Clinical Conundrums

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Financial Disclosures

I have no relevant financial relationships with any commercial interests to disclose

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Chief Complaint

2 year old with no past medical history presents to the ED with 5 days of fever. Today he has new nausea and non-bloody, non-bilious vomiting.

What other pertinent history would you like to know?

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History

He returned from a trip two weeks ago (via airplane) to visit family in the southwest. About a week later, his 4 year old sister showed URI symptoms. Father and patient appeared to become symptomatic, cough, runny nose, and intermittent fever. Father had a COVID test at that time which was negative. Sister and Father's symptoms resolved however patient's fever persisted and became more consistent over past 4 days (Tmax 102˚F). Parents also noted progressive fatigue, poor PO intake, and decreased urine output.

Presented to PCP yesterday with concern for persistent symptoms. At that time the child was ill-appearing with an otherwise unremarkable physical exam. PCP obtained rapid Covid, rapid flu, rapid strep that were all negative. Obtained a UA that was also unremarkable. Urine cultures and strep cultures pending. Return precautions were given and patient was discharged home with instructions for symptomatic treatment.

The following day, fever and other symptoms continued, Tylenol did not help. Additionally, child had 5 episodes of non-bloody, non-bilious emesis. Parents brought child promptly to ED. Parents deny diarrhea or rash.

He has no allergies. Vaccinations are up to date. No other pertinent family or social history.

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Initial ED Course

Intake Vitals: **T *105*°F, HR *164***, BP 118/71 RR 26 SpO2: 96% on RA

Exam:

- ***Gen***: Well-nourished, well developed child who is ***ill appearing***
- ***HEENMT***: NCAT, PERRL, normal conjunctiva, normal TMs and external ears, pink moist nasal passages without congestion or rhinorrhea, moist/pink lips, moist mucous membranes without lesions, midline uvula, ***tonsils +1 bilaterally without exudate***, neck supple with normal ROM, ***shotty cervical lymphadenopathy***
- ***CV***: ***Sinus tachycardia*** with normal S1/S2 no m/r/g. ***Slightly pale,*** warm with ***cap refill 2-3 seconds***. 2+ Radial/DP pulses
- ***Abd***: Normal bowel sounds, soft, NTND, no masses, no guarding or rebound tenderness
- **Resp**, **MSK**, **Neuro**, **Skin** exams were unremarkable

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Differential Diagnosis?

Please type your answers in the chat!

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Labs/Imaging?

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Initial Labs/Imaging

CBC
White Blood Count: 22.22
Hemoglobin: 11.1
Plt Ct: 486
MPV: 8.7
% Segmented Neutrophils: 74.9
Immature Granulocytes: 0.5
Immature Granulocytes (ABS #): 0.12
% Lymphocytes: 15.8
% Monocytes: 8.4
% Eosinophils: 0.1
% Basophils: 0.3
Segmented Neutrophils (ABS #): 16.65
Lymphocytes (ABS #): 3.51
Monocytes (ABS #): 1.86
Eosinophils (ABS #): 0.02
Basophils (ABS #): 0.06

CMP
NA/Sodium: 135
K/Potassium: 3.9
Chloride: 101
Bicarb/HCO3,S: 23
BUN: 7
Creatinine,S: 0.22
Glucose,S: 129
Calcium,S: 10.0
Total Protein: 7.5
Albumin,S: 4.1
A/G Ratio: 1.2
Total Bilirubin: 0.3
Alk Phos,S: 175
GPT/ALT,S: 11
GOT/AST,S: 50
LDH,Total (Serum): 549
GGT: 17

SARS CoV-2/RPP
Negative

VBG
7.44/33/36/22/-2.0

Lactate
1.85 (normal 0.5-2.0)

CRP
7.8 *(normal 0-0.9 mg/dL)*

ESR
48 *(normal 0-15)*

Blood Cultures x2

Chest X-ray 1 View
Normal lung volumes, no effusions or focal consolidations, no cardiomegaly, no pneumoperitoneum

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Has your differential changed?

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Initial Interventions

- 10cc/kg IV fluids, IV zofran, IV Torodol
- ED provider noted improvement in clinical picture after interventions
- Infectious disease consultation consultation
  - Question: Could this be incomplete Kawasaki Disease vs MIS-C vs occult bacterial infection and what additional workup would you recommend at this time?

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ID Consult

"Fever x 5 days, concern for MIS-C vs KD"

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Complete Workup

- BNP - 31 (normal <100)
- ***Pro-BNP - 231*** (normal <125)
- Troponin - <0.01(normal)
- ***Ferritin - 156*** (normal 10-60)
- ***Fibrinogen - 588*** (normal 150-400)
- ***D-Dimer - 0.62*** (normal <0.48)
- PT/PTT/INR - within normal range
- ***UA – 15 ketones, trace protein, negative nitrite, negative leukocyte, 5-10 WBC, 0 RBC***
- Urine culture - Negative
- SARS-CoV-2 IgG Antibody - Negative
- ***EKG - Sinus tachycardia*** otherwise normal intervals
- ECHO
  - Normal structure and function.
  - Normal coronary arteries without evidence of dilation or aneurysm
  - Trivial tricuspid regurgitation
  - ***Trivial pericardial effusion***
- CT Abdomen/Pelvis
  - Normal CT without evidence of occult abscess

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MIS-C

- Fever x 5 days
- Inflammation: CRP 7.8, ESR 48; elevated fibrinogen, D-Dimer, ferritin, and neutrophils
- ? Alternative plausible diagnosis
- Negative SARS-CoV-2 PCR, negative SARS-CoV-2 IgG, no recent exposure (family sick concurrently and tested negative)
- Lacks hyponatremia, hypoalbuminemia, AKI, elevated AST/ALT, leukopenia, lymphopenia, thrombocytopenia

Case Definition for Multisystem Inflammatory Syndrome in Children (MIS-C)

- An individual aged <21 years presenting with fever[i], laboratory evidence of inflammation[ii], and evidence of clinically severe illness requiring hospitalization, with multisystem (≥2) organ involvement (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatologic or neurological); **AND**
- No alternative plausible diagnoses; **AND**
- Positive for current or recent SARS-CoV-2 infection by RT-PCR, serology, or antigen test; or COVID-19 exposure within the 4 weeks prior to the onset of symptoms

[i]Fever ≥38.0°C for ≥24 hours, or report of subjective fever lasting ≥24 hours
[ii]Including, but not limited to, one or more of the following: an elevated C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), fibrinogen, procalcitonin, d-dimer, ferritin, lactic acid dehydrogenase (LDH), or interleukin 6 (IL-6), elevated neutrophils, reduced lymphocytes and low albumin

Additional comments https://www.cdc.gov/mis/hcp/index.html

- Some individuals may fulfill full or partial criteria for Kawasaki disease but should be reported if they meet the case definition for MIS-C
- Consider MIS-C in any pediatric death with evidence of SARS-CoV-2 infection

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Kawasaki Disease

- Clinical diagnosis
- Does not meet the complete criteria

McCrindle et al; American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee of the Council on Cardiovascular Disease in the Young; Council on Cardiovascular and Stroke Nursing; Council on Cardiovascular Surgery and Anesthesia; and Council on Epidemiology and Prevention. Diagnosis, Treatment, and Long-Term Management of Kawasaki Disease: A Scientific Statement for Health Professionals From the American Heart Association. Circulation. 2017 Apr 25;135(17):e927-e999

Table 3. Diagnosis of Classic KD

Classic KD is diagnosed in the presence of fever for at least 5 d (the day of fever onset is taken to be the first day of fever) together with at least 4 of the 5 following principal clinical features. In the presence of ≥4 principal clinical features, particularly when redness and swelling of the hands and feet are present, the diagnosis of KD can be made with 4 d of fever, although experienced clinicians who have treated many patients with KD may establish the diagnosis with 3 d of fever in rare cases (Figure 2):
1. Erythema and cracking of lips, strawberry tongue, and/or erythema of oral and pharyngeal mucosa
2. Bilateral bulbar conjunctival injection without exudate
3. Rash: maculopapular, diffuse erythroderma, or erythema multiforme-like
4. Erythema and edema of the hands and feet in acute phase and/or periungual desquamation in subacute phase
5. Cervical lymphadenopathy (≥1.5 cm diameter), usually unilateral

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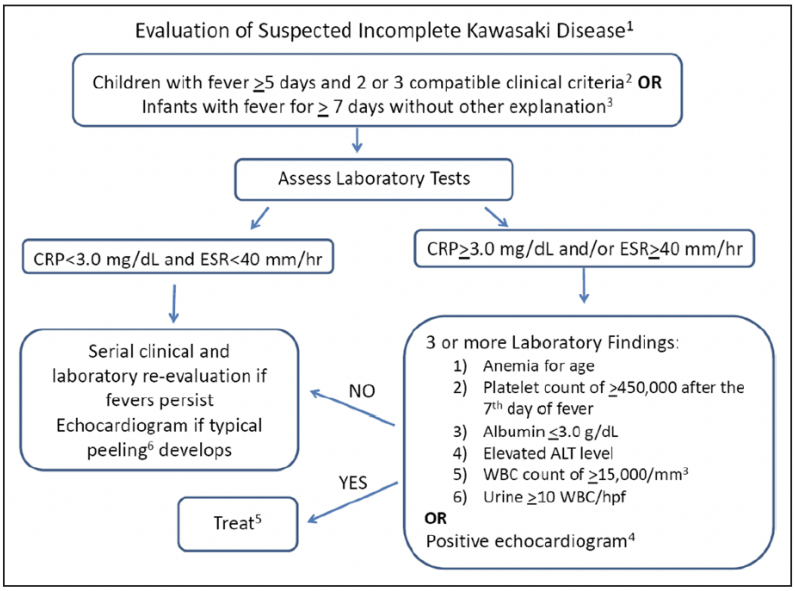
Incomplete KD

- Fever x 5 days + intermittent periorbital erythema + red cheeks; irritability
- CRP and ESR
- WBC 22, UA 5-10 WBC, Plt 459
- Echo trivial pericardial effusion only
- No clear alternative explanation



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Occult Bacterial Infection

- Sinusitis
- Pneumonia
- Neck

No symptoms/exam findings to suggest

- Abdomen (pyelonephritis, abdominal abscess, appendicitis)
  - CT abdomen/pelvis negative

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ID Consult Recommendations

- Treat with IVIG 2 grams/kg for possible MIS-C vs incomplete Kawasaki disease
- Hold on any antibiotics

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Management

- Treated with IVIG x1
- Mild clinical improvement with better PO intake
- Afebrile for 24 hours after IVIG administration
- Follow up echo was unchanged
- Inflammatory markers appeared to downtrend slightly

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The Following Day

- Patient's fever returned - Tmax 101˚F
- Mother disclosed " I heard him snoring last night which is new"
- New physical exam findings:
  - Markedly increased anterior cervical lymphadenopathy present bilaterally
  - Upper airway transmission heard throughout on lung auscultation

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Has your differential changed?

Further workup?

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Drain the Diagnosis

- Consulted ENT
- CT head and neck showed ***3cm abscess centered in left retropharyngeal space***
- Started on Unasyn
- Abscess was incised and drained
- Patient sent home on course of oral antibiotics and instructions for symptomatic relief and follow up with ENT as outpatient

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Key Takeaways

- Time is your best friend on the hospital wards
- Mom (or Dad) knows best
- Crush your physical exam every day

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Questions?

Thank you!

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