Indication for percutaneous transluminal pulmonary angioplasty is predicted by oxygenation index and pressure of vena cava superior on super-acute stage after Glenn

Osaka Medical and Research Institute for Maternal and Child Health, Osaka, Japan

Background: Stenosis of pulmonary artery (PA), which has to be mended by percutaneous transluminal pulmonary angioplasty (PTPA), frequently occurs in early infants on acute stage after Glenn, particularly after Glenn with Norwood following bilateral PA banding. We investigated whether PTPA was predicted by pulmonary circulation factors on super-acute stage in patients after Glenn.

Methods: The medical records of 54 early infants after Glenn were reviewed. Arterial carbon dioxide pressure (PaCO2) and arterial oxygen pressure (PaO2) on respirator was measured next morning after Glenn. Alveolar-arterial oxygen difference (AaDO2) was calculated with fraction of inspiratory oxygen (FiO2). If patient was free from respirator next morning, these three values were adopted ones just before ventilator weaning. Three indexes were employed as follows: AaDO2/PaO2 (RI), PaO2/FiO2 (PFR), and pressure of vena cava superior (SVCp). The area under a receiving operating characteristics (ROC) curve was calculated to determine the best discriminating each factor for predicting PTPA. Next, positive predictive value (PPV) and negative predictive value (NPV) were calculated for predicting PTPA. Results: Twenty-three infants underwent PTPA between 1 to 50 days (median 8 days) after Glenn; 16 of them had got through Norwood-Glenn procedure. The area under ROC curve of RI, PFR, and SVCp for predicting PTPA were 0.85 (95% confidence interval: 0.74-0.94), 0.84 (95% CI: 0.74-0.94), and 0.78 (95 CI: 0.66-0.90) respectively. For predicting PTPA PPV of RI (>15) was 73%; PFR (≤72) 71%; SVCp (≥18mmHg) 72%. If patients did not meet every one of three criteria as above, 87% of them got away from PTPA (NPV 87%). If we employ criteria as below, the value of NPV for predicting PTPA becomes very high respectively: NPV of RI (<10) was 94%; PFR (≥70) 100%; SVCp (≤13 mmHg) 100%. Conclusion: Our study showed RI, PFR, and SVCp on super-acute stage after Glenn were good indexes for predicting PTPA. Stenosis of PA would be formed just after the operation is completed. Measurement of blood gases and SVCp can be repeated on super-acute stage after Glenn. These pulmonary circulation factors might be useful for screening of PA stenosis on super-acute stage after Glenn.