

**Changes of myocardial deformation and dyssynchrony in children with hypoplastic left heart syndrome before and after the Norwood operation assessed by 2D speckle tracking**

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**Background:**

2D speckle tracking (2DST) is an echocardiographic technique that is independent of ventricular geometry and the angle of insonation but dependent on loading conditions of the heart. The purpose of our study was to investigate differences in deformation parameters and intraventricular dyssynchrony (ID) before and at steady state after the Norwood operation (NO) in neonates with hypoplastic left heart syndrome (HLHS) using 2DST.

**Methods:**

On echocardiograms before and  $23 \pm 15$  days after the NO, we compared global and regional peak systolic longitudinal strain (S) and strain rate (SR) as well as ID of 33 HLHS patients. ID was calculated as the standard deviation of the time intervals from the beginning of the QRS interval to peak S for the 6 segments of the right ventricle (Yu index) as well as the delay of time to peak S between basal septal and lateral walls.

**Results:**

Global S ( $-18.3 \pm 3.6$  vs.  $-16.8 \pm 3.8$  %,  $p=0.02$ ) and global SR ( $-1.6 \pm 0.3$  to  $-1.2 \pm 0.3$  s<sup>-1</sup>,  $p<0.0001$ ) decreased significantly. Regional S decreased significantly in the apical ( $-24.1 \pm 4.8$  vs.  $-19.6 \pm 6.4$  %,  $p=0.003$ ) and mid lateral segments ( $-21.8 \pm 4.2$  vs.  $-19.2 \pm 3.9$  %,  $p=0.01$ ) while regional SR decreased significantly in all but the basal septal segments. ID remained unchanged (Yu index  $38 \pm 15$  vs.  $41 \pm 20$  ms, wall-to-wall delay  $64 \pm 46$  vs.  $60 \pm 51$  ms). Arterial oxygen saturation and heart rate were lower after NO.

**Conclusion:**

2DST parameters of global and regional RV deformation were lower after the NO while ID remained similar. Factors influencing this decrease most likely include changes in loading conditions, hemodynamic parameters and medication.