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

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Background

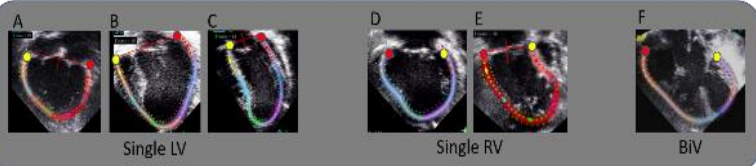
Infants with univentricular physiology are at risk of poor weight gain and reduced ventricular function, both of which have been independently associated with worse outcomes. Nutritional status has been correlated to ventricular function in other populations.

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) and strain rate, analyzed from an apical "4-chamber" view (Tomtec CPA 2.31). Ventricular myocardium was tracked along the dominant walls producing ejection (Figure; (B) has a VSD, not shown). SPSS software was utilized for statistical analysis ($P < 0.05$ determined statistical significance).



Results

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		0.21	0.26	0.19	0.31	-0.08	0.67
Normal	26 (86.7%)						
Mild dysfunction	2 (6.7%)						
Mild-Moderate	1 (3.3%)						
Moderate dysfunction	1 (3.3%)						
AV valve regurgitation		0.45	0.01	0.37	0.04	-0.16	0.4
None	11 (36.7%)						
Mild	9 (30%)						
Moderate+	10 (33.3%)						
Arch obstruction requiring reintervention	9 (30%)	0.11	0.58	0.28	0.14	0.1	0.6
Ventricular Morphology		-0.39	0.03	-0.52	0.003	0.14	0.5
Single RV	9 (30%)						
Single LV	7 (23.3%)						
Biventricular	14 (46.7%)						

- 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, -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.

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