Outcomes after SARS-CoV-2 Vaccination among Children with a History of Multisystem Inflammatory Syndrome

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Introduction

- Most children who contract SARS-CoV-2 are asymptomatic or mildly symptomatic.
- A subset subsequently develop a severe hyperinflammation condition 4-6 weeks after COVID-19 called multisystem inflammatory syndrome in children (MIS-C).
- Underlying mechanisms of MIS-C remain unclear, leading to hesitation to vaccinate children with a history of MIS-C against SARS-CoV-2.

Purpose

We aimed to evaluate outcomes following SARS-CoV-2 vaccination in patients previously diagnosed with MIS-C and hypothesized that vaccination would be well-tolerated.

Methods

- A case series was formed by retrospective chart review of medical records
- Patients presented with an acute febrile illness between April 2020 - June 2021 and fulfilled the CDC case definition for MIS-C
- 169 patients presented to TCH with MIS-C, 56 were eligible for vaccination, 13 were vaccinated (23%)
- 24 patients presented to Gaslini Children's Hospital with MIS-C, 7 were eligible for vaccination, 2 were vaccinated (28%)
- Vaccinated patients were formally queried regarding vaccine reactogenicity and recurrence of hyperinflammation.

RAPID ACCELERATION OF DIAGNOSTICS (RADX)
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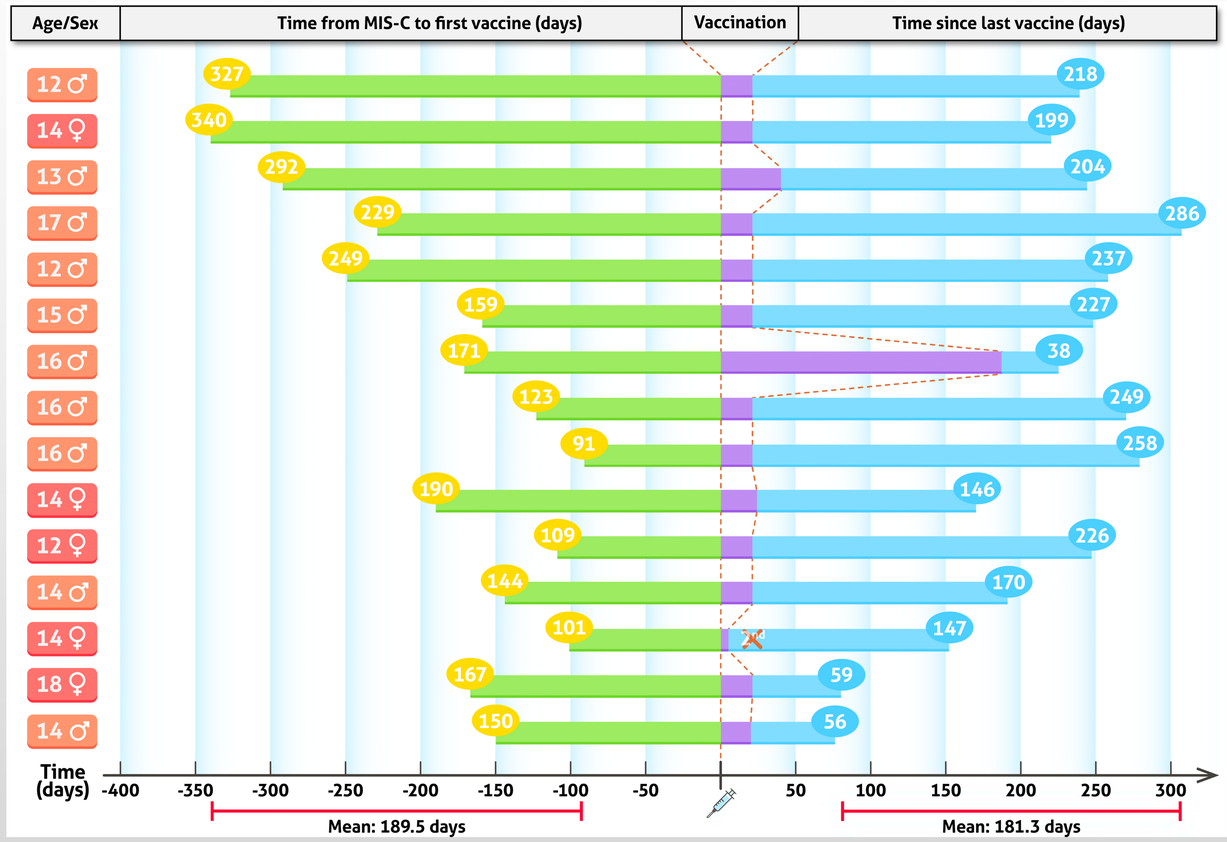

Figure: Time courses of Patients with MIS-C Receiving SARS-CoV-2 Vaccination

Each row represents a patient who received COVID-19 vaccination. The green sections represent time from their MIS-C presentation to their first vaccination. The blue sections represent time since their last vaccine. Most received 2 doses, 21 days apart. One patient received the 2nd dose after 6 months, an option suggested by the Italian immunization authorities for individuals with a history of COVID-19 in the preceding year. One patient elected in advance to follow a personalized vaccination strategy with additional time between doses and has not yet received dose 2.

	No. (%)	
Demographics (n = 63)	Vaccinated (n = 15)	Not vaccinated (n = 48)
Age, mean (range), y	14.4 (12-18)	15.3 (12-21)
Male	10 (67)	27 (56)
Female	5 (33)	21 (44)
BMI, mean (range)	25.1 (18.9-44.8)	26.5 (16.7-48.8)
Racial or ethnic minority[a]	10 (67)	39 (81)
Disease severity		
Intensive care	10 (73)	33 (69)
Hypotension	11 (73)	33 (69)
Ionotropic support	5 (33)	27 (56)
Intubation	2 (13)	11 (23)
Received corticosteroids	15 (100)	48 (100)
Received high dose immunoglobulin	11 (73)	34 (71)
Received anakinra	10 (67)	37 (77)
Length of stay, mean (range), d	10.9 (2-33)	11.4 (3-55)
Vaccine reactogenicity (n = 12)[b]		
Local site		
Pain	7 (58)	NA
Redness	0	NA
Swelling	0	NA
Systemic		NA
Fatigue	4 (33)	NA
Headache	4 (33)	NA
Myalgia	0	NA
Fever	1 (8)	NA
Nausea	1 (8)	NA

Table: Demographics, Disease Severity, and Vaccine Reactogenicity

[a]For this study, race and ethnicity were included (and included Asian, Black, and Hispanic patients) due to the known increased incidence of MIS-C in minority populations

[b]3 patients did not directly report

Results

- Demographic and clinical characteristics were not different between vaccinated and unvaccinated patients with a history of MIS-C (Table)
- Vaccinated patients were treated for MIS-C with corticosteroids (100%), IVIG (73%), and/or cytokine blockade with anakinra (67%)
- Vaccination occurred at a mean of 189.5 days from MIS-C presentation (Figure)
- A mean of 181.3+ days has elapsed since patients completed their last vaccine (Figure)
- 12 patients were directly queried for vaccine reactogenicity, with no major adverse events occurring following vaccination. For 3 patients, data was only available by chart review.
- No patients have developed a recurrence of MIS-C or any hyperinflammatory condition.

Conclusions

- 15 patients with a history of MIS-C tolerated vaccination against SARS-CoV-2 without re-developing hyperinflammation, myocarditis, or reoccurrence of MIS-C for 9.5+ months.
- This study provides critical information while the COVID-19 pandemic continues, now that vaccination is available to children in the age range most at risk for developing MIS-C (8-9 years).
- It is known that superior protection from re-infection is provided by vaccination of previously infected individuals compared to natural infection.
- **Our findings suggest that patients with a history of MIS-C can be safely offered vaccination against SARS-CoV-2.**