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Influence of aortic valvuloplasty by tricuspidalization and leaflet extensions on proximal aorta morphology in bicuspid aortic valve.

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Introduction:

Types of bicuspid aortic valve (BAV) morphology influences the development of aortic valve stenosis/regurgitation as well as aortic root/ascending aorta dimensions. The aim of the study was to evaluate changes on proximal aorta morphology (annulus, root and ascending aorta) in patients with congenital valve disease after surgical valvuloplasty by tricuspidalization and leaflet extensions.

Methods:

In 2005-2013, 66 patients with congenital valvular disease underwent aortic valve repair at our institution. For our study we selected 33 patients (M/F 27/6 patients) with BAV and severe aortic stenosis (with maximum mild-to-moderate aortic regurgitation); in 17 patients (51.5%) was the surgery performed due to combined aortic disease, 16 patients (48.5%) had isolated aortic stenosis. Mean age at operation was 14.4 ± 6.3 years. Nine patients (27.3%) had previous intervention (6.66 ± 5.6 years prior to valvuloplasty).

In a prospective mid-term FU, with median 4.6 years (1.1 months – 7.3 years), repeated echocardiographic measurements were performed. Differences in proximal aorta diameters (annulus, root, ascending aorta) converted to Z- scores were statistically evaluated.

Results:

Morphology of BAV was in 28 patients (84.8%) with right-noncoronary cusp (R-N) raphe and in 5 (15.2%) with left-right coronary cusp (L-R) raphe configuration. No noncoronary-left cusp (N-L) raphe configuration was present.

Preoperative measurements: Aortic valve annulus was dilated (Z-score >2) in 9 patients (27.3%), aortic root was not dilated in all (but below Z-score <2 in 5 patients (15.2%)), ascending aorta was dilated (Z-score >2) in 24 patients (72.7%).

Postoperative measurements: Aortic valve annulus Z-score grew proportionally in all patients after surgery (mean 1.26 ± 1.03 to 0.91 ± 1.99 , $p=0.21$); ascending aorta diameter Z-score decreased significantly (mean 2.46 ± 1.92 to 1.16 ± 2.27 , $p=0.0054$); and aortic root diameter Z-score increased slightly, reaching normal values (mean -1.12 ± 0.92 to -0.13 ± 1.59 , $p=0.0050$).

CONCLUSIONS:

BAV analysis in our patients with aortic stenosis showed dominant occurrence of R-N valve configuration (with minor L-R and no L-N configuration); and with this setting predominantly ascending aorta dilatation. In patients after aortic valvuloplasty by tricuspidalization, who remain with stable valve function, we found normalization of ascending aorta dimensions as well as normal growth of aortic root. This study may contribute to the discussion of the impact of hemodynamics on aortic morphology.