

Serial Echocardiograms Reveal Occult Coronary Dilation in Patients with Kawasaki Disease

Background

- Kawasaki disease (KD) is an acute childhood vasculitis that can lead to coronary dilation and aneurysm
- Historically, a dichotomous definition for coronary outcomes has existed to differentiate normal from abnormal
- Recently described intermediate group termed "occult dilation" includes patients with coronary measurements that remain within the normal range based on Z-score, but show reductions in size over time suggesting coronary involvement¹
- A descriptive study was performed;
 1. to further characterize coronary outcomes in patients with KD when considering those with occult dilation
 2. to examine whether clinical data can predict coronary outcomes

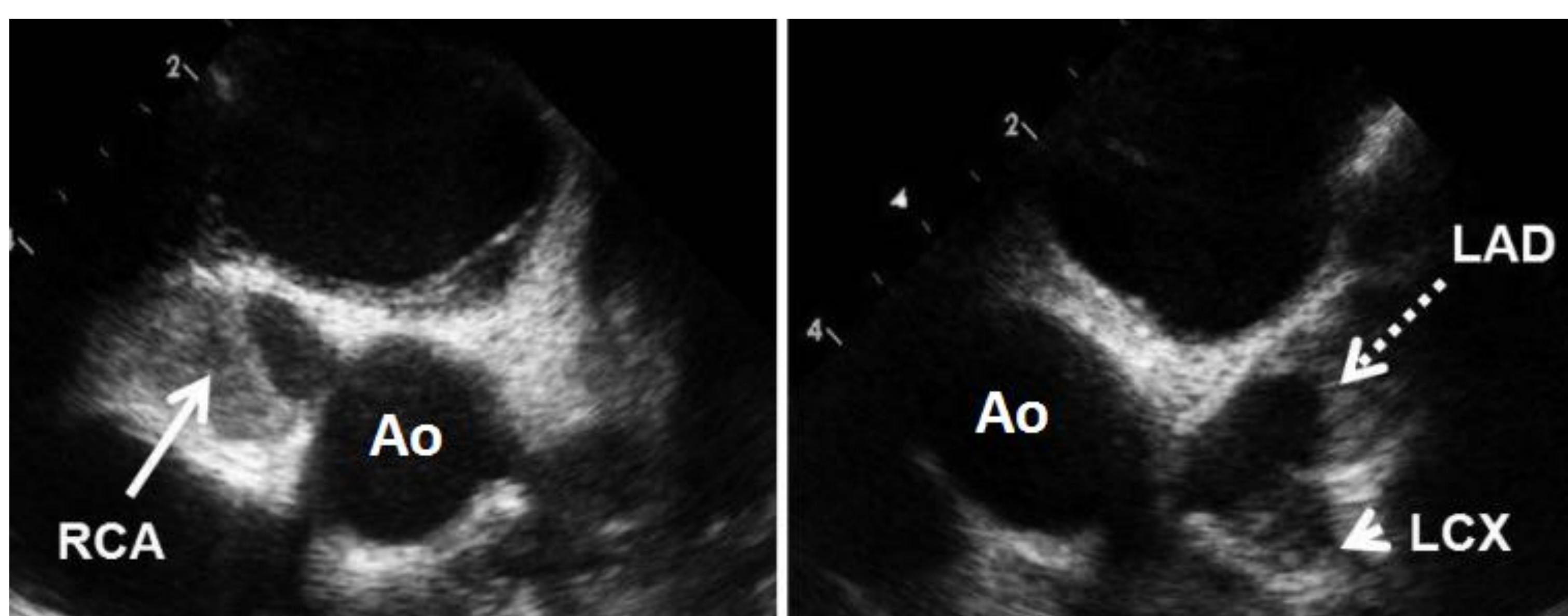


Figure 1: Coronary artery aneurysms: Echocardiogram showing proximal right coronary artery (RCA) aneurysm (left) and proximal left anterior descending (LAD) and circumflex (LCX) aneurysms

Methods

- Retrospective study on all acute KD patients treated with IVIG at Nationwide Children's Hospital from October 2012 through November 2016
- Included subjects with serial echocardiograms at diagnosis, 2 wk, 6 wk and 1 yr
- Proximal LAD and RCA were measured with values normalized for BSA
- Patients were divided into the following coronary outcome groups;
 1. **Normal** = Z-score always < 2 with Z score variation < 2
 2. **Occult Dilation** = Z-score variation ≥ 2 with absolute Z score always < 2
 3. **Definite Dilation** = Any Z-score ≥ 2
- Clinical data was analyzed by univariate analysis between each of the coronary outcome groups

Methods (Cont.)

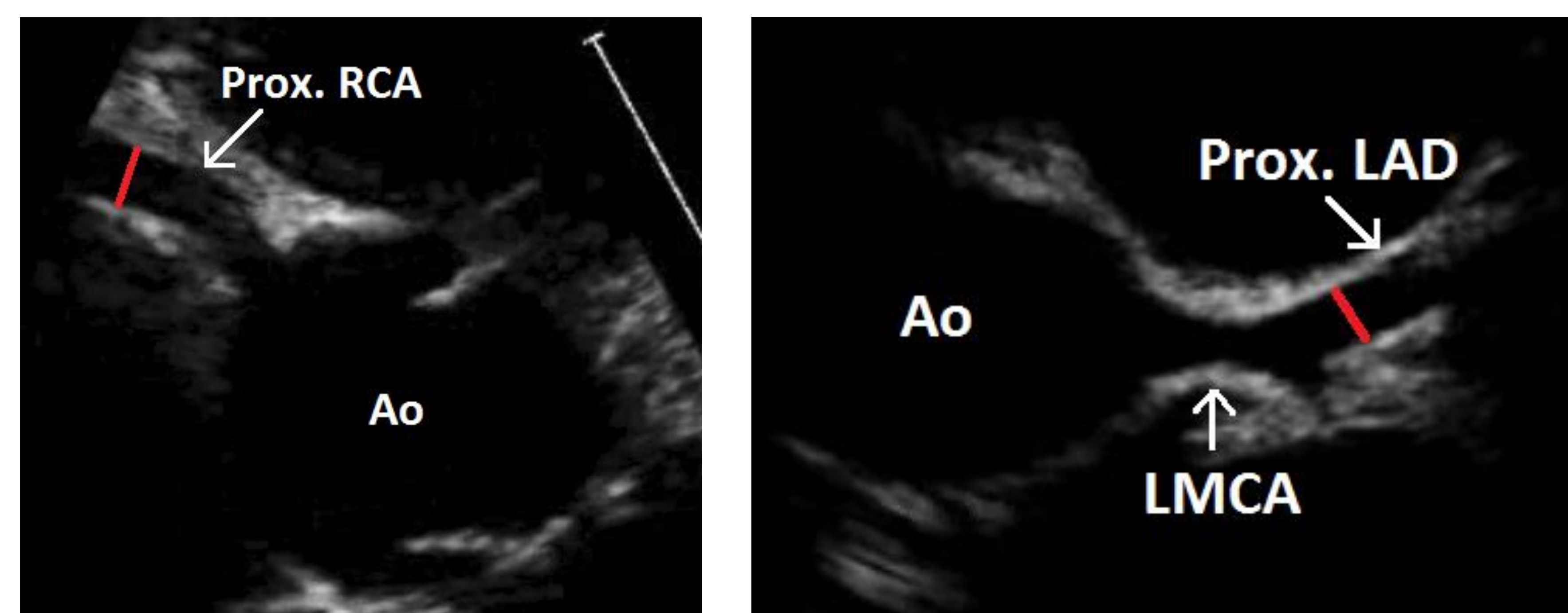


Figure 2: Example coronary artery intraluminal measurements of the proximal right coronary artery (RCA) and proximal left anterior descending (LAD) coronary artery obtained by echocardiography

Results

- Of the 129 subjects who met inclusion criteria:
 - 62% Normal, 27% Occult Dilation, 11% Definite Dilation
- Pt with occult or definite dilation were more likely to present with prolonged fever ≥ 10 days (23% and 36%) compared to normal (9%, p-value 0.004)
- Pt with occult or definite dilation were more likely to have IVIG resistance (20% and 36%) compared to normal (10%, p-value 0.01)

	All (n=129)	Normal (n=80)	Occult dilation (n=35)	Definite Dilation (n=14)	p-value
Demographics					
Number of participants	129 (100%)	80 (62%)	35 (27%)	14 (11%)	
Sex (male)	78 (61%)	52 (67%)	18 (51%)	8 (57%)	0.29
Age at diagnosis (years)	4.02 \pm 3.09	3.82 \pm 2.59	4.78 \pm 4.01	3.19 \pm 2.89	0.34
Clinical Data					
Fever days at first IVIG	7.44 \pm 4.92	6.89 \pm 5.05	7.51 \pm 3.45	10.28 \pm 6.43	0.02†
Fever ≥ 10 days	20 (16%)	7 (9%)	8 (23%)	5 (36%)	0.002‡
IVIG treatment resistance	20 (15%)	8 (10%)	7 (20%)	5 (36%)	0.01‡
Diagnostic confidence					
1 (highest)	52 (47%)	32 (49%)	13 (40%)	7 (58%)	0.22
2	26 (24%)	16 (24%)	7 (22%)	3 (25%)	
3	19 (17%)	14 (21%)	5 (16%)	0	
4 (lowest)	13 (12%)	4 (6%)	7 (22%)	2 (17%)	
Harada Score ≥ 4	87 (82%)	54 (86%)	23 (74%)	10 (83%)	0.42
Laboratory Parameters					
C-reactive protein (mg/dL)	10.89 \pm 8.41	10.78 \pm 8.61	11.58 \pm 8.58	9.59 \pm 7.13	0.83
Albumin	3.59 \pm 0.50	3.59 \pm 0.47	3.63 \pm 0.51	3.49 \pm 0.64	0.83
ALT	84 \pm 91.82	52 (25, 150.5)	35 (24, 93)	34.5 (16.5, 84.5)	0.23
Hemoglobin (g/dL)	10.89 \pm 1.32	10.78 \pm 1.04	11.01 \pm 1.26	10.38 \pm 1.99	0.29
Platelet count ($10^3/\mu\text{L}$)	387.3 \pm 175.2	395.79 \pm 164.64	333 \pm 137.49	486.42 \pm 270.71	0.13
White blood cell count ($10^3/\mu\text{L}$)	14.31 \pm 5.72	14.73 \pm 5.30	13.34 \pm 6.01	14.31 \pm 7.39	0.29

† Cochran-Armitage trend test p-value
‡ Fever days post hoc comparison: normal vs dilated (p=0.02)

Figure 3: KD Coronary Outcome Groups Demographic and Clinical Data: Medians \pm SD and median (IQR)

Results (Cont.)

- No statistically significant difference between coronary outcome groups for demographic, laboratory data, provider diagnostic confidence score or Harada score
- 2% of subjects had giant coronary aneurysms ($Z \geq 10$ or absolute $\geq 8\text{mm}$)
- 1.6% of subjects had residual disease at 1 year echo

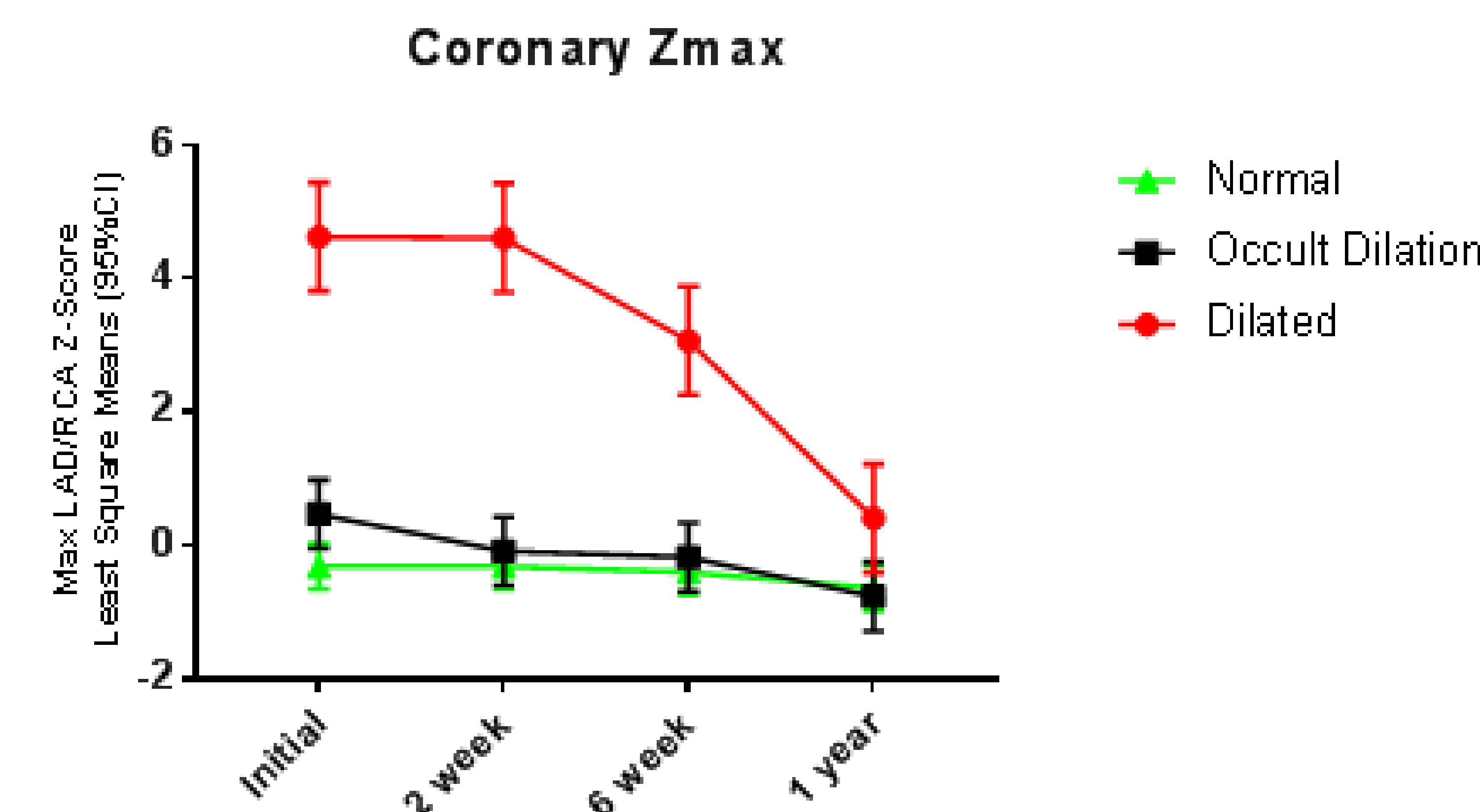


Figure 3: Mean Z-score trends according to Coronary Outcome Groups

Conclusions

- KD patients likely have a spectrum of coronary involvement which differs from the previously accepted dichotomous coronary outcomes
- Occult coronary dilation is a common finding in KD patients who have previously been grouped with those who have normal coronary outcomes
- Patients with any coronary dilation, occult or definite, were more likely to present with prolonged fever and IVIG treatment resistance
- Future longitudinal studies are needed to determine the long term outcomes for KD patients with occult coronary dilation

Reference

1. Dallaire, F., et al. (2012). "Marked variations in serial coronary artery diameter measures in Kawasaki disease: a new indicator of coronary involvement." *J Am Soc Echocardiogr* 25(8): 859-86