

## Pulmonary and systemic vascular resistance in patients with open and closed ASD type secundum.

Van De Bruaene A., Hermans H., Delcroix M., Voigt J.U., Gewillig M., Budts W.  
University Hospitals Leuven, Leuven, Belgium

**Introduction:** This study aimed at (1) evaluating total pulmonary vascular resistance (TPVR) and systemic vascular resistance (SVR), (2) comparing the relative change in TPVR and SVR and (3) evaluating the relationship between oxygen consumption and TPVR/SVR during exercise in patients with open and closed ASD type secundum.

**Methods:** Fourteen patients with open (mean age  $39 \pm 19$  years) and 29 patients with closed (mean age  $41 \pm 17$  years) ASD underwent standard and symptom-limited bicycle stress echocardiography. Oxygen consumption ( $VO_2$ ) was measured using cardiopulmonary exercise testing. TPVR was calculated as the ratio of systolic pulmonary artery pressure to right ventricular cardiac output and SVR was calculated as the ratio of mean blood pressure to left ventricular cardiac output at each stage.

**Results:** TPVR decreased significantly from rest to peak exercise in patients with closed ASD ( $4.6 \pm 1.6$  to  $3.3 \pm 0.9$  mmHg/L/min;  $P < 0.0001$ ) but not in patients with open ASD ( $3.1 \pm 0.9$  to  $3.1 \pm 0.7$ ;  $P = 0.940$ ). SVR decreased significantly from rest to peak exercise in patients with a closed ( $22.3 \pm 4.7$  to  $11.5 \pm 2.7$  mmHg/L/min) and open ASD ( $24.8 \pm 5.9$  to  $13.4 \pm 5.8$  mmHg/L/min). The decrease in SVR was larger than the decrease in TPVR in patients with open ( $-47 \pm 27$  versus  $+5 \pm 33\%$ ;  $P < 0.0001$ ) and closed ( $-47 \pm 15$  versus  $-19 \pm 26\%$ ;  $P < 0.0001$ ) ASD. In patients with a closed ASD, there was an inverse relation between TPVR and  $VO_2$  ( $R = -0.539$ ,  $P < 0.0001$ ) and between SVR and  $VO_2$  ( $R = -0.745$ ,  $P < 0.0001$ ). In patients with an open ASD, there was an inverse relation between SVR and  $VO_2$  ( $R = -0.773$ ,  $P < 0.0001$ ). These relationships were best fit by a quadratic equation (figure).

**Conclusions:** TPVR does not decrease during exercise in patients with an open ASD. SVR decreases significantly and similarly in patients with an open and closed ASD. As expected, the relative change in SVR was larger than the relative change in TPVR. There was an inverse relation between total PVR and  $VO_2$  in patients with closed ASD, which could best be described by a quadratic equation.

TPVR and SVR plotted against  $VO_2$  in patients with closed ASD

