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Right Ventricular Mechanical Dyssynchrony is Associated with Tricuspid Regurgitation in Children with Hypoplastic Left Heart Syndrome

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Background
The presence of tricuspid regurgitation (TR) is an important risk factor for adverse outcome in hypoplastic left heart syndrome (HLHS). We have previously shown that right ventricular (RV) mechanical dyssynchrony is common in HLHS, but it is unknown whether it is associated with TR in HLHS. The aim of this study was to investigate RV mechanical dyssynchrony in relation to the presence of TR in children with HLHS.

Methods
Children (0-18 years) with HLHS at all stages of surgical palliation were identified from the echo database (2004 – 2010). 2D echocardiograms were reviewed by 2 observers. RV dyssynchrony was defined by RV intraventricular delay, measured as difference in time to peak systolic tissue velocity between basal RV lateral wall and septum in the apical 4 chamber view equivalent. Patients were classified into 2 groups depending on presence or absence of TR, and results compared using Mann-Whitney test or ANOVA.
Results
Forty-eight patients were identified, median (IQR) age 0.59 (0.12 – 2.94) years, 15% had no previous surgery, 27% were at stage 1, 32% at stage 2 and 26% at stage 3 of palliation. 35 (73%) had TR; 23 (48%) had mild, 2 (4%) moderate and 10 (21%) severe TR. There was no significant difference in RV function between those with and without TR by either subjective assessment, RV fractional area change (37.5 ± 10.8 vs 38.1 ± 6.5%, p = 0.818) or peak RV longitudinal systolic tissue velocity (1.18 ± 0.51 vs 1.28 ± 0.74 cm/s, p = 0.8). RV intraventricular delay was significantly higher in children with TR vs those without (mean 117 ± 159 vs 36 ± 39 msec, p = 0.03). RV intraventricular delay did not change significantly with stage of palliation; 93 ± 136 msec in patients without surgery, 47 ± 35 msec following stage 1, 108 ± 106 msec following stage 2, 151 ± 242 msec following stage 3 palliation (p = 0.3).

Conclusion
RV mechanical dyssynchrony is worse in children with HLHS who have TR. This has important implications for further investigation into risk factors, prognosis and possibility of treatment with resynchronization therapy.