

## Echo Doppler Assessment of Vascular Function in Post-operative Congenital Heart Disease

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### Background

Most children with congenital heart disease (CHD) now survive until adulthood with a good quality of life. In some forms of CHD the aorta may be large and abnormal which has implications for future cardiovascular risk. Therefore, we sought to assess the biophysical properties of the aorta of children with: 1) tetralogy of Fallot (TOF); 2) coarctation of the aorta (COA) and 3) transposition of great arteries (TGA).

### Methods & Results

Forty children with CHD (17 TOF, 16 COA and 7 TGA) were compared with 55 matched control subjects (CTRL). The aortic diameters and pulse wave transit time around the aortic arch were measured with echo-Doppler. Pulse wave velocity (PWV), aortic input impedance ( $Z_i$ ), characteristic impedance ( $Z_c$ ), arterial pressure-strain elastic modulus ( $E_p$ ) and arterial wall stiffness index ( $\beta$ -index) were calculated. The results are presented in Table 1. There was no significant difference within the CHD group.

### Conclusion

Children with certain forms of CHD have impaired biophysical properties of the aorta, with increased PWV, impedance and stiffness. This predisposes them to early-onset cardiovascular events such as elevated blood pressure and ischemic events. Since these measurements are easily obtainable by routine ultrasound, they should become part of the regular follow-up of children with certain forms of CHD.

Table 1 – Demographics data and biophysical properties of the aorta.

	CTRL group (n=55)	CHD group (n=40)	P value
Age [years]	13.8 +/-4	14.5 +/-2.6	0.36
PWV [cm/s]	351.4 +/-49.9	540.9 +/-174.6	<0.001
$Z_i$ [dyn · s · cm <sup>-5</sup> ]	140.5 +/-27	134.4 +/-60.9	0.21
$Z_c$ [dyn · s · cm <sup>-5</sup> ]	132.9 +/-31.4	193.4 +/-89.6	0.003
$E_p$ [mm Hg]	247.9 +/-52.1	310.6 +/-127.6	<0.001
$\beta$ -index	3.0 +/-0.6	3.9 +/-1.5	<0.001