Incidence of Depressed Systolic Function in Pediatric Patients with Acute SARS-CoV-2 Infection

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INTRODUCTION

- Multisystem Inflammatory Syndrome in children (MIS-C) is known to cause cardiac dysfunction in pediatric patients following a SARS-CoV-2 infection
- Acute SARS-CoV-2 infection is associated with myocardial injury in adult patients
- The timing of the development of depressed cardiac function in children with acute SARS-CoV2 infection is not well described

OBJECTIVES

- To quantify the incidence of depressed systolic function and pericardial effusion on cardiac Point of Care Ultrasound (POCUS) in pediatric patients with acute SARS-CoV-2 infection upon presentation to the emergency department (ED)

METHODS

- Retrospective and Prospective chart review
- May 2020 – May 2021
- Inclusion: Children ages 0- 18, CVID swab and cardiac POCUS performed
- Exclusion Criteria: known pre-existing depressed cardiac function, cardiac arrest, or a diagnosis of MIS-C
- Independent POCUS review by POCUS trained faculty and a pediatric cardiologist
- Outcome Measures: Depressed function, pericardial effusion

CONCLUSIONS

- These findings suggest that depressed cardiac function or pericardial effusion are not a frequent component of the presentation of acute SARS-CoV-2 infection in children
- There was excellent correlation between scanners and POCUS Faculty

LIMITATIONS/FUTURE DIRECTIONS

- Analysis of Delta and Omicron variants

RESULTS

Children with acute SARS-COV-2 infection did not have an increased incidence of depressed cardiac function or pericardial effusion on POCUS

Comparison of POCUS results between positive and negative COVID patients (N = 338)

	Negative for COVID-19 N = 271 (80.2%) N (%)	Positive for COVID-19 N = 67 (19.8%) N (%)	P-value
Scanner Function			
Indeterminate	2 (0.8)	0 (0.0)	
Normal	243 (92.0)	62 (95.4)	
Hyperdynamic	6 (2.3)	3 (4.6)	0.31
Reduced	12 (4.5)	0 (0.0)	
Severe	1 (0.4)	0 (0.0)	
Missing	7	2	
Scanner Effusion			
Indeterminate	5 (1.9)	1 (1.5)	
No effusion	248 (93.9)	64 (98.5)	
Effusion w/o tamponade	11 (4.2)	0 (0.0)	0.24
Missing	7	2	
Faculty Function			
Indeterminate	4 (1.5)	1 (1.5)	
Normal	255 (94.1)	66 (98.5)	
Hyperdynamic	1 (0.4)	0 (0.0)	0.55
Reduced	9 (3.3)	0 (0.0)	
Severe	2 (0.7)	0 (0.0)	
Missing	0	0	
Faculty Effusion			
Indeterminate	5 (1.9)	2 (3.0)	
No effusion	254 (94.1)	65 (97.0)	0.21
Effusion w/o tamponade	11 (4.1)	0 (0.0)	
Missing	1	0	
Cardiology Function			
Indeterminate	0 (0.0)	2 (4.8)	
Normal	28 (90.3)	40 (95.2)	
Hyperdynamic	0 (0.0)	0 (0.0)	0.13
Reduced	1 (3.2)	0 (0.0)	
Severe	2 (6.5)	0 (0.0)	
Missing	0	0	
Cardiology Effusion			
Indeterminate	0 (0.0)	2 (4.8)	
No effusion	26 (83.9)	40 (95.2)	
Trivial	1 (3.2)	0 (0.0)	0.08
Small	2 (6.5)	0 (0.0)	
Moderate	2 (6.5)	0 (0.0)	
Missing	0	0	

The frequency of detection of abnormal function or pericardial effusion was similar between scanners and POCUS faculty with an overall sensitivity >90% and specificity close to 100%

Diagnostic test results between faculty and scanners

Test	N% (95% CI)
Function (N = 323)	
Sensitivity	100% (69.2% - 100.0%)
Specificity	99.0% (97.2% - 99.8%)
PPV	76.9% (46.2% - 95.0%)
NPV	100.0% (98.8% - 100.0%)
AUC	1.00 (0.99 – 1.00)
Effusion (N = 318)	
Sensitivity	90.9% (58.7% - 99.8%)
Specificity	99.7% (98.2% - 100.0%)
PPV	90.9% (58.7% - 99.8%)
NPV	99.7% (98.2% - 100.0%)
AUC	0.95 (0.86 – 1.00)

Inter-rater reliability between POCUS faculty and cardiology review were moderate for both function and effusions ($\kappa = 0.65$ and $\kappa = 0.79$, respectively)

Frequencies of POCUS results across readers

	Scanner N (%)	Faculty N (%)	Cardio N (%)
Function			
Normal	314 (96.0)	322 (96.7)	68 (95.8)
Reduced	13 (4.0)	11 (3.3)	3 (4.2)
Missing	11	5	0
Effusion			
No effusion	312 (96.6)	319 (96.7)	66 (93.0)
Effusion	11 (3.4)	11 (3.3)	5 (7.0)
Missing	15	8	0