Cardiol Young 2008; 18: 350
© Cambridge University Press
ISSN 1047-9511
doi: 10.1017/S1047951108002023
First published online 14 April 2008

Images in Congenital Cardiac Disease

Reversal of flow in the descending aorta associated with hypercapnoea

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Keywords: Aortic arch; retrograde; diastolic flow; cerebral vasodilation

Following surgical repair of an atrioventricular septal defect with common atrioventricular junction and common valve, an eight month old girl, who had no other cardiovascular abnormalities, developed severe adenovirus pneumonia, requiring high frequency oscillatory ventilation. Her arterial blood gases shifted repeatedly between normocapnoea and hypercapnoea. Postoperative echocardiography showed good ventricular function, a residual ventricular septal defect of moderate size, and mild regurgitation across the left atrioventricular valve. It also revealed diastolic reversal of flow in the descending aorta, both on colour (Fig. 1) and pulsed wave (Fig. 2) Doppler interrogation. This had not been present preoperatively. The partial pressure of carbon dioxide in an arterial blood sample was 7 kilopascals at the time of the echocardiogram, the normal values being from 4 to 6 kilopascals. Following optimization of ventilation, the partial pressure of carbon dioxide fell to approximately 5 kilopascals, and the diastolic reversal of aortic flow disappeared, only to return when the levels of carbon dioxide increased again.

Diastolic reversal of flow in the distal aortic arch is a well described finding in severe aortic regurgitation, aortopulmonary window, and cerebral arteriovenous fistula, none of which were present in our patient. It is also well known that increased partial pressure of carbon dioxide in the blood causes cerebral vasodilation. In the absence of any other explanation, we hypothesize that cerebral vasodilation was responsible for the diastolic reversal of flow observed in the aorta of our patient.

Figure 1.

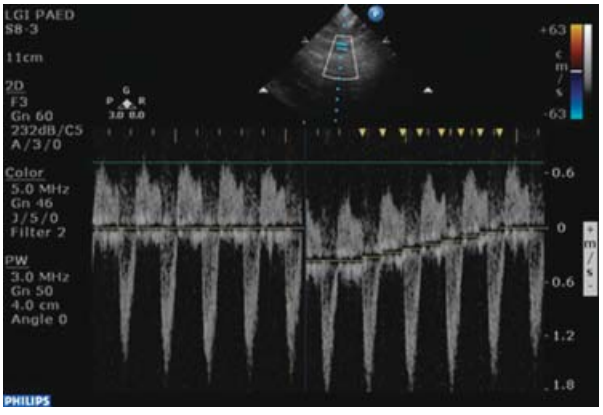

Figure 2.

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Accepted for publication 31 July 2007