Comparison of perfusion index and echocardiographic parameters in preterm infants with hemodynamically significant patent ductus arteriosus

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Background/Aim: The aim of the study was to compare echocardiographic parameters and the perfusion index (PI) and plethysmographic variability index (PVI) values obtained by routine pulse oximetry in the diagnosis of hemodynamically significant patent ductus arteriosus (hsPDA).

Materials and Methods: This prospective study was conducted between 2016 and 2017 at the HacettepeUniversity Neonatal Intensive Care Unit. The study included premature neonates who had a birth weight below 1500 g. Patients were routinely monitored from the right wrist and right foot using a pulse oximeter (Masimo Radical-7® Pulse CO-Oximetry), and PI and PVI values were recorded. The difference between right-hand and right-leg PI values was calculated as the delta PI (ΔPI). A cardiologist blinded to the results evaluated the presence of patent ductus arteriosus (PDA) with echocardiography on postnatal days 1^{th}, 3^{rd}, and 7^{th}.

Results: Of the 66 preterm neonates included in the study, 23 had hsPDA. On postnatal day 1, the hsPDA group had a significantly greater ductal diameter, PDA/left pulmonary artery (LPA) ratio, and left ventricle (LA)/aortic (Ao) ratio ($P < 0.05$). On day 7, the hsPDA group had a significantly higher ductal velocity, PDA/LPA ratio, LA/Ao ratio, antegrade PA and LPA diastolic flow, and LV/Ao ratio ($P < 0.05$). In hsPDA group, the median ΔPI values were 0.85 (25–75 interquartile range [IQR]; 0.62–1.15) on day 1; 1.03 (25–75 IQR; 0.85–1.26) on day 3; and 0.89 (25–75 IQR; 0.64–1.22) on day 7. The median (25–75 IQR) ΔPI values were higher in the hsPDA group than in the non-hsPDA group on postnatal days 1, 3, and 7 ($P < 0.001$, $P < 0.001$, and $P < 0.001$, respectively). The ΔPI cutoff values for the diagnosis of hsPDA were 0.47 on day 1 (91.3% specificity; 90.5% sensitivity), 0.41 on day 3 (100% specificity; 97.3% sensitivity), and 0.47 on day 7 (90% specificity; 100% sensitivity).

Conclusions: Our study shows that the difference between PI values (ΔPI) in the right hand and right leg obtained by pulse oximetry has diagnostic value in hsPDA and can assist diagnosis when echocardiography is not available.