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Transient Tricuspid Valvulitis: Another Brief Casualty of COVID-19 in Children

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Children's Mercy Kansas City

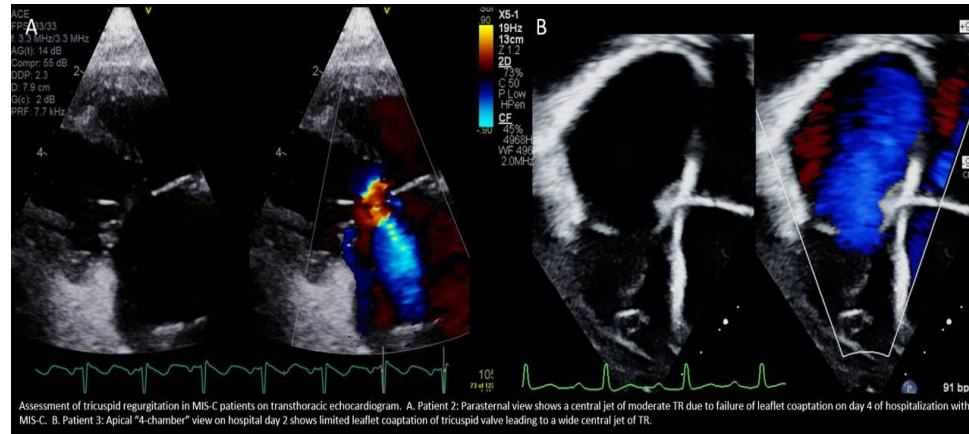
Clinical Decision Making

Imaging Findings

	Patient 1	Patient 2	Patient 3
Degree of Tricuspid Regurgitation			
On admission	Moderate	Mild	Mild-moderate
Post fluid/IVIG administration	Moderate-severe	Moderate	Severe
At discharge	Mild	Mild	Mild
RV Function			
On admission	Low normal	Normal	Normal
Post fluid/IVIG administration	Low normal	Normal	Moderate dysfunction
At discharge	Normal	Normal	Normal
Degree of Mitral Regurgitation			
On admission	Mild	None	Mild-moderate
Post fluid/IVIG administration	Mild	Mild	Mild-moderate
At discharge	Trivial	Trivial	Mild
LV Ejection Fraction (%)			
On admission	45%	57%	38%
Post fluid/IVIG administration	58%	47%	32%
At discharge	67%	71%	68%
NT-pro Brain Natriuretic Peptide (pg/mL)			
On admission	8600	1840	63200
Post fluid/IVIG administration	18100	15300	19900
At discharge	924	717	309
C-Reactive Protein (mg/dL)			
On admission	33.5	26.5	38.2
Post fluid/IVIG administration	16.8	4.1	8
At discharge	1.7	1.1	1.4
Blood Urea Nitrogen (mg/dL)			
On admission	60	5	73
Post fluid/IVIG administration	45	9	30
At discharge	20	12	29
Creatinine (mg/dL)			
On admission	2.43	0.4	2.77
Post fluid/IVIG administration	0.88	0.35	0.66
At discharge	0.32	0.28	0.44

- We present 3 patients, 8-10 years old, with significant tricuspid valve dysfunction during initial days of admission for multi-system inflammatory syndrome in children (MIS-C) associated with COVID-19 infection.
- Patients had COVID antibodies and presented in decompensated shock needing aggressive fluid resuscitation and vasoactive support.
- Elevated acute inflammatory markers, acute kidney injury (2/3 patients), troponin leak and repolarization abnormality on ECG were present on admission and resolved by discharge.
- All were treated with intravenous immunoglobulin (IVIG) infusion, high-dose steroids and prophylactic low molecular weight heparin.
- All had depressed LV systolic function with LVEF of 38-52% and trivial to mild mitral regurgitation.
- Following fluid resuscitation and administration of IVIG, all patients developed moderate to severe, new-onset tricuspid valve regurgitation (TR) with failure of leaflet coaptation.
- There were normal tricuspid regurgitation velocities, with a TR vena contracta of 6-9 mm.
- RV systolic function as measured by fractional area change and TAPSE ranged from low normal to moderately decreased. RV size and tricuspid annular diameter Z score was normal for all patients.
- All patients responded to diuresis and fluid restriction and had mild TR at discharge.

- Our patients demonstrated an interesting pattern of early, acute onset, moderate to severe TR, with a wide gap of non-coaptation between the septal and anterior tricuspid valve leaflets leading to a broad central jet of TR.
- The degree of TR was disproportionate to the degree of RV systolic dysfunction or annular dilatation.



Role of Imaging in Patient Care

- We postulate that the etiology of tricuspid valve dysfunction is a combination of valvulitis / papillary muscle dysfunction, RV diastolic dysfunction and volume overload due to fluid resuscitation and IVIG.
- The frequency of these findings points to the need for judicious volume resuscitation and slower IVIG infusions in MIS-C.

Summary

- TR associated with MIS-C in the pediatric population appears to be transient, and responsive to alterations in the patient's volume status and inflammatory state.
- This contrasts with adults, in whom TR with RV dysfunction has been identified as a predictor of mortality.