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Enhanced aortic pressure wave reflection in patients after successful repair of aortic arch in children

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Introduction: Despite an apparently successful surgical repair of aortic coarctation, subsequent cardiovascular complications (hypertension, ishchemic heart diseases, stroke etc.) have sometimes been encountered. Increased aortic pressure wave reflection is one of the risk factors for developing such cardiovascular diseases, and the enhanced pressure wave reflection has been reported in patients after an aortic arch repair. The purpose of this study is to clarify whether the enhanced pressure wave reflection becomes cardiac load in patients with aortic coarctation after successful aortic arch repair.
Methods: This study enrolled 25 patients aged 1-25year (9.8 ± 5.6) with aortic coarctation (19) or interrupted aortic arch (6) after a successful aortic arch repair (i.e. no pressure gradient in aortic arch). The methods of aortic arch repair were extended to end-to-end anastomosis in 15, subclavian flap in 7, Blalock-Park operation in 1, patch angioplasty in 1 and a graft interposition in 1. The period after aortic arch repair was 8.5 ± 4.2 years. None of them were taking any medication and none were diagnosed to be suffering from Turner syndrome. The aortic pressure waveform was recorded using a pressure sensor mounted catheter, and the augmentation index was thus calculated. The relationship between the increment of augmentation index and left ventricular mass, which was calculated by using echocardiography, was examined.
Results: The increment of augmentation index was 27.7 ± 16.7%. The percent of left ventricular mass was 124.3 ± 25.4% and left ventricular mass index was 85.7 ± 18.9 g/m2. There was positive correlation between the increment of augmentation index and the percent left ventricular mass ($p = 0.026$), and left ventricular mass index ($p = 0.025$).
Conclusions: In patients after a successful aortic arch repair, the pressure wave reflection increases, and it is one of the causes of left ventricular hypertrophy of them. The enhanced pressure wave reflection may lead to future cardiovascular disease in patients after repair of aortic arch.