

Pulse Wave Analysis in Adult Patients With Congenital Heart Disease

Murakami T.(1,2), Fukuoka S.(1), Shiraga K.(1), Saito Y.(1), Higashi K.(1), Tateno S.(2), Kawasoe Y.(2), Nakajima H.(1), Aotsuka H.(1), Niwa K.(2,3)
Chiba Children's Hospital, Chiba, Japan (1); Chiba Cardiovascular Center, Ichihara, Japan (2); St Luke's International Hospital, Tokyo, Japan(3)

Introduction: □Based on advance of surgical procedure and medical therapy, most patients with congenital heart disease can be expected to survive into adulthood today and it means that the patients are faced with problems associated with aging. The aging process of cardiovascular system starts with fracture of aortic elastic lamellae and results in elevation of pulse wave velocity (PWV) and enhanced pressure wave reflection. In some clinical course in congenital heart disease, similar changes had been reported. The purpose of the present study is to clarify the risk factors of the elevation of PWV and the enhanced pressure wave reflection.
Methods: □Brachial-ankle PWV (baPWV) and radial augmentation index (rAI) were examined in 99 patients with congenital heart diseases over 20 years of age. The factors affect the two parameters were analyzed. The patients' age was 36.0 ± 14.5 (20-76), and male/female was 63/36. Thirteen patients demonstrated oxygen saturation under 90%. NYHA I: 67, II: 26, III: 6. The systolic blood pressure was 118.1 ± 19.2 mmHg and 13 patients were hypertensive.

Results: □The rAI was $77.1 \pm 19.1\%$ and it had a significant correlation with the history of aorto-pulmonary shunt ($t=4.194$; $p<0.0001$), age ($t=4.091$; $p<0.0001$), height ($t=-3.580$; $p=0.0010$) and the history of direct aortic surgery ($t=2.253$; $p=0.027$). Forty-four patients (44.4%) demonstrated high rAI (>1SD of age- and gender matched control) and the determinants of the elevated rAI were the history of aorto-pulmonary shunt (odds ratio, 21.319; 95% confidence interval, 5.467-83.142; $p<0.0001$) and direct aortic surgery (4.183; 1.376-12.721; $p=0.012$). The baPWV was 1227 ± 339 cm/s and it had a significant correlation with reflected blood pressure ($t=6.764$, $p<0.0001$), age ($t=4.216$, $p<0.0001$), male ($t=2.823$, $p=0.006$). Twenty-three patients (23.2%) demonstrated high baPWV (>1SD of age- and gender matched control) and the determinants of the elevated baPWV were reflected blood pressure (1.122; 1.067-1.181; $p<0.0001$) and administration of renin-angiotensin-aldosterone system blockers (0.109; 0.013-0.020, $p=0.019$).

Conclusions: □The aorto-pulmonary shunt and the direct aortic surgery could enhance the pressure wave reflection and the enhanced pressure wave reflection could elevate the PWV. The blockades of renin-angiotensin-aldosterone system might prevent the elevation of the PWV.