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Right Ventricular Strain Is associated with increased length of stay after tetralogy of fallot repair

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Background: Little is known regarding right ventricular (RV) remodeling immediately after TOF repair. We sought to describe myocardial deformation by cardiac magnetic resonance imaging (CMR) after TOF repair and investigate associations between these parameters and early post-operative outcomes.

Methods: Fifteen infants underwent CMR without sedation as part of a prospective pilot study after undergoing complete TOF repair, prior to hospital discharge. RV deformation (strain) was measured using tissue tracking, in addition to RV ejection fraction (EF), volumes and pulmonary regurgitant fraction. Pearson correlation coefficients were used to determine associations between both strain and CMR measures/clinical outcomes.

Results: Most patients were male (11/15, 73%), with median age at TOF repair 53 days [interquartile range (IQR) 13,131]. Most patients had pulmonary stenosis (vs. atresia) (11/15, 73%) and seven (47%) received a transannular patch as part of their repair. RV function was overall preserved with mean RV EF of 62% (standard deviation [SD] 9.8). Peak radial and longitudinal strain were overall diminished [mean/SD 33.8% (\pm 18.3) and -15.5% (\pm 6.4), respectively]. Longer hospital length of stay after TOF repair was associated with worse RV peak radial ventricular strain [correlation coefficient (r): -0.54, $p=0.04$]. Greater pulmonary regurgitant fraction was associated with shorter time to peak radial RV strain ($r= -0.55$, $p=0.03$).

Conclusion: In this small study, our findings suggest presence of early decrease in RV strain after TOF repair and its association with hospital stay when changes in ejection fraction and RV size are not yet apparent.

Top Panel: Endocardial and Epicardial Contour Tracings of the right ventricle (left) and left ventricle (right) at End- Diastole for calculation of strain via tissue tracking

Bottom Panel: Representative strain maps of the right ventricle free wall in an infant with tetralogy of Fallot after repair

Left panel: Right ventricle short axis circumferential strain Right panel: Right ventricle long axis longitudinal strain.

Recent Publications

1. Ortigoza M, Yoon H, Goldfeld K et al. Efficacy and Safety of COVID-19 Convalescent Plasma in Hospitalized Patients: A Randomized Clinical Trial. *JAMA Intern Med.* Published online December 13, 2021. doi:10.1001/jamainternmed.2021.6850
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5. Srinivasan R, Weller R, Chelliah A, Einstein AJ. Multimodality Cardiac Imaging in a Patient with Kawasaki Disease and Giant Aneurysms. *Case Reports in Pediatrics,* vol. 2016, Article. doi: 10.1155/2016/4298098.

Speaker Biography

Srinivasan is a pediatric cardiologist and advanced imaging faculty at the New York University, Langone Medical Center and Grossman School of medicine. She as expertise in cardiac MRI, CT, echocardiography and fetal echocardiography. She is also committed to education of trainees and mentorship for young pediatric cardiologists. This recently authored work focuses on the youngest infants diagnosed with severe congenital heart disease and new ways to monitor these patients with the aid of cross-sectional imaging.

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