

BACKGROUND

- Dobutamine stress cardiac magnetic resonance imaging (DS-CMR) has been validated to predict future major cardiovascular events in adults with coronary artery (CA) disease.^{1,2}
- DS-CMR has been used in children, but data are limited in CA anomalies.³
- Reversible ischemia precedes changes in diastolic function and WMA.^{4,5} → the addition of first-pass perfusion (FPP) to wall motion assessment (WMA) increases the sensitivity of DS-CMR.^{6,7}

PURPOSE

- We prospectively determined the feasibility and safety of DS-CMR in children with anomalous aortic origin of a CA (AAOCA) and myocardial bridges (MB)

METHODS

- Children with AAOCA and MB undergoing DS-CMR from 06/2014-12/2019.
- Hemodynamic response: heart rate (target 150 bpm), blood pressure, rate-pressure product (HR x SBP, $\geq 20 \times 10^3$)
- Major events: cardiac arrest, ventricular arrhythmia, myocardial infarction. Minor events: severe hypertension ($\geq 200/120$ mmHg), chest pain, nausea/vomiting, paradoxical bradycardia, rash, anxiety, dizziness, and dyspnea

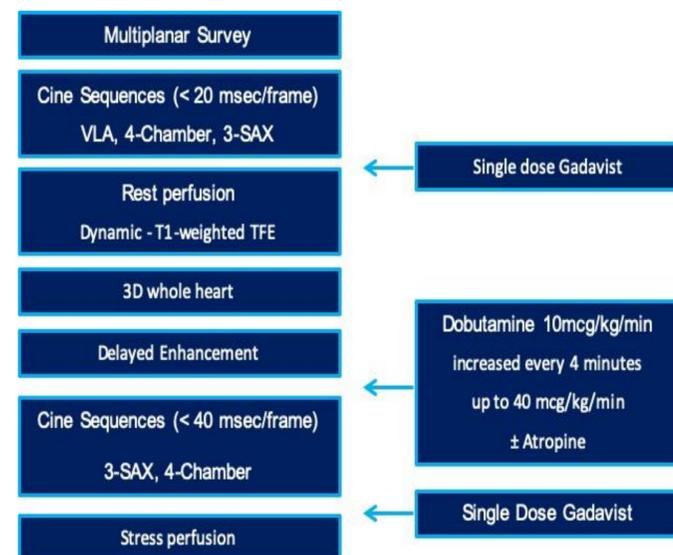


Fig 1: DS-CMR Protocol

- Rest and stress FPP, WMA, and late gadolinium enhancement (LGE) were assessed.
- Image quality, spatial resolution, and temporal resolution were evaluated. A kappa coefficient was calculated to assess inter-observer agreement of the perfusion assessment

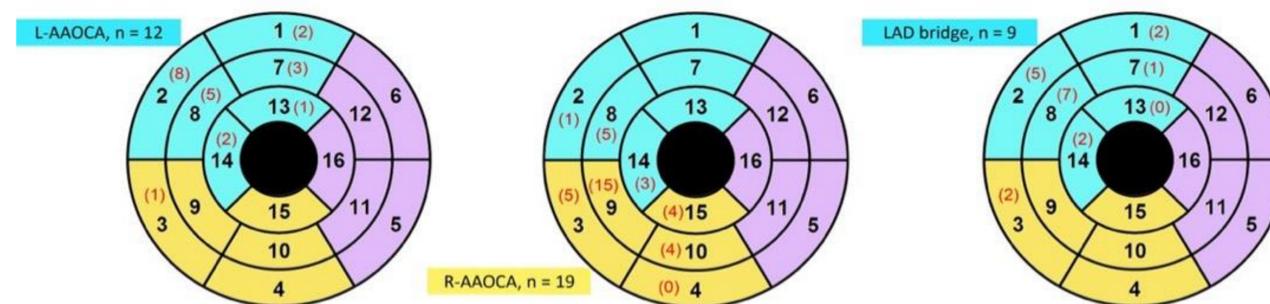


Fig 2: Distribution of wall segments with inducible perfusion defects

RESULTS

- 250 DS-CMR performed in 204 pts (male 126/204, 61.8%), mean age of 14.1 ± 3.4 years and weight of 60.6 ± 22.0 kg
- Anomalous left CA (51, 20%), anomalous right CA (173, 69%) and MB (26, 11%)
- Examinations completed in 247/250 (98.8%). All images were of diagnostic quality
- HR, BP, and RPP increased significantly from baseline ($p < 0.001$).

Table 1. Major and minor events

	Total 250	Sedated 41	Non-sedated 209
Major events	0	0	0
Minor events	28 (11.2%)	2 (4.9)	26 (12.4)
HTN $\geq 200/120$ mmHg	7 (2.8)	0	7 (3.4)
Paradox. bradycardia	2 (0.8)	0	2 (1)
Chest pain	2 (0.8)	0	2 (1)
Nausea/vomiting	12 (4.8)	2 (4.8)	10 (4.8)
Skin rash	2 (0.8)	0	2 (1)
Anxiety	2 (0.8)	0	2 (1)
Dizziness	1 (0.4)	0	1 (0.5)
Dyspnea	1 (0.4)	0	1 (0.5)

RESULTS

- HR ≥ 150 in 74%, RPP $\geq 20 \times 10^3$ in 86%
- No major events, and 28 minor events (11.2%). All symptoms resolved and patients were discharged the same day.
- Temporal resolution < 40 msec/frame (cine). FPP spatial resolution $< 2.2 \times 2.2 \times 8$ mm³.
- Fixed perfusion defects were noted in 2/247 (0.8%); inducible perfusion defects in 40/247 (16.2%) and associated WMA in 19/40 (47.5%).
- Inter-observer agreement was excellent ($\kappa = 0.87$) between two readers.

CONCLUSIONS

- DS-CMR is feasible in patients with AAOCA and MB to assess for inducible FPP defects and WMA, given the high completion rate, significant hemodynamic response, and good interobserver agreement.
- It can be performed safely with low incidence of major/minor events. This makes DS-CMR a valuable test for risk stratification in this patient population.
- Further studies are necessary to determine implications of these findings on clinical outcomes.

REFERENCES

1. Lipinski MJ et al. *JACC*. 2013. doi: 10.1016/j.jacc.2013.03.080
2. Nagel E et al. *NEJM*. 2019. doi: 10.1056/NEJMoa1716734
3. Strigl S et al. *J Magn Reson Imaging*. 2009. doi: 10.1002/jmri.21639
4. Charoenpanichkit C et al. *JCMR*. 2010. doi: 10.1186/1532-429X-12-59
5. Leong-Poi H et al. *Circulation*. 2002. doi: 10.1161/hc0802.104326
6. Lubbers DD et al. *Int J CV Imag*. 2008. doi: 10.1007/s10554-006-9205-5
7. Gebker R et al. *Int J CV Imag*. 2012. doi: 10.1007/s10554-010-9764-3