

Images in Congenital Heart Disease

Cardiac-gated multislice computerised tomographic angiography in the preoperative evaluation of an infant with tetralogy of Fallot and pulmonary atresia

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AN 8-MONTH-OLD FEMALE INFANT WITH tetralogy and pulmonary atresia and totally anomalous pulmonary venous connection to the superior caval vein showed increasing dysphagia and postprandial vomiting after left-sided unifocalisation of major aortopulmonary collateral arteries. By gastroscopy, we demonstrated a nearly circular, and pulsatile, indentation in the middle of the oesophagus (Fig. 1). Contrast-enhanced and retrospective cardiac-gated multislice computerised tomographic angiography was performed for further evaluation. Volume-rendering, using a data set reconstructed in late diastole (Fig. 2), shows the presence of an aortopulmonary collateral artery passing posteriorly, then curving around and compressing the oesophagus, the position of which is marked by the stomach tube (ST). The dorsal view, shown in Panel 2A with a zoom in Panel B, reveals the vertebral bodies (VB), the aorta (AO), and the peripheral pulmonary arteries (PA), as well as two right-sided aortopulmonary collateral arteries ventral to the vertebral column (MAPCA 1 and 2, arrows). Panel C is reconstructed in the perpendicular plane through the second collateral artery.

From the data set, we extracted high quality virtual images (Fig. 3), that demonstrate the morphology of the heart. Reconstruction in a long axis plane (Panel A), shows the left and right ventricles (LV and RV), the ventricular septal defect (VSD), and the relationship of the aortic and tricuspid valves (AV and TV). Panel B, a greyscale image, shows the inner

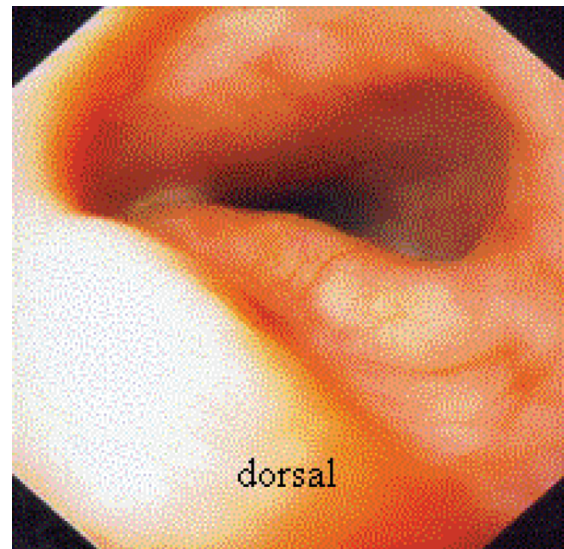


Figure 1.

surfaces, while Panel C is a short axis cut showing the anterior view through the tricuspid valve. Figure 4 is then a reconstructed view analogous to that of the surgeon looking down onto the crest of the ventricular septum from the aorta through the open aortic valve. This shows the precise override of the aortic valve, three commissures of which are apparent in late diastole (AV). Figure 5 is then a further reconstruction of all the vascular abnormalities. Viewed from the front, it shows an aortopulmonary (AP-shunt), the brachiocephalic trunk (1), endotracheal (2) and stomach (3) tubes, the left carotid artery (4), the left vertebral artery (5), the left subclavian artery (6), and the left superior (LSVC) and superior caval veins (SVC). Movies of Figures 2, 3 and 5 are available on-line at www.greenwich-medical.co.uk.

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Accepted for publication 2 July 2003

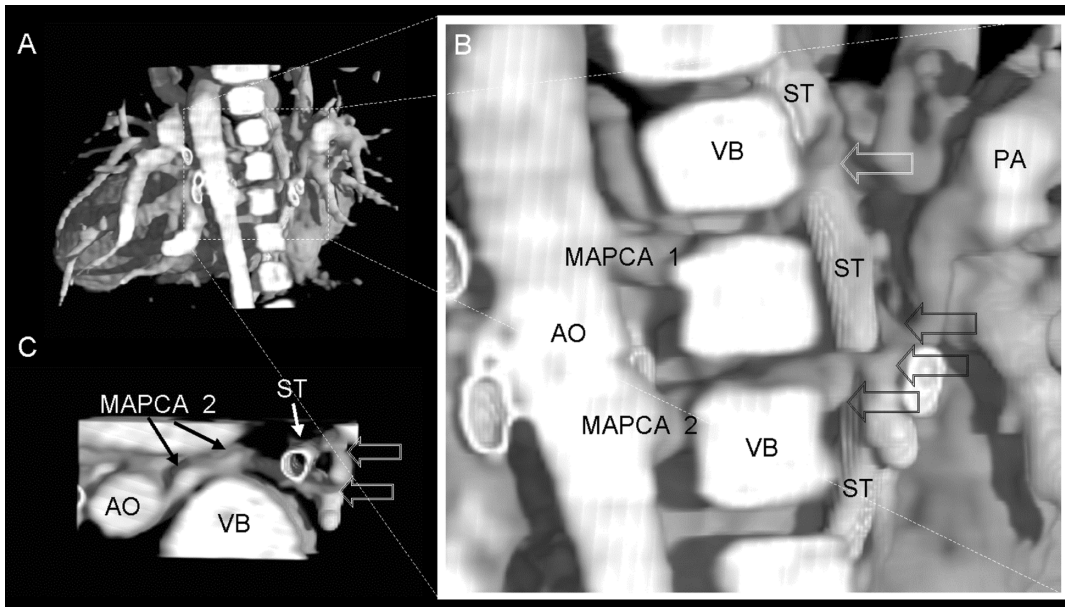


Figure 2.

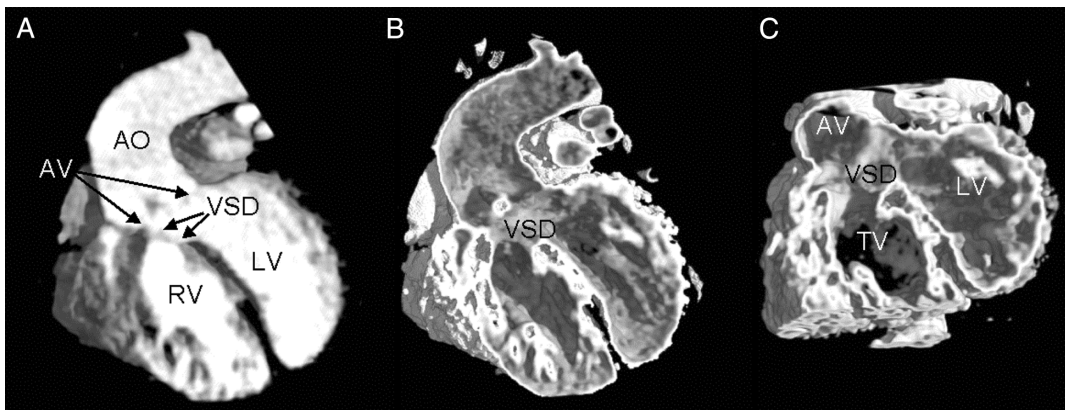


Figure 3.

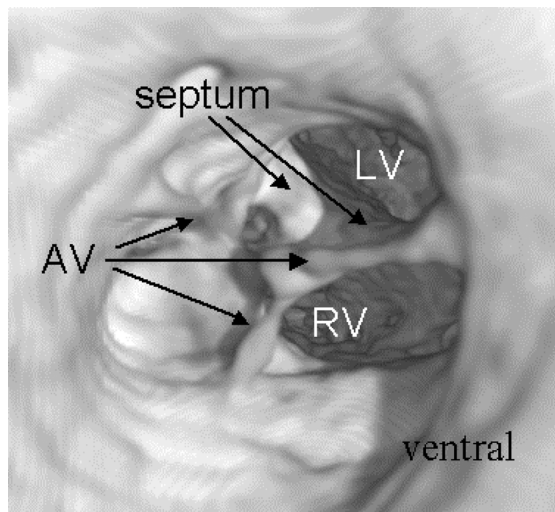


Figure 4.

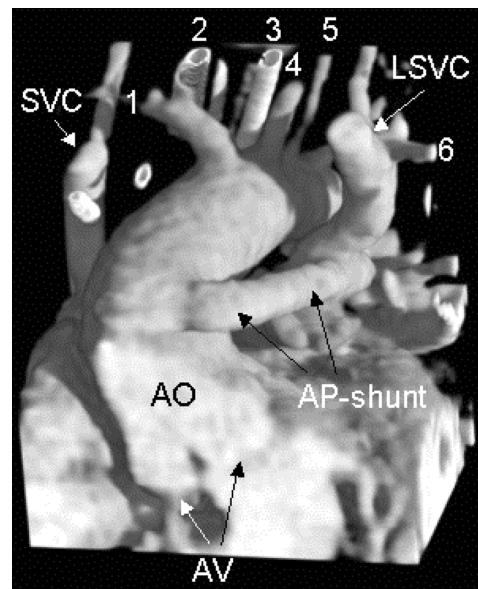


Figure 5.

Considered together, these findings permitted us to optimise management by surgical unifocalization of the right-sided collateral arteries with a second aortopulmonary shunt. We submit that our experience reveals computerised tomographic angiography

now to be the modality of choice as a minimally invasive, robust, and accurate technique for the diagnosis of complex congenital cardiac and vascular abnormalities in newborns and infants.