Correlation between strain and weight status in infants with a univentricular hear

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Background

Infants with univentricular physiology are at risk of poor weight gain and reduced ventricular function, both of which have been independently associated with worse outcomes. Nutritional status has been correlated to ventricular function in other populations.

Objective

We evaluated the relationship between weight for age z-score (WAZ) and ventricular function including speckle-tracking strain among infants with univentricular physiology prior to undergoing Glenn operation.

Methods

Thirty term infants (median age 55 days, 13 females) with univentricular physiology prior to stage II were included with data obtained at the time of their initial hospital discharge. Ventricular function was quantified using 2D global longitudinal strain (GLS) obtained at the time of their initial hospital discharge. Ventricular morphology, AV valve regurgitation, hybrid and 1 no stage I (balanced circulation).

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Variable | Median (IQR 25,75) or N (%) | Correlation (r) with GLS | p-value | Correlation (r) with Strain Rate (SR) | p-value | Correlation (r) with weight for age z-score (WAZ) | p-value |
--- | --- | --- | --- | --- | --- | --- | --- |
Sample size | 30 | - | - | - | - | - | - |
Weight for age z-score (WAZ) | -2.4 (-2.8, -1.4) | -0.45 | 0.01 | -0.33 | 0.07 | - | - |
Genetic syndrome including Heterotaxy | 9 (30%) | -0.13 | 0.49 | -0.15 | 0.42 | 0.29 | 0.13 |
GLS (%) | -15.8% (-17.7, -12.5) | - | - | 0.89 <0.001 | 0.45 | 0.01 |
Strain rate (1/s) | -0.8 (-1, -0.7) | 0.99 <0.001 | - | - | 0.33 | 0.07 |
Qualitative function Normal Mild dysfunction Mild-Moderate Moderate dysfunction | 26 (86.7%) 2 (6.7%) 1 (3.3%) 1 (3.3%) | 0.21 | 0.26 | 0.19 | 0.31 | -0.08 | 0.67 |
AV valve regurgitation None Mild Moderate+ | 11 (36.7%) 9 (30%) 10 (33.3%) | 0.45 | 0.01 | 0.37 | 0.04 | -0.16 | 0.4 |
Arch obstruction requiring reintervention | 9 (30%) | 0.11 | 0.58 | 0.28 | 0.14 | 0.1 | 0.6 |
Ventricular Morphology | Single RV Single LV Biventricular | -0.39 | 0.03 | -0.52 | 0.003 | 0.14 | 0.5 |

Results

- Stage I consisted of 14 Norwood, 8 BT shunt, 5 PA bands, 2 hybrid and 1 no stage I (balanced circulation).
- GLS correlated with WAZ, AVV regurgitation and ventricular morphology.
- Multivariate regression model revealed an independent association between GLS and WAZ score (Beta = -0.33, p=0.03) while the association of GLS with AV valve regurgitation lost significance (Beta=-0.32, p=0.06).
- On ANOVA, GLS was diminished in the single RV subgroup [median -13.1% IQR -15.7, -10.7] compared to GLS in single LV [-17.2% ( -21, -12.5)] and biventricular [-17.2% [-18.1, -14] subgroups (p=0.043).

Conclusion

In this univentricular cohort, lower WAZ at the time of neonatal discharge is independently associated with lower ventricular GLS. The single RV morphology group has a lower GLS than the single LV or biventricular morphology groups.

References