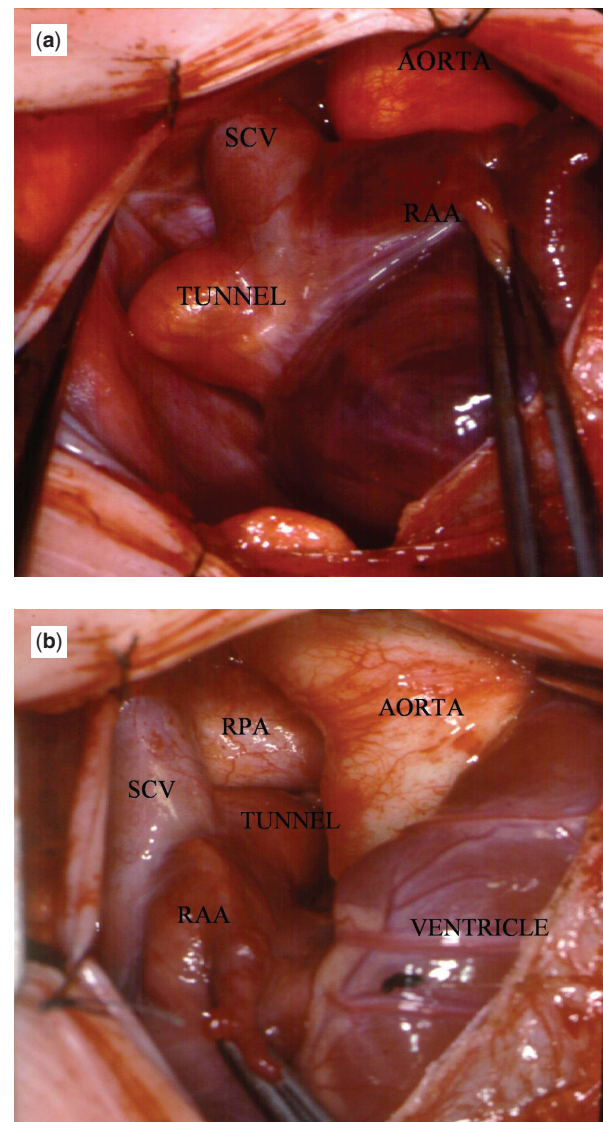


Figure 2.

An intraoperative photograph (a) shows the insertion of the tunnel into the lateral border of the cavoatrial junction. The tunnel then ran (b) in retroaortic and retrocaval fashion before inserting in the lateral wall of the right atrium. RAA: right atrial appendage; RPA: right pulmonary artery; SCV: superior caval vein.

electrocardiogram and cross sectional echocardiogram were normal.

Comment

In describing 4 cases of communication between the left sinus of Valsalva and the right atrium, Rosenberg et al.² noted that the left coronary artery arose independently from the tunnel in one, while in one the anterior descending coronary artery, and in the other two the main stem of the left coronary artery, arose from the proximal part of the tunnel, the latter as in our case. These authors noted that there was no

communication between the small distal coronary arteries arising from the tunnel and the right atrium. They therefore interpreted the abnormal communication as an aorto-right atrial tunnel, rather than as a coronary-cameral fistula as had been suggested earlier by Otero Coto et al.⁴ Turkay et al.⁸ also used the term aorto-right atrial tunnel in their case, where the tunnel arose from the right sinus of Valsalva, as did Moraes et al.⁵ in the case recently described where the tunnel arose from the non coronary aortic sinus. We agree that the entity is best described as an aorta-right atrial tunnel, it being necessary also to specify from which sinus the tunnel arises, and whether or not a coronary artery and/or its branches arise from the abnormal vessel.

The course of the tunnel in our, and the other cases^{2,3,7} described, is similar to that of the anticipated course of a sinus node artery when it arises from the left circumflex artery, a pattern found in up to 30 percent of normal hearts.⁹ In the two cases reported by Kalangos et al.³ with the same course as our case, the coronary arteries were normal apart from absence of the artery supplying the sinus node. In our case, however, right coronary angiography demonstrated the usual origin of the sinus node artery, as found in 70 percent of normal hearts.⁹

We were able to demonstrate the detailed anatomy of the tunnel by cross-sectional echocardiography combined with colour flow Doppler, but the precise origin of the left coronary artery and its branches was only shown with certainty by angiography. While

transcatheter coil occlusion may have been possible, we considered surgical occlusion of the feeding vessel distal to the origin of the left coronary artery, together with obliteration of its insertion to the right atrium, to be a safer way of managing this unusual condition.

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