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The novel 2D strain reflects improvement and remodelling of LV function rather the conventional echo parameter after aortic valve repair in pediatric patients

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Objectives: To evaluate the outcome and regional and global left ventricular (LV) function after aortic valve repair in children with congenital aortic valve disease.

Methods: 32 consecutive patients aged 1.96 years undergoing aortic valve repair due to valve stenosis (AS group, n=21) or aortic regurgitation (AR group, n=11) were studied over a follow-up time period of 12 month in regard to change and adaptation of myocardial function using conventional and novel echocardiographic methods including two-dimensional (2D) strain echo. Conventional and 2D strain echo studies were performed and analysed off-line using commercially available software (EchoPac 6.1.0, GE).

Results: The peak aortic valve gradient decreased from 62.04 ± 30.34 mmHg before surgery to 22.80 ± 14.13 mmHg 2 weeks after surgery and 35.73 ± 22.11 mmHg 12 months after surgery ($p=0.01$). The degree of AR was decreased significantly to grade 0 in 20 children and grade I in 12. There was a significant reduction of thickness of interventricular septum (IVS) and posterior wall resulting in improvement of LV mass index ($p = 0.007$, $p = 0.043$ and $p = 0.001$, respectively). Significant reduction of myocardial thickness was in found especially in the IVS in the AS group ($p=0.008$) and the significant reduction of LV end-diastolic dimension (EDD) was found in the AR group ($p=0.007$). 2D strain analysis demonstrated that the global peak strain, global systolic strain rate and global early diastolic strain rate improved significantly for all the patients during the study period after aortic valve repair ($p < 0.001$, $P=0.037$ and $P=0.018$, respectively). The global strain and strain rate correlated significantly to IVS thickness ($r=0.002$ and $r=0.003$), LV mass index ($r=0.02$ and $r=0.015$) and EDD ($r=0.26$ and $r=0.005$). **Conclusion:** Aortic valve repair surgery in pediatric patients results in improvement of global and regional systolic and diastolic LV parameter, which was demonstrated by the 2D strain parameters rather than the conventional echocardiography.