

Adrenal insufficiency in Multisystem Inflammatory Syndrome in Children (MIS-C)

BACKGROUND

- Endocrine manifestations are extremely rare in MIS-C secondary to COVID 19 virus.
- Common endocrine manifestations are diabetes mellitus, autoimmune thyroiditis.
- We present an uncommon endocrine dysfunction manifesting as primary adrenal insufficiency in a MIS-C patient.

CASE REPORT – Admission

- 5-year-old previously healthy boy
- 2 days of fever, sore throat, headache, lethargy, vomiting and diarrhea.
- Multiple family members were sick in the preceding month.
- Patient recently received COVID-19 vaccine
- Exam: neurologically intact, tachycardic (125/min), hypotensive (69/31 mmHg), delayed capillary refill (4-5 sec)

Pertinent labs at admission	
Serum Glucose	10 mg/dL
Serum Sodium	133 mmol/L
Serum cortisol* (4.8-19.5µg/dL)	2.5µg/dL

Initial treatment

- Fluid bolus
- Dextrose bolus
- Stress dose steroids
- Stabilized blood pressure and glucose with the above-mentioned therapies

CASE REPORT – Hospital Course

- Patient continued to have borderline blood pressures.
- Additional work up undertaken.

Endocrine work up

Endocrine studies	
Serum Cortisol * (>14µg/dL)	5.8 µg/dL
ACTH level (N: 7.2-63.3 pg/mL)	1.8 pg/mL
Dehydroepiandrosterone (< 85.3 µg/dL)	< 10.5 µg /dL
Aldosterone (<36 ng/dL)	<3ng/dL
Adrenal antibodies	Negative
Computerized tomography	Normal adrenals

* ACTH stimulation test

Inpatient management

- Stress dose Hydrocortisone: weaned to physiologic dosing
- Fludrocortisone added as borderline low blood pressures.

MIS-C work up

MIS-C	
Age	5 years
Fever (temp >= 38C)	2 days
Evidence of inflammation	↑ CRP: 7.2 mg/L ↑ IL-6: 84.3 pg/mL
>= 2 multisystem involvement	Neurological: lethargy Gastrointestinal: vomiting and diarrhea Cardiovascular: ↑ NT pro BNP:2979 pg/mL Hematological: ↑ ANC 8800 cells/mcL, ↑ INR 1.6

Outpatient follow up with Endocrine at 3 months:

- Stable blood pressures, normal glucose on physiologic hydrocortisone dosing
- Fludrocortisone: weaning

DISCUSSION

- Adrenal insufficiency is a rare occurrence in MIS-C.
- Only 2 case reports in literature (one with secondary adrenal insufficiency and second with primary adrenal insufficiency due to autoimmune process).
- Pathophysiology of adrenal insufficiency in patients in COVID-19 infection remains unexplained – commonly proposed theories include direct viral invasion or extensive cytokine induced damage of adrenal gland.

CONCLUSION

- Adrenal insufficiency does occur in MIS-C patients.
- Concomitant hypoglycemia, hyponatremia and hypotension in a MIS-C patient warrants adrenal insufficiency evaluation.

NEXT STEPS

- Long term follow up required to differentiate transient vs permanent adrenal gland damage.
- Further studies needed to investigate adrenal insufficiency in MIS-C.

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