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Editorial

Growth Pattern of the Neo-Aorta after Arterial Switch Operation: What Is the Factor of Determination?

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In the recent published article according to the Korea Heart Foundation data, the diagnosis prevalence of transposition of the great arteries (TGA) among the congenital heart surgeries is between 1.7% and 2.4% depending on the surgical eras,[1] and arterial switch operation (ASO) has become the standard operation for correction of TGA. Despite of low early mortality and morbidity of ASO, some long-term problems are still existed such as right ventricular outflow tract obstruction, coronary artery problems, aortic root dilatation (ARD), and aortic valve regurgitation (AR).[2]

Dr. Cha and colleagues[3] studied the growth pattern of the neo-aortic root, annulus, and sinotubular junction (STJ) z-scores using random coefficients model and the risk factors affecting neo-aortic dilatation in 163 patients who underwent ASO from 2006 to 2015. The median follow-up duration of the study was 6.61 years. The increase in the neo-aortic root z-scores was different between the trapdoor and the non-trapdoor coronary artery transfer techniques (0.149/year vs. 0.311/year). It means that the trapdoor coronary artery transfer technique in this study is better for the neo-aortic root z-score change, which is a different result from the report by Formigari et al.[4] In general, the trapdoor coronary artery transfer technique is a risk factor for the neo-AR and neo-aortic dilatation. However, the present study is contrary to the previous reports. The reason for the different result could be the technical modification of the author's group. In the previous report by the author's group in 2012,[5] the superiority of the trapdoor technique in terms of neo-AR compared to other reports which mainly used traditional button technique was reported. They said that the maintaining the STJ and the ratio of STJ-annulus is a critical factor in preventing neo-AR, and they also suggested that, in ASO, even the STJ was disrupted by coronary transfer such as the trapdoor coronary artery transfer technique, preservation of the STJ z-score and the ratio of the STJ to the annulus could prevent neo-AR in long-term. For this purpose, they made the modification as the "inclusion trapdoor technique" by simply trimming the upper margin of the coronary cuff.[5] It helped to avoid unnecessary enlargement of the STJ and finally reduce the change of the aortic root dilatation in the present study.

Moreover, the neo-aortic annulus and STJ z-scores significantly increased over time after ASO (0.067/year and 0.309/year), and the probabilities of freedom from ARD, aortic annulus dilatation (AAD), and neo-aortic STJ dilatation at 10 years after ASO were 33.4%, 53.9%,

and 65.4%, respectively, in the present study. One study reported an increase only until 10 years after ASO,[6] and another study reported that, after a rapid increase in the first year after ASO and proportional growth in childhood, neo-aortic dimensions continued to increase throughout adulthood without stabilization.[7] Another study also noted progressive dilatation of the neo-aortic root disproportional to the somatic growth.[8] The last meaningful result was that neo-AR within 1 year was the predictor of ARD, AAD, and neo-aortic STJ dilatation, and Taussig-Bing (TB) anomaly, pulmonary artery banding (PAB) prior to ASO, and native pulmonary sinus z-score were other predictors for ARD.

AR and neo-aortic dilatation after ASO seems to result from both intrinsic and extrinsic factors. There are risk factors in literatures such as older age at time of ASO, prior PAB, associated ventricular septal defect, the size discrepancy between pulmonary annulus and aortic annulus,[9] preoperative left ventricular outflow obstruction, TB anomaly, and coronary transfer technique. Most of the risk factors are intrinsic causes or unchangeable things, but one of the important changeable factors is a coronary transfer technique. The authors used the trapdoor coronary artery transfer technique in most patients (148 patients, 91.9%), and their modified inclusion trapdoor technique showed better effect for the change of the aortic root z-score using random coefficient model.

To conclude, the article from Dr. Cha and colleagues[3] showed that the neo-aortic dilatation is disproportional after ASO in mean duration of 6.61 years, and coronary artery re-implantation using the author's modified inclusion trapdoor technique has better effect in the change of the aortic root z-score. Furthermore, it tells us that with longer follow-up period and more patients who have neo-aortic dilatation or AR are mandatory, and careful monitoring of these patients is fundamental because aortic valve function declines 15 years after ASO in another recent report.[10]

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