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Can cardiac mechanics predict outcome in hypoplastic left heart syndrome patients? A speckle tracking echocardiography study

Authors:

Topic(s):
Congenital Heart Disease: Echocardiography

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Introduction: Hypoplastic Left Heart Syndrome (HLHS) still carries a high morbidity and mortality. Right ventricle (RV) dysfunction is one of the most important responsible of a worse outcome. Unfortunately, RV assessment is a challenge. Speckle tracking echocardiography (STE) demonstrated an excellent ability in the estimation of RV function.

Purpose: The aim of our study is to evaluate the ability of STE and standard 2D echo parameters in predicting death and need for heart transplantation (HT) in HLHS patients.

Methods: 31 patients with diagnosis of HLHS successfully completed Norwood (n=29) or comprehensive Norwood stage II at our Institution between 2016 and 2018. Survival at 6 months was 93.3%, survival at 18 months was 81.1%. We present our preliminary data on 23 HLHS patients (13 male).

All the studied patients underwent in-hospital interstage stay. Serial echocardiographic assessments were performed in all the included patients (baseline, one month after Norwood, three months after Norwood, one week before bidirectional cavopulmonary anastomosis [BCPA] and two months after BCPA).

From apical view we measured: tricuspid annulus peak systolic excursion (TAPSE), fractional area change (FAC), longitudinal strain (LS) and strain rate (LSR).

Results: After a median follow-up of 2.2 years (1.7–2.6 years), 6 out of 23 patients met the composite endpoint of death/HT.

At pre-Norwood assessment, there was no statistical difference between survivor and death/HT patients.

In death/HT group TAPSE declined at one-month after Norwood procedure. LS decreased significantly at three-months after Norwood. After BCPA, death/HT patients had much lower FAC, TAPSE, LS and LSR than survived patients.

At one-month evaluation, TAPSE ≤5 mm had a good specificity for death/HT (80%) and a moderate sensitivity (70.6%) with an area under the curve (AUC) of 0.80. Still at one-month evaluation, Δ LS ([baseline LS – one-month post Norwood LS]/ baseline LS] *100) >7.7% showed a 100% sensibility and moderate specificity (76.5%) for death/HT (AUC 0.841).

Conclusions: HLHS patients with TAPSE ≤5 mm and Δ LS of >7.7% one-month after Norwood had a high likelihood of death or HT. These preliminary data encourage the routine use of TAPSE and LS to monitor cardiac function in HLHS patients and to identify subgroup patients at high risk.
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LS in HLHS patient and LS ROC curve.

AUC = 0.841
P < 0.001

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