



Multisystem inflammatory syndrome in children and adolescents with COVID-19

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<https://www.evelinalondon.nhs.uk/our-services/hospital/south-thames-retrieval-service/clinical-guidelines.aspx/>

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[Riphagen S et al. Hyperinflammatory shock in children during COVID-19 pandemic. Lancet 2020](#)

Presentation

- Persistent Fever $>39^{\circ}\text{C}$
- Abdominal symptoms
- Vasodilated shock
- +/- rash
- Low sodium
- Hyperinflammation
 - CRP >100
 - Ferritin >500
 - D-dimers
 - Fibrinogen
 - Neutrophilia/ Lymphopenic
- Cardiac dysfunction
 - Troponin
 - BNP

WHO

Children with features of typical or atypical Kawasaki disease or toxic shock syndrome:

Fever > 3 days

AND two of the following:

- a) Rash or bilateral non-purulent conjunctivitis or oral, hands or feet inflammation signs
- b) Hypotension or shock.
- c) Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities
- d) Evidence of coagulopathy
- e) Acute abdominal symptoms

AND

Elevated markers of inflammation

AND

No other obvious microbial cause of inflammation, including bacterial sepsis, staphylococcal or streptococcal shock syndromes.

AND

Evidence of COVID-19 (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19

Treatment

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 - Troponin
 - BNP
- Febrile until immunomodulated (+/- cooling)
- Avoid laparotomy
- 10-30ml/kg fluid then dopamine
- Noradrenaline via femoral line
- Hyperinflammation
 - Antibiotics
 - Immunomodulation
 - Anticoagulation
- Cardiac dysfunction
 - Attention when moving children (?!)
 - Milrinone/ levosimenden
 - ECMO

Admitted 14th April-5th May (one on 14th March)

Shock group

Age: median 9 years (IQR 6-13)

Male: 71% (15/21)

BAME: 95% (20/21),

BAME: ~40% of London

All processed serology IgG/IgM positive

PICU, all received noradrenaline

22 Cases

PCR negative

PCR positive

Shock
n = 21

Respiratory
n = 1

Cardiac dysfunction
n = 20

Nil dysfunction
n = 1

Ventilated
n = 10

HFNC
n = 3

CPAP
n = 1

Nil
n = 6

Ventilated
n = 0

Nil
n = 1

Vent
1

1

ECMO
n = 2

No ECMO
n = 8

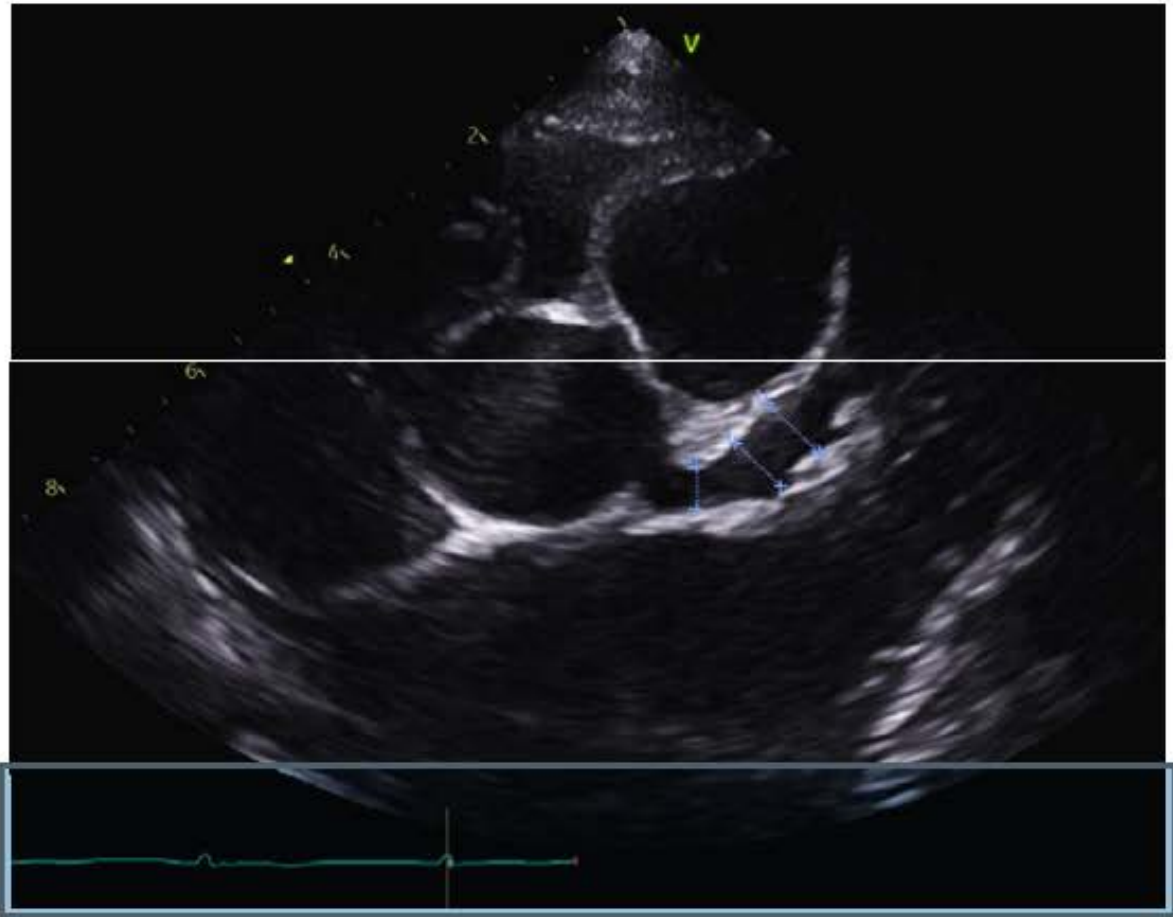
Alive
1

One death
Majority respond to immunomodulation+norad

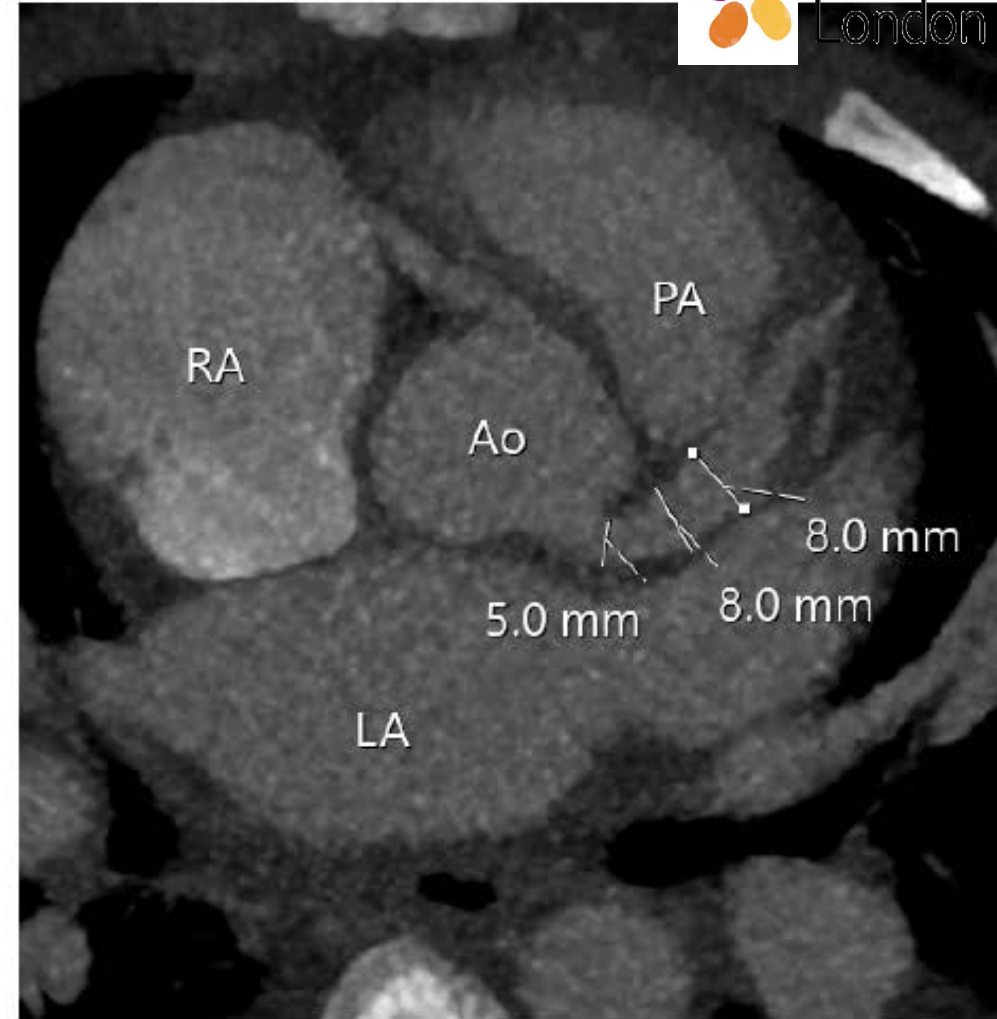
Laboratory values

Laboratory Data Evelina- median [IQR]

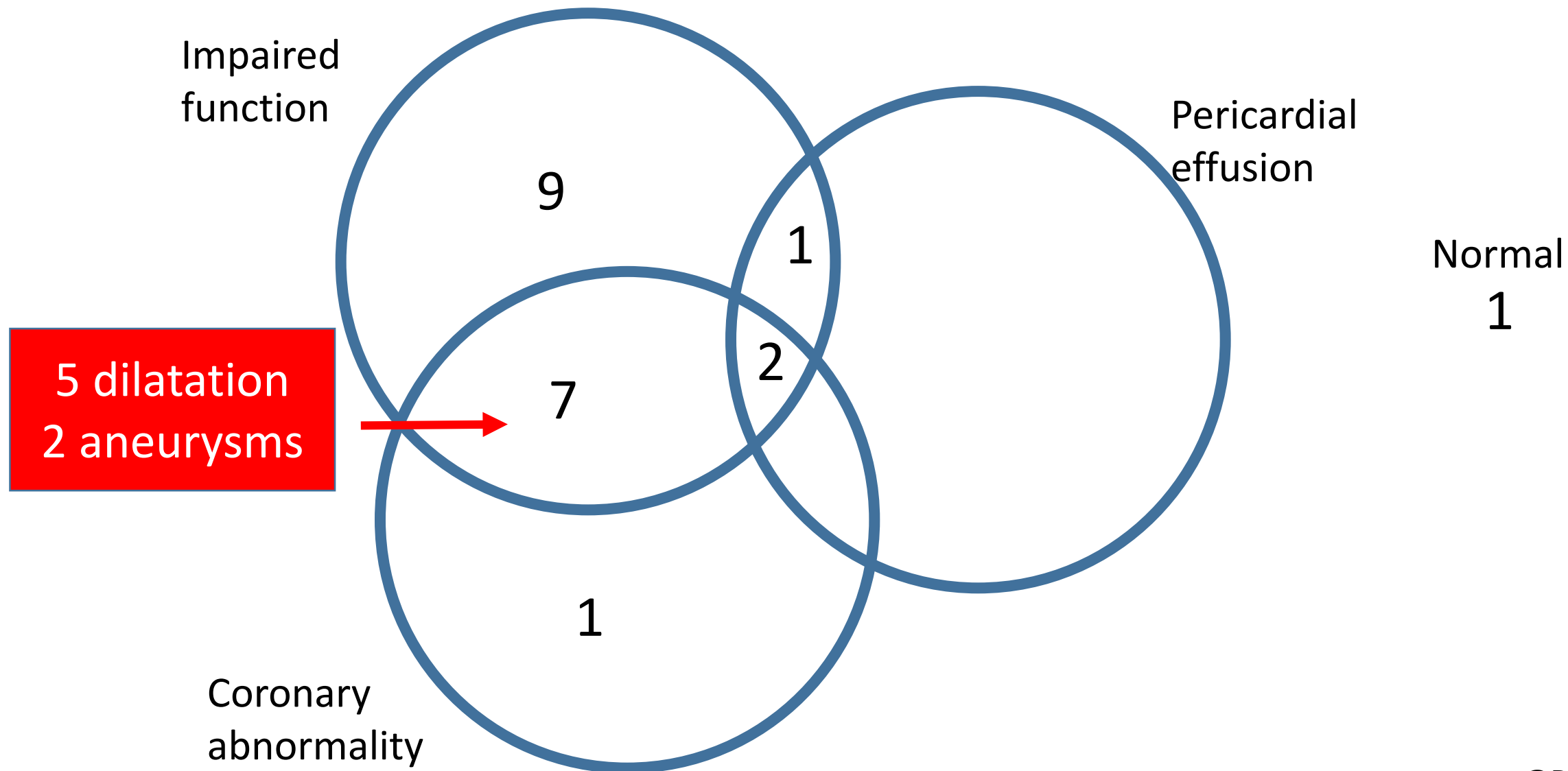
	Presentation	Peak
White cell count	10.7 (9.6-14)	18.6 (14.2-22.4)
Lymphocyte Count*	1 (0.5-1.3)	0.4 (0.3-0.7)
Platelets*	150 (96 – 172)	129 (82 – 165)
CRP	211 (162 – 306)	307 (187 – 340)
D-dimers	6.44 (3.7-10.2)	11.2 (6.5 -13.3)
Ferritin (µg/L) (14 -101)	924 (460 – 1534)	1023 (642 – 1834)
Troponin T (ng/L) (0-13)	45 (25 – 120)	110 (45 -251)
NT – pro BNP (ng/L) (< 400 normal)	4708 (1542 - 9376)	7377 (3280 – 15670)



Echocardiogram: Parasternal short axis.
Showing origin and proximal course of left coronary artery. There is aneurysmal dilatation of the left main and left anterior descending coronary artery.



Cardiac involvement-21 patients with shock





Thank you



We are learning together

- Paediatricians
- Paediatric intensivists
- Cardiology
- Infectious diseases
- Pharmacists
- Rheumatology
- Haematology
- Radiology
- Adult teams

• What is correct treatment?

- Intravenous immunoglobulin
- Methylprednisolone and proton pump inhibitor
- Aspirin
- Low molecular weight heparin
- Biologicals
 - Infliximab
 - Tocilizumab
 - Anakinra
- Vitamin D