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3D Wall Motion Tracking: Our Experience in Healthy Children and Congenital Suprarrenal Hyperplasia

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INTRODUCTION:
New techniques such as 3D Speckle Tracking (3DST) claim to be the future gold-standard in non-invasive ventricular function diagnosis in children. Our goal is to test their reproducibility and value in a healthy paediatric population and compare it to a probable high-risk cardiovascular population.
METHODS:
37 patients (age range 4-19 years), 14 healthy children and 23 diagnosed with Congenital Suprarrenal Hyperplasia (CSH) on long-term corticosteroid treatment with no structural heart disease were included prospectively. An Artida Toshiba ultrasound with PST-25SX probe was used. After calculating Ejection Fraction by M-Mode (EFM), 3DST images were acquired for analysis by 2 observers. Image quality score (low, medium and high) was assigned. Comparative inter-observer statistic analysis was done with Lin's correlation coefficient on: EF by 3DST (EF3D), Area Tracking (AT) and 3D Strain (3DS). Reproducibility between EFM and by 3DST was analyzed with Passing-Bablok regression line. Inter-group (healthy and CSH) analysis was performed with the same parameters obtained by one observer.

RESULTS:
There were no significant differences between healthy and CSH children in gender (64.3% vs 60.9% male), mean age (10.6 vs 11.4 years), weight and BSA.
Inter-observer comparison: Global mean quality in all 37 patients was medium, 10 (27%) in the high quality group (mean age 11.8 years). Observer1 mean EF3D, AT and 3DS were 43.1%, -27.1% and 35.4% respectively. Observer2 were 45.6%, -27.8% and 42.8%. Global Lin's coefficient agreement was 0.39, 0.29 and 0.33 (low) for EF3D, AT and 3DS respectively. In the high quality group 0.44, 0.42 and 0.61(acceptable). Passing-Bablok regression line revealed no differences only in the high quality group.
Intergroup data: In healthy and CSH children Mean EF by M mode were 67.7% and 65.3% (p=0.25). EF3D were 49.7% and 43.1% respectively (p=0.002), mean AT were -31.4% and -25.6% (p=0.002) and mean 3DS were 43.6% and 42.2% (p=0.76).

CONCLUSIONS:
These preliminary data in 3DWMT show an acceptable agreement among observers in high quality studies only. Assuming these limitations, we describe that EF3D was lower than M mode standard in all patients, and that EF3D and AT are significantly lower in CSH patients compared to healthy ones.