

## *Brief Report*

# Anomalous left coronary artery from the non-adjacent sinus of the pulmonary trunk

Bhava R. J. Kannan, Sivadasan R. Anil, R. Krishna Kumar

*Division of Pediatric Cardiology, Amrita Institute of Medical Sciences and Research Centre, Kochi, Kerala, India*

**Abstract** We report a rare variant of anomalous origin of the left coronary artery from the non-adjacent sinus of the pulmonary trunk. The patient also had the right coronary artery arising from the non-facing sinus of the aorta.

**Keywords:** Anomalous coronary artery; anterior sinus

**A**NOMALOUS ORIGIN OF THE LEFT CORONARY artery from the pulmonary trunk is rare, comprising no more than 0.25 to 0.50% of all congenital heart defects.<sup>1</sup> Most affected children suffer from myocardial infarction and congestive heart failure during early infancy, and early operation is generally recommended.<sup>2</sup> The anomalous left coronary artery typically arises from the leftward of the two facing sinuses of the pulmonary trunk. We report a case of anomalous left coronary origin from the non-facing sinus of the pulmonary trunk, which was successfully managed surgically.

## Case report

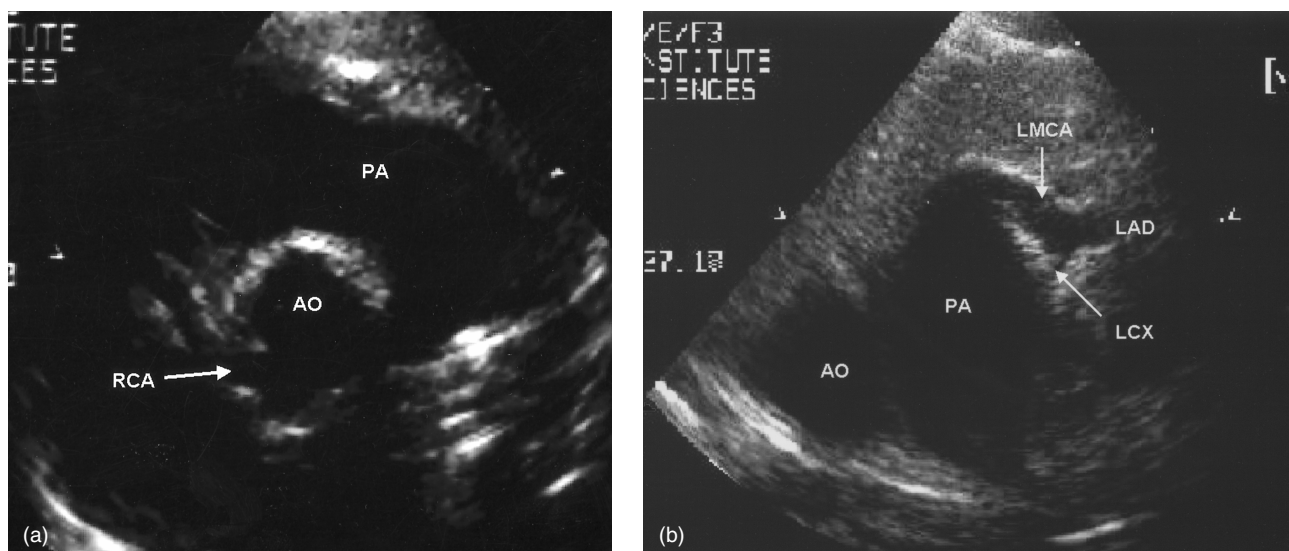
A 3-month-old male infant was referred for cardiac evaluation because of radiographic evidence of cardiac enlargement. He had been diagnosed as having a fistula from the left coronary artery to the pulmonary trunk in another center, and was referred to us for cardiac catheterization. When the child was brought to us at the age of 4 months, he was asymptomatic. Examination revealed cardiac enlargement and a third heart sound. His electrocardiogram revealed deep Q waves in leads I and aVL, and depression of the ST segment, with inversion of the T waves in chest leads V2 through V6. Echocardiography showed dilation

of the left ventricle with an ejection fraction of 30%, mild mitral regurgitation, and increased echogenicity of the anterolateral papillary muscle. The right coronary artery was dilated, and measured 3.5 mm in diameter, arising from the most posterior sinus of the aorta, in other words, the sinus that did not face the pulmonary trunk (Fig. 1a). The main stem of the left coronary artery originated from the non-facing sinus of the pulmonary trunk (Fig. 1b). It also measured 3.5 mm in diameter, and was 5 mm in length. The circumflex artery coursed posteriorly close to the anticipated left coronary sinus of the aorta. Color Doppler study showed retrograde flow in the circumflex artery towards the pulmonary trunk, this retrograde flow giving an impression of a left coronary artery arising normally from the aorta (Fig. 2). There were no other associated defects.

At surgery, the echocardiographic findings were confirmed. The pulmonary end of the main stem of the left coronary artery was disconnected. A pericardial tube, measuring 5 mm in diameter, was created and anastomosed to the cut end of the main stem. The other end of the pericardial tube was anastomosed to the aorta, this interposed pericardial tube forming a long new main stem without any stretch or kink. Due to myocardial oedema, closure of the sternum was delayed for 24 hours. The postoperative period was otherwise uneventful. Initial heparinisation for 48 hours, and later antiplatelet doses of aspirin, were given to preserve the flows in the newly constructed left coronary artery. Repeat echocardiography showed good flows in the newly constructed artery, and in its circumflex and anterior interventricular

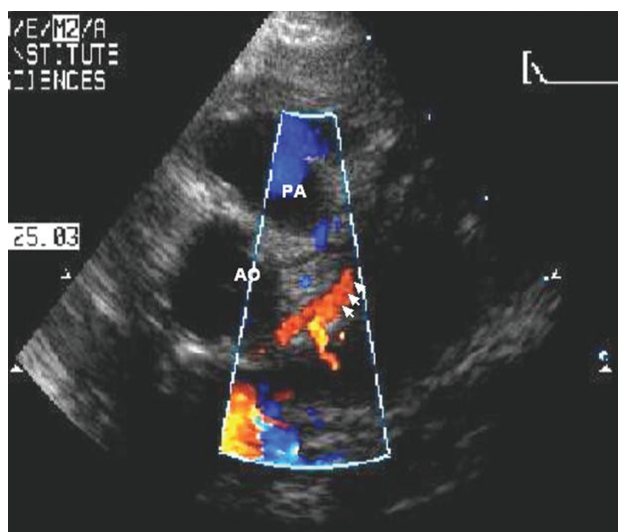
Correspondence to: Dr R. Krishna Kumar DM, Chief Pediatric Cardiologist, Amrita Institute of Medical Sciences and Research Centre, Elamakkara PO, Kochi, 682 026, Kerala, India. Tel: 91 484 339080; Fax: 91 484 340801; E-mail: rkrishnakumar@aimshospital.org

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**Figure 1.**

A dilated right coronary artery (a) is seen arising from the non-facing sinus of the aorta. The main stem of the left coronary artery, also dilated, arises from the non-facing sinus of the pulmonary trunk (b). RCA: right coronary artery; AO: aorta; LMCA: main stem of left coronary artery; PA: pulmonary trunk; LCX: left circumflex artery.



**Figure 2.**

Colour Doppler of the circumflex branch of the left coronary artery showing retrograde flow towards the pulmonary trunk. This can give a false impression of the left coronary artery arising from the aorta.

branches. The child was symptom-free at 3 months follow-up, and the left ventricular ejection fraction had improved to 55%.

## Discussion

In most patients with anomalous origin of the left coronary artery from the pulmonary trunk, the anomalous artery usually arises from leftward of the facing sinuses of the pulmonary trunk. Less commonly, it

arises from the rightward facing sinus of pulmonary trunk,<sup>3</sup> the trunk itself<sup>4</sup> or from one of the pulmonary arteries.<sup>5</sup> In our patient, the artery arose from the non-facing sinus of the pulmonary trunk. Of 11 patients reported by Turley and co-workers,<sup>6</sup> one patient had the left anterior interventricular artery arising from the non-facing sinus. We have not been able to find any report of the main stem of the left coronary artery arising from the non-facing sinus. The abnormal origin of the right coronary artery from the non-facing aortic sinus is also strikingly unusual.

Echocardiography allows accurate diagnosis in most patients. Diagnostic errors resulting from imaging of the transverse sinus of pericardium<sup>7</sup> can be avoided by demonstration of color Doppler flows. In our case, the circumflex branch was coursing posteriorly close to the left facing coronary sinus of the aorta, with the direction of color flow away from the aorta mimicking the normal arrangement (Fig. 2). This could have resulted in the mistaken diagnosis of a fistulous communication from the coronary artery to the pulmonary trunk. Careful evaluation failed to establish any communication between the presumed left coronary artery and the aorta. Moreover, the caliber of the vessel increased as it coursed away from the aorta. This permitted us to identify it as the circumflex branch of the left coronary artery arising from the non-facing sinus of pulmonary trunk.

Individual variations in anatomy necessitate a variety of techniques for surgical correction of this condition. In the previous report of origin of the left anterior interventricular artery arising from non-facing

sinus of the pulmonary trunk, the walls of pulmonary trunk were used to restore the continuity with the aorta.<sup>6</sup> In our case, the anatomy was such that mobilization of the main stem of the left coronary artery towards the aorta would have resulted in stretching of the anterior interventricular artery, and kinking of the circumflex artery. A pericardial tube was therefore used, and gave a good immediate result. Long-term follow-up will now be needed to document patency of the pericardial tube used to reconstruct the left coronary artery.

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