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Correlation between Basic Pulmonary Hemodynamics and Pulmonary Vascular Resistance in Children with Pulmonary Hypertension associated with Congenital Heart Disease

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Background: Derived calculated pulmonary vascular resistance (PVR) has been routinely utilized as a parameter to evaluate children with pulmonary arterial hypertension associated with congenital heart disease (aPAH/CHD). Debatable whether the PVR is the ideal parameter to reflect the severity of aPAH/CHD due to the derived calculated value depends on oxygen consumption which is difficult and complicated to obtain the accurate value. To avoid using the oxygen consumption, the ratio between the PVR and systemic vascular resistance or Rp/Rs has been used instead of PVR. The objective of this study is to define whether the basic pulmonary hemodynamic parameters could be used as parameters to correlate with PVR and Rp/Rs .
Methods: Patients with aPAH/CHD underwent cardiac catheterization. Derived calculated PVR was calculated from transpulmonary pressure gradient divided by the pulmonary blood flow. The PVR was tested and showed to be directly correlated with the Rp/Rs.The pulmonary hemodynamics especially the diastolic pulmonary pressure (dPAP), diastolic pressure gradient (DPG: difference between the dPAP and pulmonary capillary wedge pressure) and the pulmonary pulse pressure (difference between the systolic pulmonary pressure and dPAP) was compared and correlated with the PVR. The sensitivity and specificity of the pulmonary hemodynamic threshold value predict the PVR were determined.
Results: The cardiac catheterization data of 50 children (mean age 5.97 years , range 6 months to 18 years, 25 male) was retrospectively reviewed. The dPAP, DPG and PPP were correlated with the PVR, r= 0.83, 0.84 and 0.67 respectively. The dPAP > 24.5 mmHg had 93.3% sensitivity and 81.8% specificity to predict PVR > 6 WU.m² with area under the curve of 0.92. The ratio of the DPG >14 mmHg had 80% sensitivity and 78.8 % specificity to predict PVR >6 WU.m² with area under the curve of 0.898.
Conclusion: The basic pulmonary hemodynamics particularly the dPAP and DPG could be used to assess the severity of aPAH/CHD in children with reasonable correlation with the PVR. The dPAP has a better prediction of the PVR in comparison with the DPG and PPP.