Images in cardiovascular medicine

# Magnetic resonance assessment of an adult patient with congenitally corrected transposition of the great arteries

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Congenitally corrected transposition of the great arteries (CC-TGA) is a heart disease in which the great arteries are abnormally related to each other and to the ventricles. Nonetheless, they arise above the physiologically correct ventricles. In this malformation the aorta is generally on the left (levo- or L-mal-position), and the pulmonary artery is on the right. When no other defects exist, the circulation proceeds normally. Corrected or L-transposition occurs when the primitive cardiac tube loops to the left, instead of the right, during embryogenesis. The anatomically right ventricle lies on the left and receives oxygenated blood from the left atrium; this blood is ejected into a usually anterior-placed, left-sided aorta. The anatomically left ventricle lies to the right and connects the right atrium to a posterior-placed pulmonary artery. This arrangement of the great arteries and ventricles (in contrast to the uncorrected, complete, or D-transposition) permits functional correction, so that systemic venous blood passes into the pulmonary trunk while arterialized pulmonary venous blood flows into the aorta[1].

CC-TGA is an unusual congenital heart disease defect, particularly in adults. Management of these patients requires detailed information on cardiac and great vessel morphology. Currently, echocardiography and angiography are still commonly used for its diagnosis[2]. Real-time cross-sectional echocardiography is usually sufficient for definitive diagnosis, but may occasionally be hampered by limited acoustic windows. Moreover, echocardiography has limited value in assessment of right ventricular function in these patients.

Cardiovascular magnetic resonance imaging (MRI) and computed tomography have the potential to overcome many of these limitations and have shown to be important non-invasive imaging techniques in adult patients with congenital heart disease[3-5]. In particular, cardiovascular MRI which provides additional information, may serve as a useful alternative to conventional imaging techniques in selected patients: relevant concomitant diseases are clearly documented by cardiovascular MRI using standard spin-echo and gradient-echo techniques. In patients with CC-TGA, they offer extremely useful information about abnormalities of the heart and great vessels and they also provide assessment of cardiac anatomy and function. Right ventricular dysfunction and tricuspid regurgitation are important determinants of late morbidity and mortality. Therefore cardiovascular MRI often plays a role in the evaluation of the great vessels and the cardiac valves.

We report the case of a 36-year-old man in whom echocardiography revealed a CC-TGA: a morphological right ventricle with a tricuspid valve on the left, a morphological left ventricle with a thick and irregular wall without papillary muscles, bicuspid atrioventricular valve on the right, the aorta arising in the anterior position from the left-sided (morphological right) ventricle. In our patient, transthoracic echocardiography could not provide adequate cardiac images of the connection of great vessels and ventricles due to the rotation of the cardiac apex and the presence of lung tissue.

Cardiovascular MRI shows that the pulmonary artery is posterior to the aorta and is

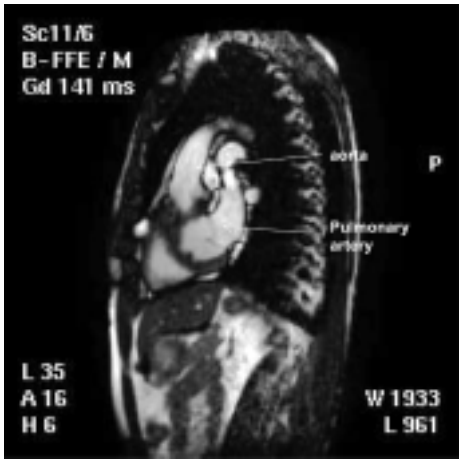


**Figure 1.** *Turbo field echo balance image in the sagittal plane showing an anterior-placed aorta and a posterior-placed pulmonary artery.*

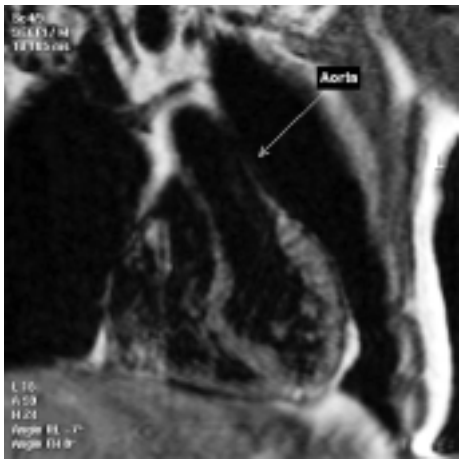


**Figure 2.** *T1 spin-echo image: the aorta arises from the left-sided, morphologically right ventricle.*

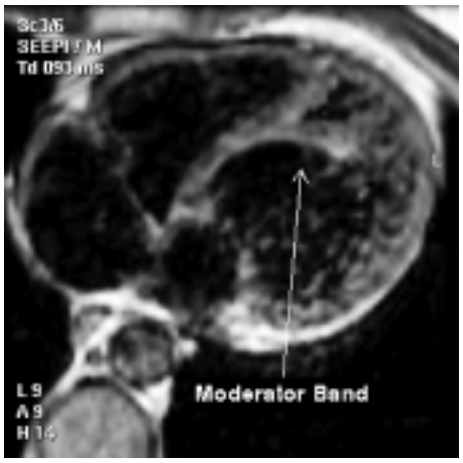


**Figure 3.** *Spin-echo image with the moderator band in the left-sided ventricle.*

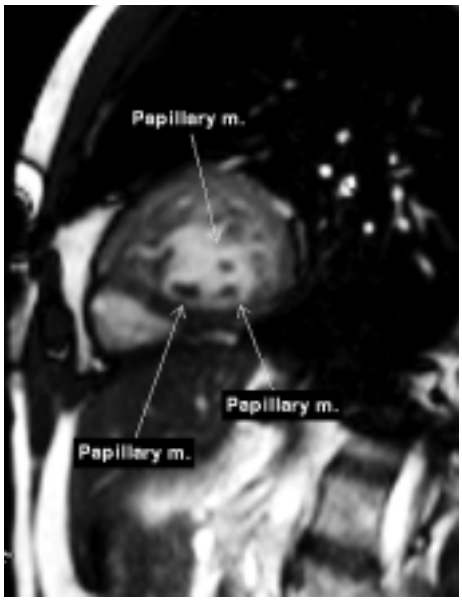


**Figure 4.** *Turbo field echo balance image with ECG triggering: heavy trabeculations and three papillary muscles in the left-sided ventricle.*

connected to the posterior ventricle, the morphologically left one (Fig. 1).

Cardiovascular MRI clearly revealed findings indicative of CC-TGA: the aorta arose from the left-sided (morphological right) ventricle with heavy trabeculations and three papillary muscles (Figs. 2-4, spin-echo images), and the medial placed pulmonary artery arose from the right-sided (morphological left) ventricle. We diagnosed this patient as CC-TGA with systemic atrioventricular valve regurgitation.

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