Preoperative treatment of pulmonary hypertension in congenital heart disease is associated with improvement in hemodynamics, oxygen saturation and circulating interleukin-6

(1) Heart Institute (InCor), University of São Paulo School of Medicine, São Paulo, Brazil
(2) Pro-Sangue Foundation, São Paulo, Brazil

Objectives: Perioperative treatment of pulmonary arterial hypertension (PAH) has been considered for selected patients with congenital heart disease (PAH-CHD) in order to minimize the risk of complications following repair of cardiac shunts. Despite the lack of evidence to support such routine, PAH drugs have been used worldwide in pediatric patients undergoing cardiac surgery. We wished to investigate hemodynamic, oximetric and biochemical (anti-inflammatory) effects of short-term preoperative PAH therapy (sildenafil) in children with PAH-CHD with moderately elevated pulmonary artery pressure (PAP) and vascular resistance (PVR).

Methods: Fifteen patients were enrolled, with age of 15 [9-30] months (median and interquartile range), with a mean PAP of 55±13 mmHg (mean±SD) and a PVR index of 5.2 [4.2-8.9] Wood units•m². Oral sildenafil was started at the dose of 1.0 mg/Kg/day, and increased until development of pulmonary congestion (desired effect) or the observation of a >10% decrease in systemic pressure (safety limit). The maximal dose of sildenafil per patient ranged from 1.5 to 5.0 mg/Kg/day, and treatment duration was 8 to 60 days. Efficacy was further evaluated by measuring the pulmonary-to-systemic blood flow ratio (Qp/Qs, Doppler-echocardiography), systemic oxygen saturation and the circulating level of interleukin-6 (IL-6, chemiluminescence assay). All measurements were performed before surgery.

Results: In the whole patient group, sildenafil treatment resulted in a significant increase in Qp/Qs ratio (1.95 [1.30-2.60] at baseline to 2.25 [1.70-2.90] at maximal dose, p=0.021) and peripheral oxygen saturation (92±4% to 95±3%, p=0.005). These changes were associated with a decrease in serum concentration of IL-6 (pixel density of 286 [72-510] and 134 [47-262], respectively at baseline and maximal sildenafil dose, p=0.041). Three patients did not develop any features suggestive of pulmonary overcirculation while on sildenafil treatment, and were considered as non-responders. The remaining ones were subjected to surgical repair of the anomalies, with one immediate postoperative death.

Conclusions: These preliminary observations suggest that most young PAH-CHD patients with moderately elevated PVR respond favorably to PAH therapy. Hemodynamic improvement seems to be associated with changes in proinflammatory profile, with potential benefits. Extended observations in larger patient populations are required for a better understanding of the impact on outcomes.