Myocardial function following repair of anomalous origin of left coronary artery from the pulmonary artery (ALCAPA) in children - a speckle tracking study.

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Introduction: We hypothesised that speckle tracking may improve detection of myocardial dysfunction and provide new pathophysiological insights in anomalous coronary artery from the pulmonary artery (ALCAPA).

Method: Echocardiography including speckle tracking was performed in 22 children with ALCAPA (8 male, median age at surgery 0.4 years; IQR:0.21-1.05) pre and postoperatively and in 22 healthy controls. Measurements included global and segmental longitudinal, radial and circumferential peak deformation (strain) and synchronicity index (SI) defined as agreement of time to peak strain measurements between segments per subject summarised using intraclass correlation coefficient.

Results: Global strains were lower in unoperated patients than controls (longitudinal:-46 vs.-123;p<0.001; circumferential:48 vs.-118;p<0.001, radial:110 vs.357;p<0.001) and improved postoperatively (longitudinal:-46pre vs.-82post;p=0.002,circumferential:48 vs.96;p=0.012, radial:110 vs.317;p=0.001). Unoperated patients with normal 2D function (n=8) had significantly impaired strain. Global dyssynchrony significantly improved postoperatively (longitudinal SI 0.93 pre vs.0.94 post, circumferential 0.85 vs.0.9, radial 0.71 vs.0.88). Global time to peak shortened (longitudinal 2236 pre vs.1589 post;p<0.001, circumferential 2037 vs.1447;p=0.005, radial 2169 vs.1602;p=0.01, ms).

Despite overall global improvement some abnormalities remained. Strain improved in the majority of segments but apical septal and anterolateral segments remained abnormal. Post systolic index improved in some segments but presystolic stretch persisted.

Conclusions: Both global contractility (strain) and global synchrony (coordinated contraction) improved after repair of ALCAPA suggesting recovery of hibernating myocardium. Contractility in some segments supplied by the anomalous left coronary artery failed to improve following ALCAPA repair suggesting a degree of irreversible myocardial damage. 2D speckle tracking identified impairment of function not revealed by standard echocardiography.