Diagnosis of Hemi-Truncus Arteriosis by Three-Dimensional Magnetic Resonance Angiography

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Two patients, aged 3 days (weight 2 kg) and 40 years (weight 80 kg) underwent gadolinium-enhanced magnetic resonance angiography (MRA) because of diagnostic uncertainty. The newborn infant was antenatally diagnosed with truncus arteriosis. Postnatal echocardiography confirmed the diagnosis. It was thought that the branch pulmonary arteries were confluent (type II); however, an MRA was requested to clarify this. The MR angiograms (Figure 1) showed the right pulmonary artery arising from the left side of the ascending aorta. The left pulmonary artery, which was disconnected from the right pulmonary artery, was supplied by the patent ductus arteriosis arising from the underside of the aortic arch. The MRA findings were confirmed at surgery.

The adult patient had been diagnosed with pulmonary atresia and ventricular septal defect in childhood and had been managed conservatively. Nevertheless, he began to experience reduced exercise tolerance and became cyanotic. An MRA was requested to outline the source of his pulmonary blood supply. The MR angiograms (Figure 2) showed a large left pulmonary artery arising from the left side of the ascending aorta, with pruning of its distal branches. On the right side, the patient had a number of small pulmonary arteries that were not supplied by the aorta or its main branches. A double aortic arch was also discovered. The patient is being assessed for heart-lung transplantation.

Figure 1. Three-dimensional reconstructed MRA of the newborn patient. Blue shows the superior vena cava, pulmonary veins, right and left atria, and right ventricle. Red shows the aorta and main branches, right pulmonary artery (RPA), and left ventricle. Orange shows the patent ductus arteriosis and left pulmonary artery. A, Posterior view. B, Posterior view without the descending aorta showing the disconnected left and right pulmonary arteries. C (anterior view) and D (left lateral view) show the RPA arising from the left side of the ascending aorta. Reconstruction was performed off-line. Heart and major vessels were segmented in a semi-automated manner (seedling, thresholding, and eventual manual editing) using Analyze (Mayo Clinic). The segmented data sets were then rendered and visualized using vtk (Schroeder W, Martin K, Lorensen B. The Visualization Toolkit. 2nd ed. New Jersey: Prentice Hall, 1998).
Figure 2. Maximum intensity projections of the adult patient MRA. A, Anterior view. B, Left anterior oblique view. A large left pulmonary artery arises just above the aortic valve with pruning of its distal vessels. There is a double aortic arch with both arches being widely patent into the descending aorta. Few small pulmonary vessels are present on the right side.
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