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Coronaries from the Brachiocephalic Artery: Anomalous Origin of the Coronary Arteries in a Case of Situs Inversus and Truncus Arteriosus

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Abstract

Congenital anomalies of the coronary arteries are rare. In this article, we reported a case of 6-month-old female who was brought with breathing difficulty and poor weight gain. Echocardiography was done which showed dextrocardia and truncus arteriosus. A cardiac computed tomography confirmed these findings and additionally revealed that the coronary arteries originated from a common vascular channel from the brachiocephalic artery. This is a very rare occurrence. To our knowledge, only a few such cases have been reported in the literature.

Keywords
- coronary artery
- truncus arteriosus
- situs inversus

Introduction

Coronary artery anomalies are a diverse and complex group of congenital disorders with variable manifestations and pathophysiological mechanisms.[1] In this case report, we describe an extremely rare case of a female child with a common vascular trunk from the brachiocephalic artery giving rise to the coronaries. The child also had situs inversus and truncus arteriosus.

Case Report

A 6-month-old female child was brought with breathing difficulty and poor weight gain. There was cyanosis on clinical examination. Chest radiograph showed dextrocardia and cardiomegaly. Echocardiography revealed dextrocardia and a large truncus arteriosus.

A 64-slice multidetector cardiac computed tomography (CT) was done for further evaluation of the pulmonary arteries and the coronaries.

Sections of the upper abdomen showed the liver to the left and the spleen to the right suggestive of situs inversus (►**Fig. 1A, B**).

The right atrium and the right ventricle were to the left. The left atrium was to the right. The left ventricle was hypoplastic and placed inferior to the right ventricle. The right ventricle was apex forming and directed to the right side suggestive of dextrocardia (►**Fig. 2A, B**).

There was a large ventricular septal defect (►**Fig. 3A**).

Truncus arteriosus was seen. Both pulmonary arteries had separate origins from the common trunk with the right pulmonary artery arising superior to the left pulmonary artery at the level of the arch of the aorta (type A3—Van Praagh classification system; ►**Fig. 3B**).

The aortic arch showed complex variant anatomy. There was right-sided aortic arch and an aberrant left subclavian artery. The brachiocephalic artery and the left common carotid artery shared a common origin suggestive of a bovine variant of the aortic arch (►**Fig. 4A-C**).

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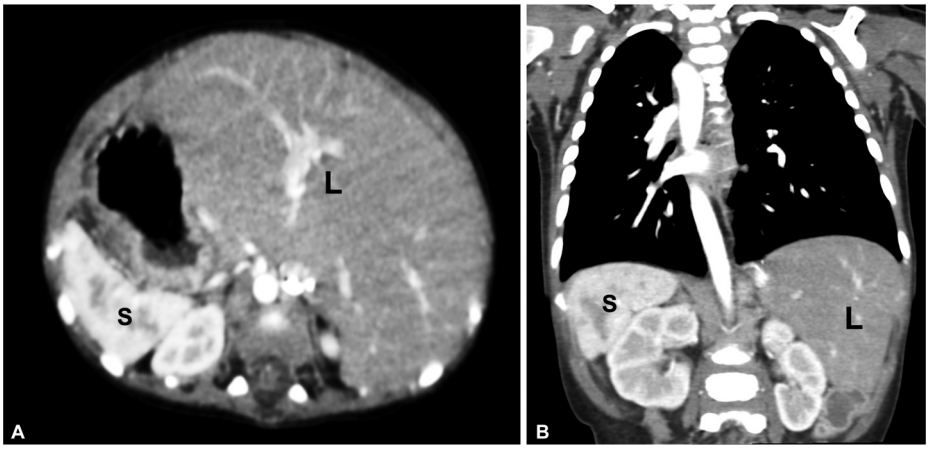

Fig. 1 Axial (**A**) and coronal reformatted (**B**) postcontrast CT images show the liver(L) to the left and the spleen(S) to the right-situs inversus.

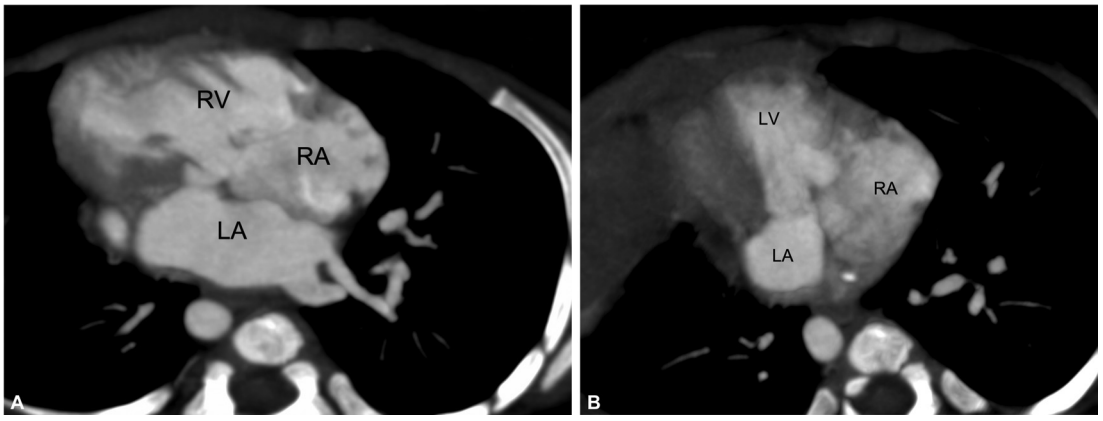

Fig. 2 (**A**) Axial cardiac CT image—superior section shows cardiac apex directed to the right. The right atrium (RA) and the right ventricle (RV) are to the left. The left atrium (LA) is to the right. The RV is apex forming and directed to the right side (dextrocardia). The left ventricle is hypoplastic and not seen in this image. (**B**) Axial cardiac CT image—inferior section shows a smaller sized left ventricle (LV) inferior to the right ventricle (RV). Right atrium (RA) left atrium (LA) are also seen.

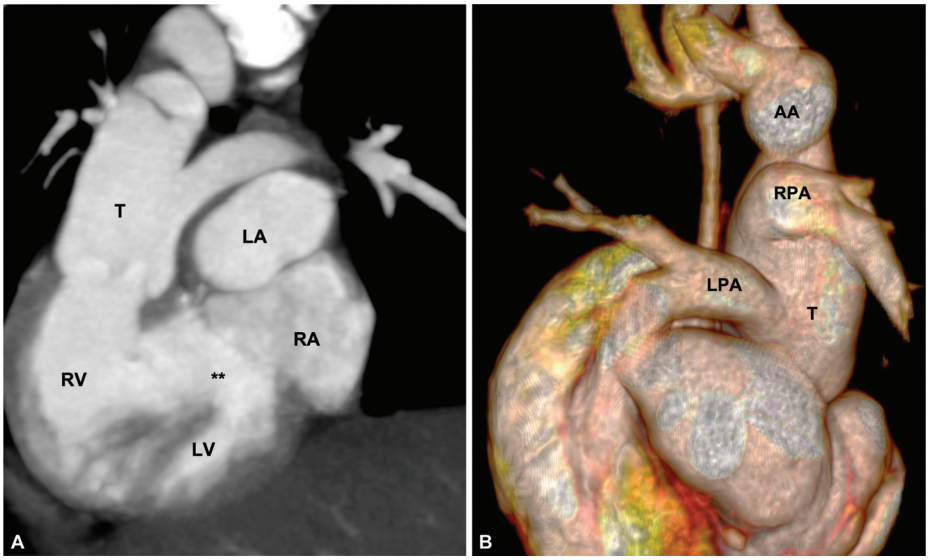

Fig. 3 (**A**) Cardiac CT reformatted RVOT view image shows truncus arteriosus (T) and a large VSD (**) along with inferiorly placed small left ventricle (LV). The left atrium (LA), the right atrium (RA), and the right ventricle (RV) are also seen. (**B–D**) Volume rendered image from the posterior aspect of the heart shows truncus arteriosus (T) with separate origins of the right pulmonary artery (RPA) and the left pulmonary artery (LPA) and continuation as the aortic arch (AA). The aorta has been removed posteriorly to display the origins of the pulmonary arteries.

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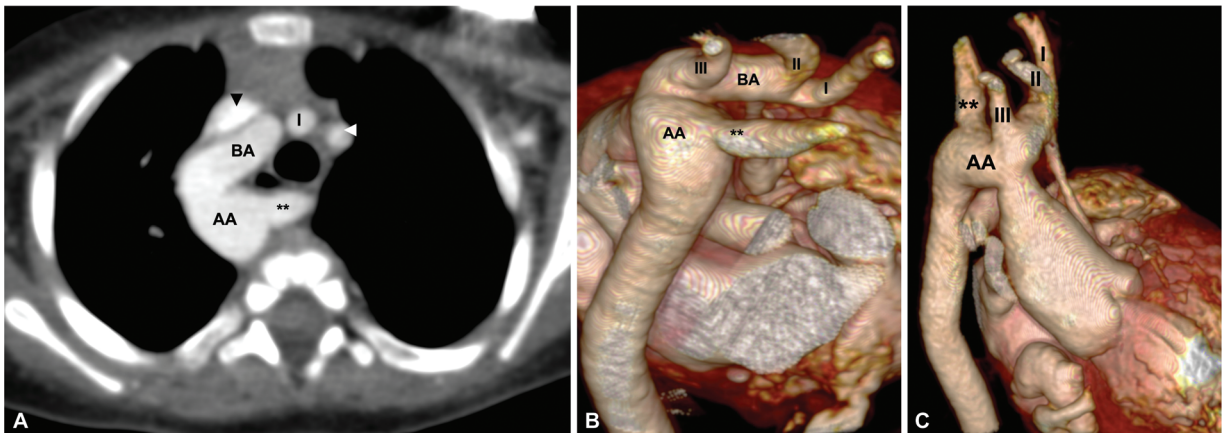

Fig. 4 Axial cardiac CT image (**A**), posterior oblique (**B**), and anterior oblique (**C**) 3D volume rendered images shows right aortic arch (AA) with aberrant left subclavian artery (**). The brachiocephalic artery (BA) and the left common carotid artery (I) shares a common origin suggestive of bovine variant of aortic arch. The right common carotid artery (II), the right subclavian artery (III), the right brachiocephalic vein (*black arrowhead*) and the left brachiocephalic vein (*white arrowhead*) are also seen.

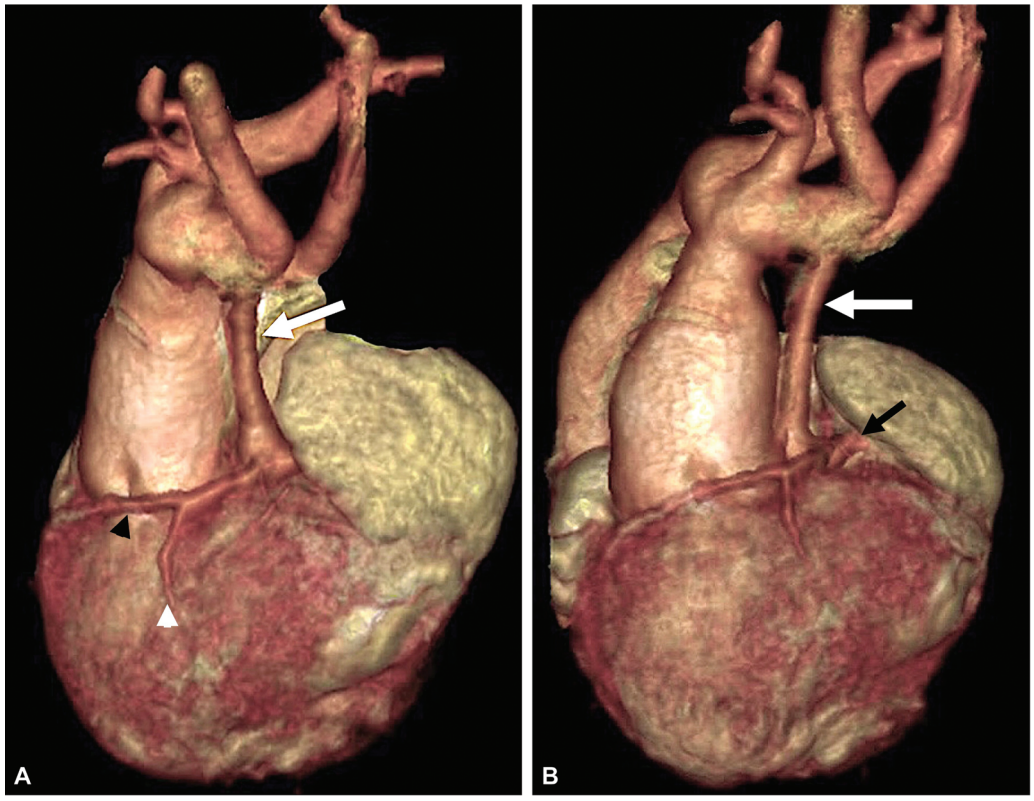

Fig. 5 Anterior (**A**) and lateral (**B**) 3D volume rendered images shows a common vascular trunk (white arrow) from the brachiocephalic artery which descends inferiorly and gives rise to the coronaries—the right sided left circumflex artery (*black arrowhead*), the left anterior descending artery (*white arrowhead*), and the left sided right coronary artery (*black arrow*).

There was a common vascular channel arising from the brachiocephalic artery passing inferiorly and dividing into the three coronary arteries (►**Fig. 5A, B**).

Discussion

Congenital abnormalities of the coronary arteries are uncommon.[2–8] Though rare, it is an important cause of sudden cardiac death in young adults.[1–8] Normally, there are three main coronary arteries: the right coronary artery (RCA), the left anterior descending (LAD), and the left circumflex artery (LCX). The LAD and the LCA arise from the left main coronary artery.[2,3] The RCA arises from the anterior right coronary sinus/right sinus of Valsalva and the left main coronary artery arises from the left posterior coronary sinus/left sinus of Valsalva of the ascending aorta.[2,3]

Anomalies of the coronary arteries are of various types like anomalies of origin, anomalies of course, and anomalies of termination.[1–3] Of these, anomalous origin of the coronary artery is a common type of congenital coronary

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abnormality.[4] The increased use of multidetector CT in cardiac and coronary imaging has improved the detection and characterization of such anomalies.[5] Very few cases of anomalous origin of the coronary artery from the brachiocephalic artery have been reported in the literature. All these cases were also associated with truncus arteriosus.[9–11]

Follow-Up

The proposed management plan to the patient's family was unifocalization of the branch pulmonary arteries with right ventricle to pulmonary artery conduit repair and routing of the ventricular septal defect to the aorta. The patient was lost to follow-up.

Conclusion

Anomalies of the origin of the coronary arteries are an important part of the spectrum of congenital coronary artery disorders. The knowledge of these entities is essential for their detection and further management if required. Advances in CT imaging techniques like multidetector CT, multiplanar reconstructions, maximum intensity projection, and 3D volumetric rendering have helped in improving our understanding of these anomalies. Few cases of anomalous coronary artery origin from the brachiocephalic artery reported in the literature were also associated with truncus arteriosus suggesting a probable association between these two entities.

Note

All the figures used in this article were sourced from the Department of Radiology, Bai Jerbai Hospital for Children, Wadia Hospital, Parel, Mumbai.

Conflict of Interest

None declared.

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