Multisystem Inflammatory Syndrome in Children (MIS-C) Kawasaki disease

DU Cardiologie pédiatrique 08/03/2022

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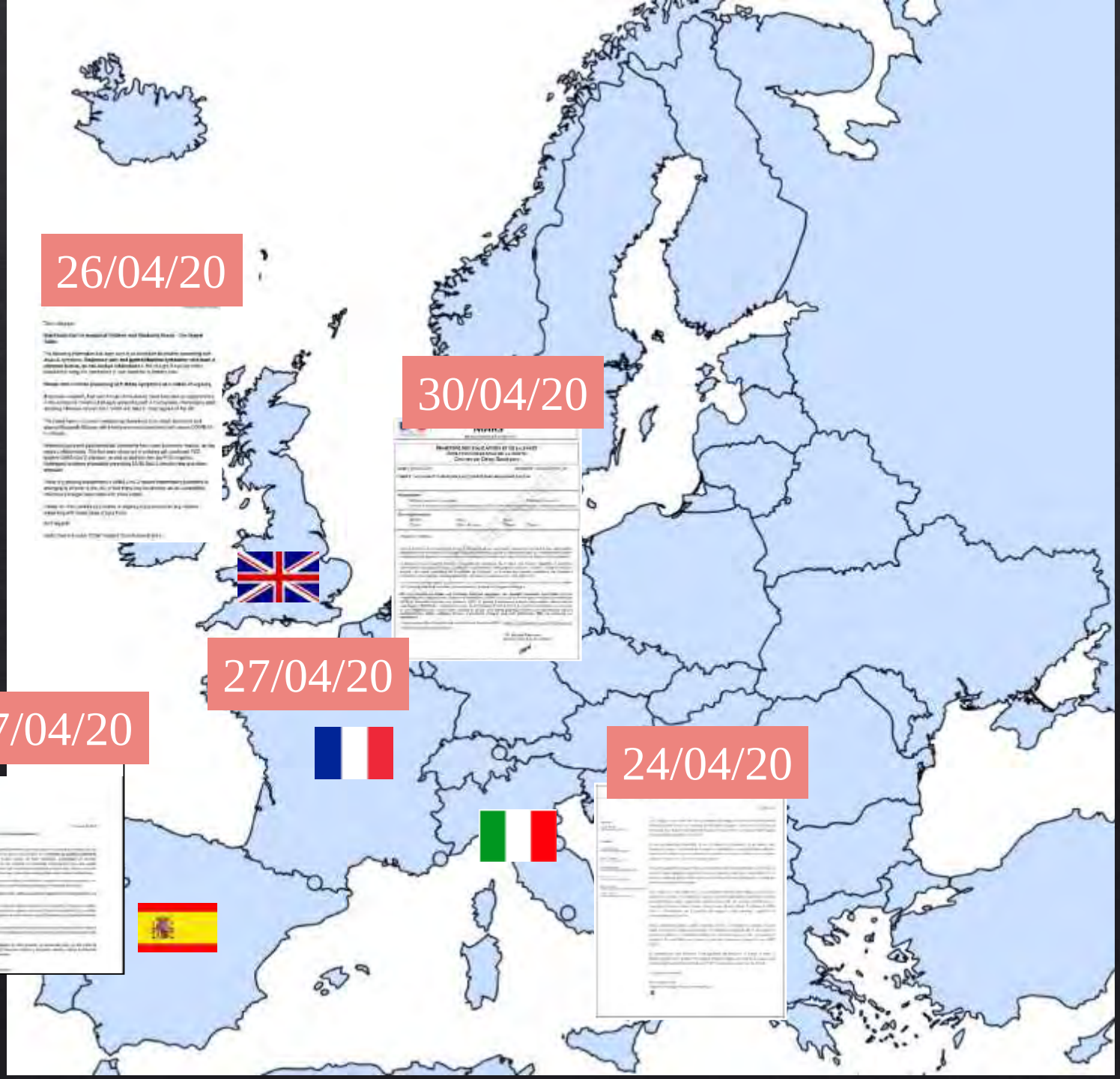
Alert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HEALTH ADVISORY

MIS-C : a new disease

- New disease with systemic inflammatory state after SARS-CoV-2 contact

- Similarities to severe atypical Kawasaki disease

→ PIMS : Paediatric Inflammatory Multisystem Syndrome

Or

MIS-C : Multisystem Inflammatory Syndrome in Children

CDC and WHO definitions (May 2020)

CDC case definition : All 4 criteria must be met:

1. Age <21 years
2. Clinical presentation consistent with MIS-C, including **all** of the following:
- Fever:
  - Documented fever >38.0°C (100.4°F) for ≥24 hours
  - **or**
  - Report of subjective fever lasting ≥24 hours
- Laboratory evidence of inflammation
  - Including, but not limited to, **any** of the following:
    - Elevated CRP, ESR, fibrinogen, procalcitonin, D-dimer
    - Elevated ferritin, LDH, IL-6 level, neutrophilia, lymphocytopenia, Hypoalbuminemia
- Multisystem involvement
  - **2 or more** organ systems involved:
    - Cardiovascular (eg, shock, elevated troponin, elevated BNP, abnormal echocardiogram, arrhythmia)
    - Respiratory (eg, pneumonia, ARDS, pulmonary embolism)
    - Renal (eg, AKI, kidney failure)
    - Neurologic (eg, seizure, stroke, aseptic meningitis)
    - Hematologic (eg, coagulopathy)
    - Gastrointestinal (eg, abdominal pain, vomiting, diarrhea, elevated liver enzymes, ileus, gastrointestinal bleeding)
    - Dermatologic (eg, erythroderma, mucositis, other rash)
- Severe illness requiring hospitalization

3. No alternative plausible diagnoses
4. Recent or current SARS-CoV-2 infection or exposure
- **Any** of the following:
  - Positive SARS-CoV-2 RT-PCR, positive serology, positive antigen test
  - COVID-19 exposure within the 4 weeks prior to the onset of symptoms

CDC and WHO definitions (May 2020)

WHO case definition

All 6 criteria must be met:

1. Age 0 to 19 years
2. Fever for ≥3 days
3. Clinical signs of multisystem involvement (**at least 2** of the following):
- Rash, bilateral nonpurulent conjunctivitis, or mucocutaneous inflammation signs (oral, hands, or feet)
- Hypotension or shock
- Cardiac dysfunction, pericarditis, valvulitis, or coronary abnormalities (including echocardiographic findings or elevated troponin/BNP)
- Evidence of coagulopathy (prolonged PT or PTT; elevated D-dimer)
- Acute gastrointestinal symptoms (diarrhea, vomiting, or abdominal pain)

4. Elevated markers of inflammation (eg, ESR, CRP, or procalcitonin)
5. No other obvious microbial cause of inflammation, including bacterial sepsis and staphylococcal/streptococcal toxic shock syndromes
6. Evidence of SARS-CoV-2 infection
- **Any** of the following:
  - Positive SARS-CoV-2 RT-PCR
  - Positive serology
  - Positive antigen test
  - Contact with an individual with COVID-19

Material and M

- Multicentric retrospective study: France (12 hospitals) and Switzerland (1 hospital)
- From March 22 to April 30, 2020.
- Inclusion criteria : fever > 38°5

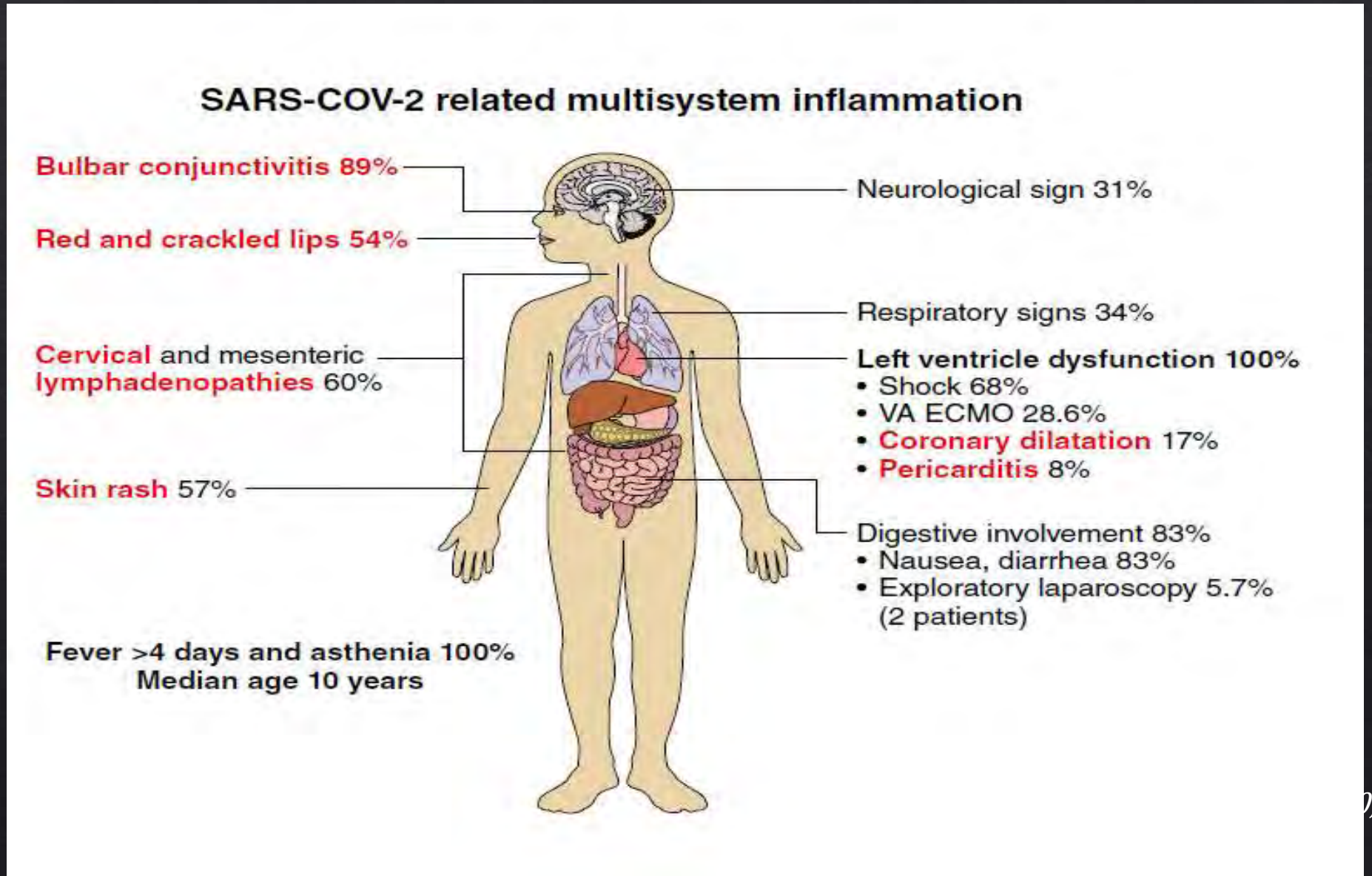
  acute LV dysfunction (EF<50%) or cardiogenic shock

  acute inflammatory state (CRP>100mg/l)

=> 35 children were included

Belhadjer Z. et al. Circulation 2020;142:429-36

Clinical presentation



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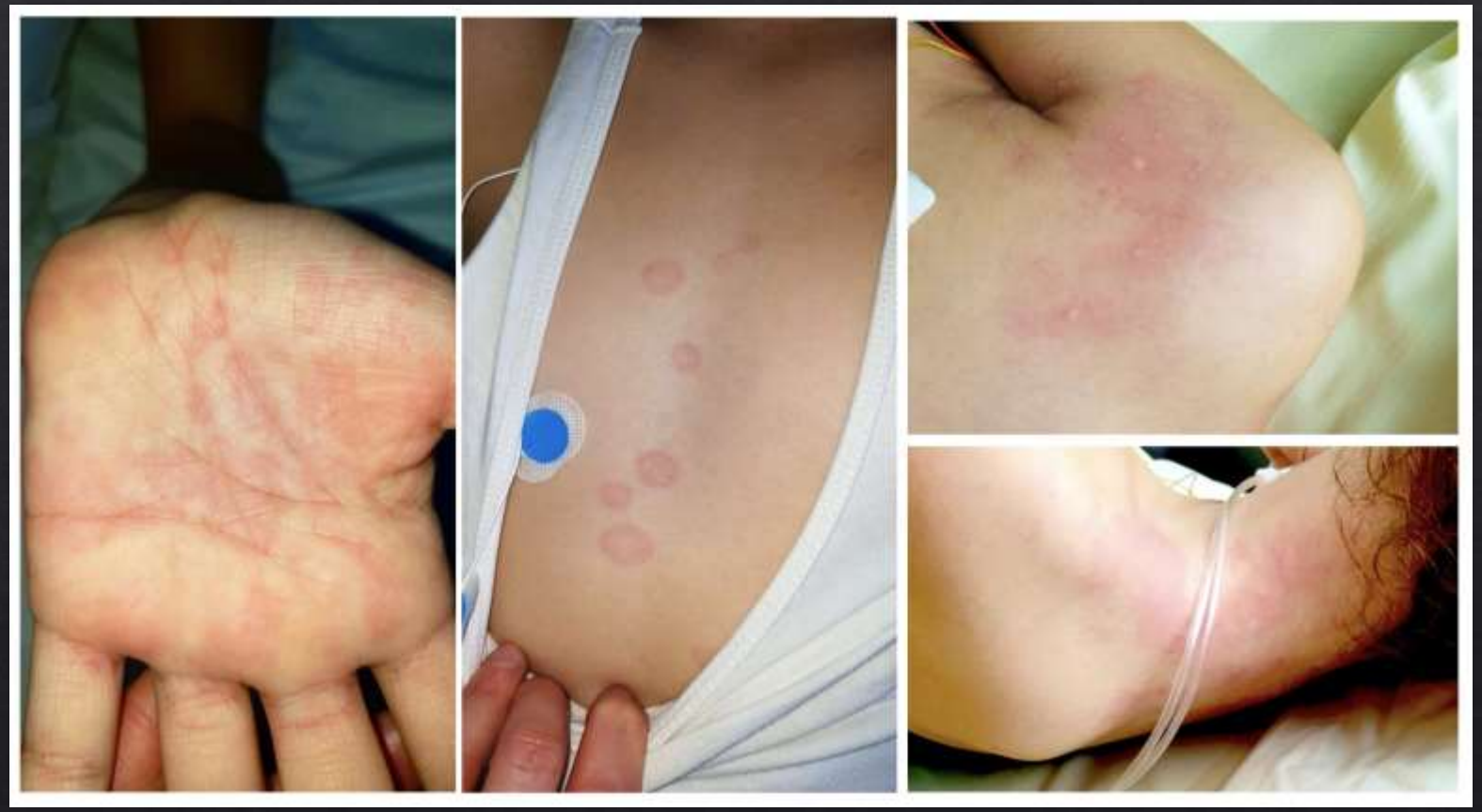
Results



Belhadjer Z. et al. Circulation 2020;142:429-36

Clinical presentation and outcome

	n (%)
Clinical signs	
Chest pain	6 (17)
Cardiogenic shock with collapse	28 (80)
Ventricular arrhythmia	1 (3)
Systolic blood pressure at admission (percentile (IQR))	1 (1-10)
Coronary artery dilatation Z-score > +2	6 (17)
Aneurysms at day 10 (echography only)	0 (0)
Left ventricular ejection fraction at baseline, n (%)	
<30%	10 (28)
30-50%	25 (72)
Evolution of LVEF (median±SD)	
Baseline (35 patients)	32±9
Day 3 (23 patients)	52±10
Day 7 (34 patients)	60±6
Recovery left ventricular ejection fraction	
LVEF > 60% at day 7 n (%)	25 (71)
Time to full recovery, days (median and range)	2 (2-5)

Data are median (IQR) or n (%), where n is the total number of patients with available data.

Treatment, n (%)	
Inotropic support	28 (80)
Immunoglobulin infusion	25 (71)
Intravenous corticosteroids	12 (34)
Interleukin 1 receptor antagonist	3 (8)
Anticoagulation with heparin	23 (65)
Respiratory support, n (%)	33 (94)
Invasive	22 (62)
Non invasive	11 (32)
VA-ECMO, n (%)	10 (28)
ECMO duration in days (range)	4.5 (3-6)
Recovery left ventricular ejection fraction	
LVEF > 60% at day 7 n (%)	25 (71)
Death, n (%)	0 (0)

VA ECMO: veno-arterial Extracorporeal membrane oxygenation.

Data are median (IQR) or n (%), where n is the total number of patients with available data.

Belhadjer Z. et al. Circulation 2020;142:429-36

Biological markers

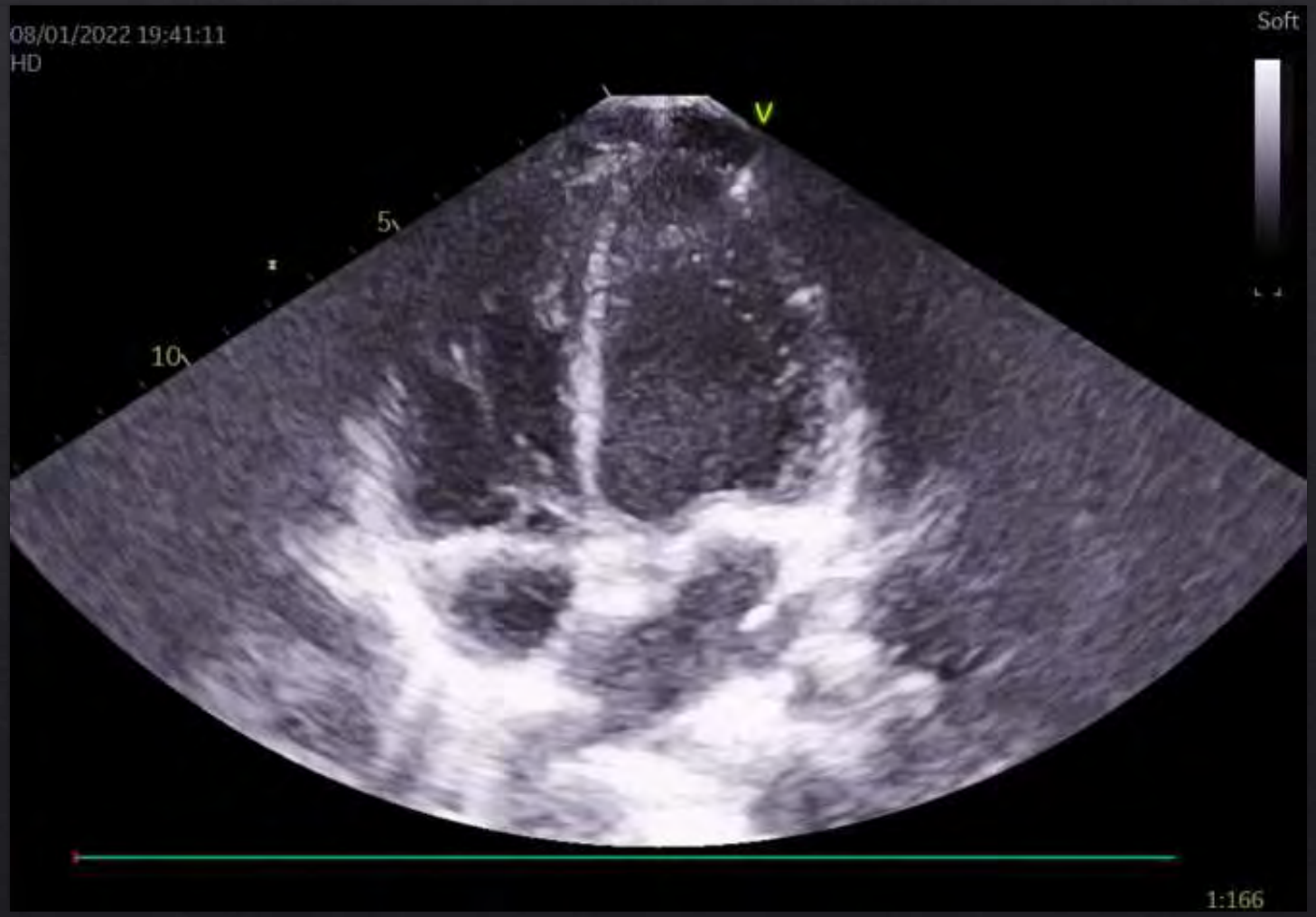
Table 3. Laboratory Findings

	Baseline	Peak Value, Day (No. of Patients)	Nadir Value, Day (No. of Patients)	Normal Values
High-sensitivity troponin I (n=35), ng/L	347 (186–1267)	408 (258–679)	28 (18–53)	<26
		Day 1 (16)	Day 10 (16)	
Creatinine kinase (n=19), U/L	174 (110–510)	—	—	<180
NT-proBNP (n=5), pg/mL	41 484 (35 811–52 475)	—	—	<300
BNP (n=28), pg/mL	5743 (2648–11 909)	4256 (2340–6503)	72 (56–140)	<100
		Day 1 (11)	Day 7 (12)	
D-dimer (n=20), ng/mL	5284 (4069–9095)	—	—	<500
C-reactive protein (n=35), mg/mL	241 (150–311)	—	—	<6
Procalcitonin (n=26), ng/mL	36 (8–99)	—	—	<2
White blood cell count (n=35), $\times 10^3$/L	16 (12–23)	—	—	<12
Neutrophil count (n=34), $\times 10^3$/L	13 (8–19)	—	—	<8.5
Interleukin-6 (n=13), pg/mL	135 (87-175)	—	—	<8.5

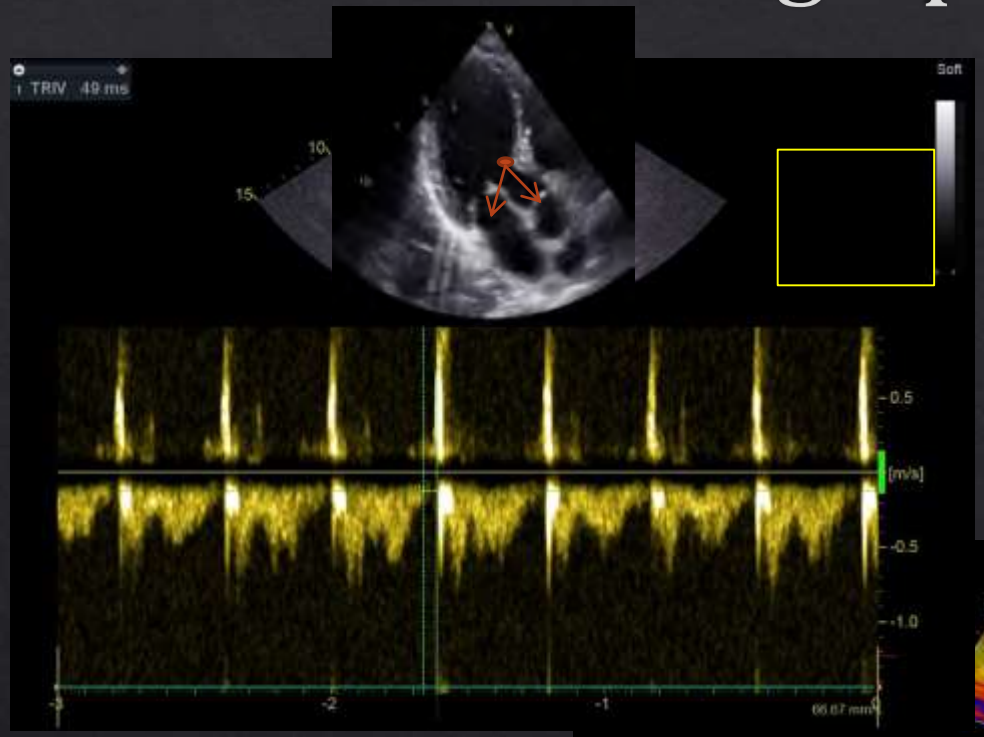
Data are median (interquartile range) or n (%), where number is the total number of patients with available data. Dashes indicate not applicable. BNP indicates B-type natriuretic peptide; and NT-proBNP, N-terminal pro-B-type natriuretic peptide.

Bellaujer Z. et al. Circulation 2020;142:429-36

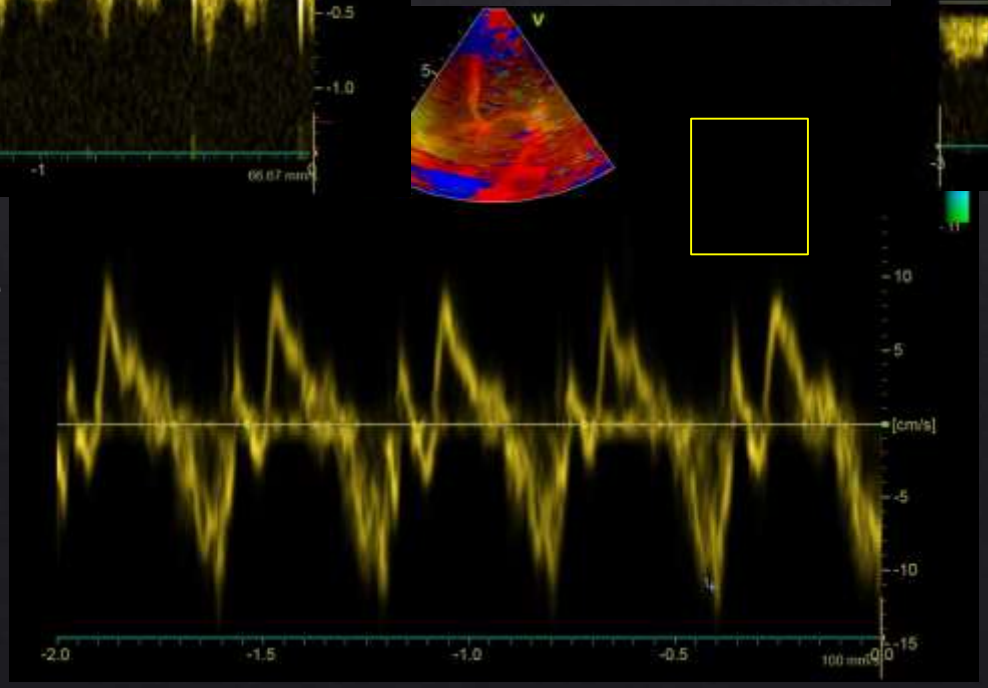
Echocardiography : systolic and diastolic dysfunction

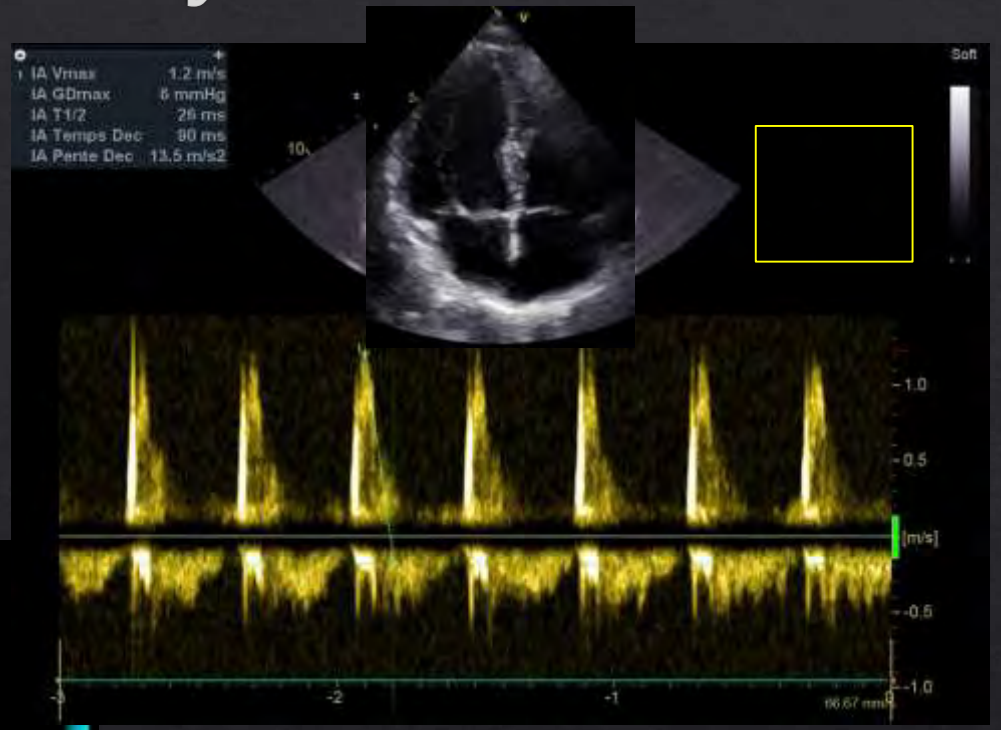


Echocardiography : diastolic dysfunction



Isovolumic relaxation time





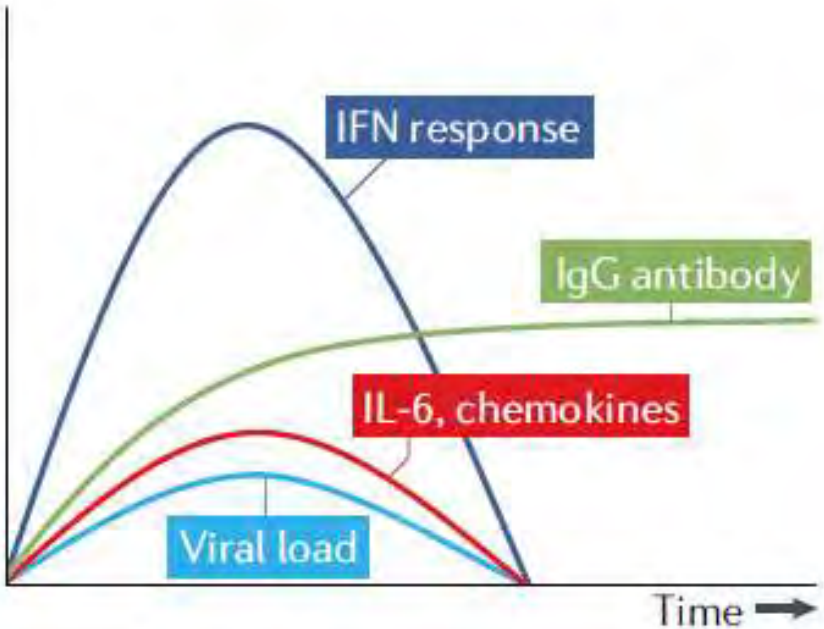
Mitral flow pressure half-time

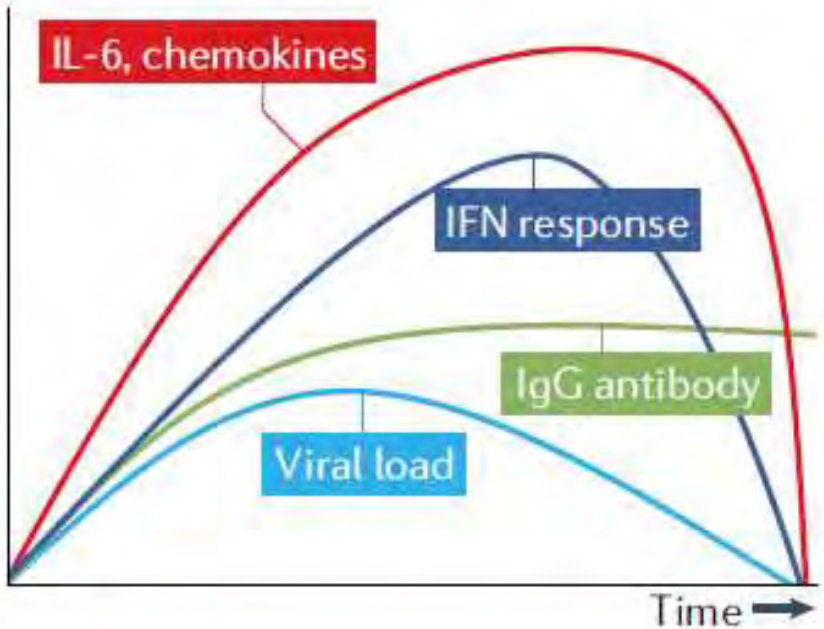
Mechanism hypothesis

- Cytokine storm
- Imbalanced response by proinflammatory and regulatory T cells

Myocardial edema

MIS-C : mechanism





- Early IFN response
- Rapid viral clearance
- Less inflammation

Mild disease

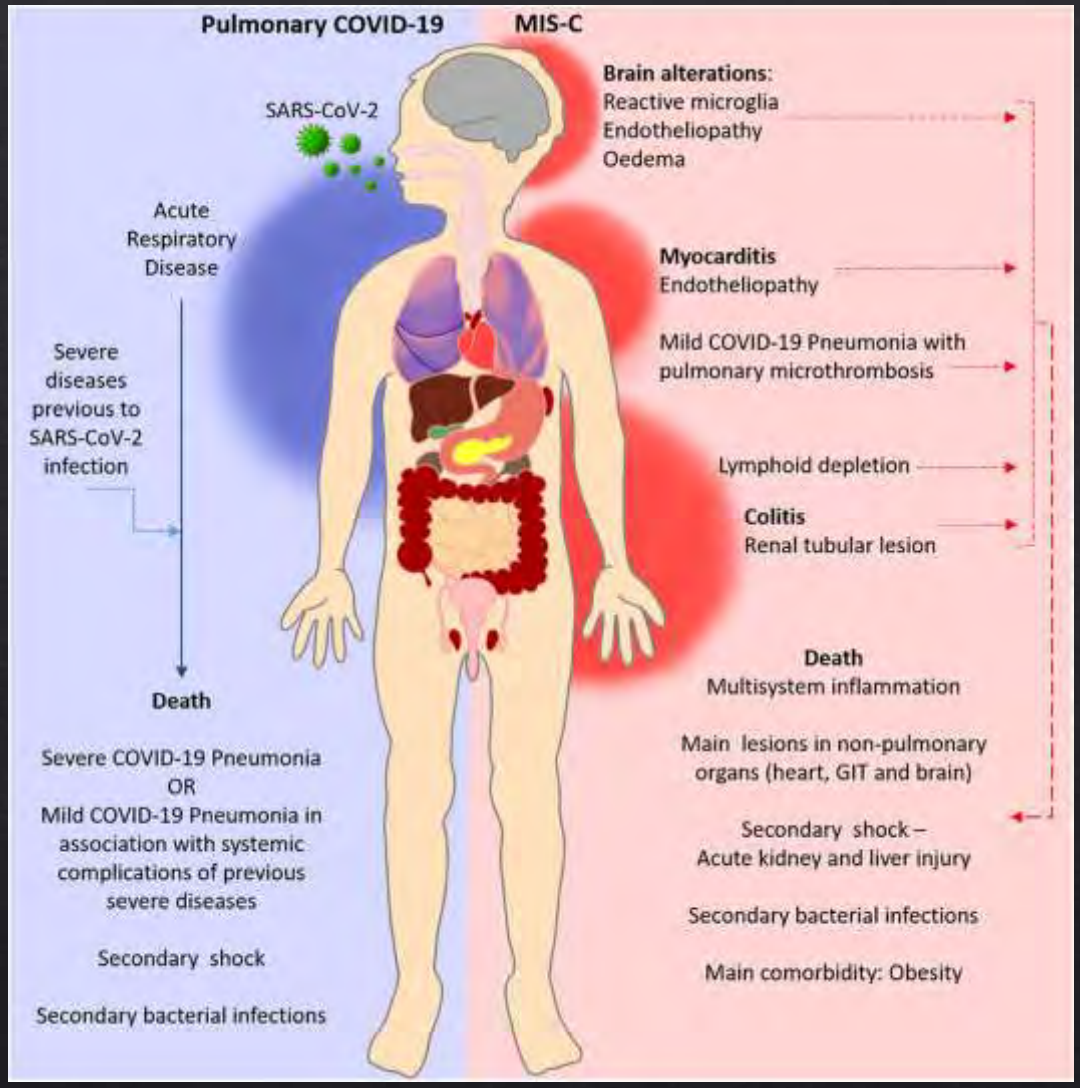
- Delayed IFN response
- Slow viral clearance
- More inflammation

Severe disease including MIS-C

Rowley AH.
Nat Rev Immunc

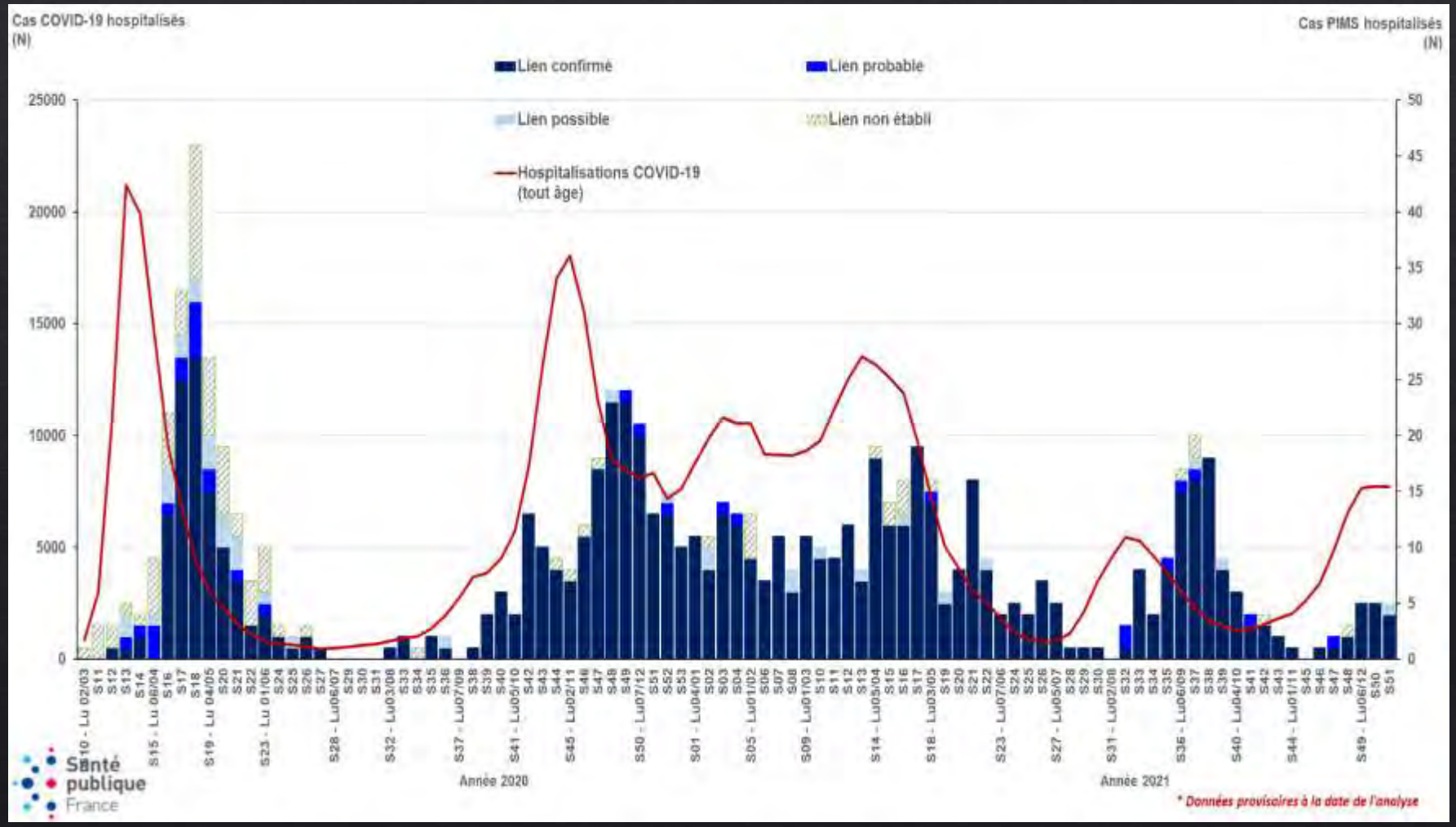
MIS-C vs Kawasaki

- Common clinical features : fever, rash, conjonctival injection, elevated inflammatory markers
- But many differences
  - Epidemiology
  - Clinical presentation
  - Biologic markers
  - Cardiac involvement



Pronostic and therapeutic implications

MIS-C in France 2020-2021



MIS-C vs Kawasaki disease

Tableau 2 - Différences et similitudes entre les atteintes inflammatoires multi-systémiques liées au SARS-CoV-2, le syndrome de Kawasaki avec ou sans choc et syndrome de choc toxique

	MIS-C	Maladie de Kawasaki (MK)	Maladie de Kawasaki avec choc (7% des MK)	Syndrome de choc toxique
Clinique				
Âge (ans)	7,5 +/-3,5	3,0 +/- 2,5	3,0 +/- 3,4	9 +/- 4,6
Hypotension	+	-	++	++
Atteinte muqueuse	+/-	++	+	+/-
Rash cutané	+	++	+	++ Erythrodermie
Desquamation	+	++	+	++
Trouble de la conscience	+	Rare	+	+
Symptomatologie digestive	++	Rare	+	+
Détresse respiratoire	+	Rare	+	+/-
Myalgies	+	-	-	+
Échographie				
Dilatation/anévrysme coronaire	+/-	+	++	-
Dysfonction ventriculaire	++	+/-	+	Rare
Insuffisance valvulaire	+	+	++	Rare
Biologie				
Leucocytes	Lymphopénie	Polynucléose	Polynucléose	Lymphopénie
Plaquettes	↓	↑	↓	↓
Fibrinogène	↓, normal ou ↑	Normal	Normal ou ↑	↓
D-dimères	↑	Normal	Normal ou ↑	↑
ALAT	Normal ou ↑	Normal ou ↑	Normal ou ↑	Normal ou ↑
Créatininémie	↑	Normal	↑	↑
Hyponatrémie	++	+ /-	++	+
Hypoalbuminémie	++	+/-	++	+
Troponine	↑	Normal ou ↑	↑	NC
NT-Pro-BNP	↑ ↑	Normal ou ↑	↑	NC
Ferritinémie	↑	Normal ou ↑	Normal ou ↑	Normal
CRP	↑ ↑	↑	↑ ↑	↑

ALAT : *alanine amino tranferase* ; CRP : *C Reactive Protein* ; MIS-C : *Multisystem Inflammatory Syndrome in Children* ; NT-Pro-BNP : *natural terminal pro brain natriuretic peptid*

Oualha et al., revue MIR

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Characterizing the differences between multisystem inflammatory syndrome in children and Kawasaki disease

Maskit Bar-Meir[1,2,4✉], Alex Guri[2,3], Max E. Godfrey[4,7], Avram R. Shack[4], Philip J. Hashkes[2,5], Ofra Goldzweig[2,6] & Orli Megged[1,2,4]

KD, n=13 KD+MISC, n=5 MISC, n=10

Demographic characteristics				
Median age, months (range)	18 (5–36)	36 (24–193)	136 (60–204)	0.0001
Gender, % male	54	20	60	0.3
Ethnicity				
Jew	9	5	8	
Arab	4	0	2	0.3
Clinical characteristics				
SARS-CoV-2				
RT-PCR	0	0	3	
Positive serology	0	2	8	
Exposure	0	3	10	
Fever, mean temperature °C ± SD	39.5 ± 0.4	38.7 ± 0.8	39.4 ± 0.6	0.08
Days of fever ± SD	5.8 ± 2	4.4 ± 2	3.7 ± 1	0.02
Low blood pressure, %*	0	60	60	0.003
Acute gastrointestinal symptoms, %	15	40	90	0.01
Median length of stay in hospital, days (range)	4(3–12)	7(2–13)	7.5(4–21)	0.05
Anti-inflammatory treatment (N of patients receiving)				
IVIG, 2 g/kg	13	5	3	
High dose IV corticosteroids#	1	4	10	
IV pulse corticosteroids##			1	
Anakinra			3	
Intensive care unit admission	0	2	6	0.006

(2021) 11:13840

KD, n=13 KD+MISC, n=5 MISC, n=10

Laboratory tests§				
White blood count (× 10³/μL) ± SD	19 ± 13	15 ± 7	7 ± 5	0.05
Lymphocyte count (× 10³/μL) ± SD	5.6 ± 4	1.5 ± 1	0.7 ± 0.5	0.001
Hemoglobin, g% ± SD	10.3 ± 0.9	11.7 ± 1	11 ± 1	0.02
Platelet count (× 10³/uL) ± SD	518 ± 365	260 ± 109	136 ± 81	0.006
Na, mEq/L	135 ± 1.8	134 ± 3	134 ± 4.5	0.5
Alanine aminotransferase, IU/L ± SD	62 ± 71	80 ± 119	52 ± 46	0.7
Albumin, g/L ± SD	3.6 ± 0.4	3.0 ± 0.5	3.1 ± 0.6	0.06
C-reactive protein, mg/dL ± SD	13 ± 7	16 ± 4	18 ± 8	0.3
Lactate dehydrogenase umole/L ± SD	298 ± 69	284 ± 317	301 ± 66	0.7
Troponin, ng/L ± SD (nL < 20)	< 6 (N = 1)	4731 ± 9326 (N = 4)	259 ± 526	0.1
D-dimer, ng/mL ± SD (nL < 500)	1638 ± 108 (N = 2)	1455 ± 2511 (N = 3)	2372 ± 2220	0.8
Fibrinogen, mg/dL (nL < 500)	952 (N = 1)	699 ± 187 (N = 3)	688 ± 212	0.5
Ferritin, ng/mL (nL < 205)	235 ± 135 (N = 3)	703 ± 74 (N = 3)	887 ± 1234	0.6
B-type natriuretic peptide (BNP), pg/mL (nL < 100)			799 ± 37	
IL-6, pg/mL (nL < 7)			317 ± 243	
Echocardiography findings				
Coronary dilation**	4	2	0	0.09
Decreased LV function	0	0	6	0.004
Valvular regurgitation	2	4	5	0.02
Pericardial effusion	0	1	5	0.009
Retrograde aortic diastolic flow	2	1	5	0.01

Steroids+IgIV vs IgIV alone

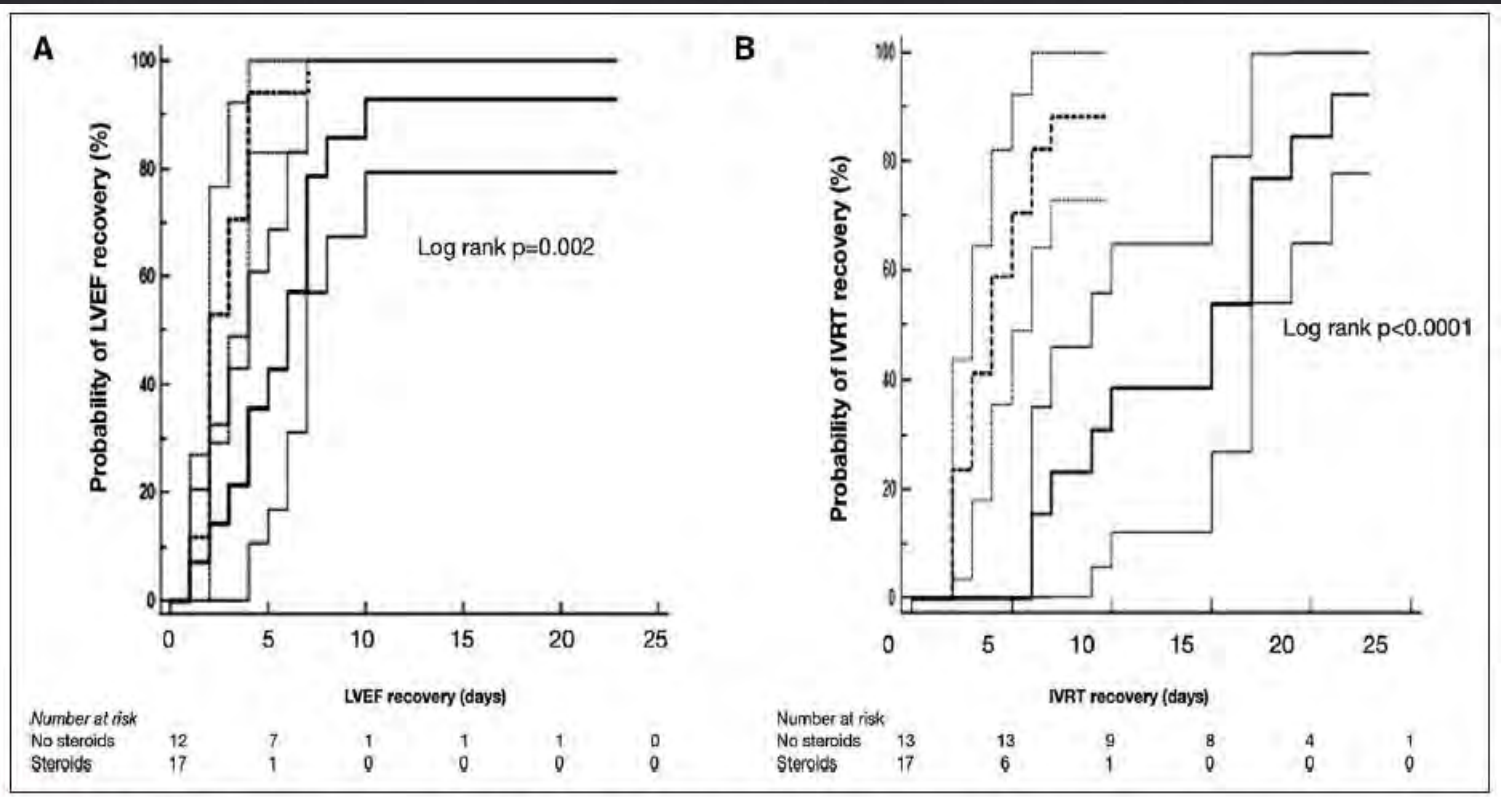


Figure. **Kaplan-Meier recovery curves, along with the 95% confidence interval for patients who received intravenous immunoglobulin and steroid treatment (dashed line) versus those who were treated with intravenous immunoglobulin only (full line).**
A, LVEF recovery. (Only 29 of 40 patients who had LVEF<55% at admission were included in this analysis.) **B**, IVRT recovery. (IVRT was measured at admission in 30 of 40 patients who all had sequential evaluations.) IVRT indicates isovolumic relaxation time; and LVEF, left ventricular ejection fraction

- Results in favor of the combination steroids + IgIV versus IgIV alone
- Less therapeutic failure: def by persistence of fever at H48 or resurgence of fever within 7 days
- Less need for a second line of treatment

Belhadjer et al., Circulation 2020;142:2282-4
Ouldali et al, JAMA 2021

Treatment protocol : steroid bolus

- Methylprednisolone IV, 10 mg/kg/24h, 3 h bolus, 3 consecutive days
- Oral prednisolone, 2 mg/kg/24h for 5 days
  1 mg/kg/24h for 5 days
  0,5 mg/kg/24h for 5 days and stop
- Cefotaxime 100 mg/kg/24h for 48h
- Aspirin 100 mg/j for 8 weeks

- Persisting fever > 39°C + reascension CRP :
  - IgIV 2g/kg/24h for 2 days
  - Or Corticosteroids IV +/- anakinra (IL-1 antagonist)

Mid-term follow-up

- Follow-up calendar :
  - D3, D7, M1, M3, M6, M12
- All children are alive and well
- No cardiac sequelae
  - Normal coronary arteries
  - Cardiac MRI : normal
- No relapse

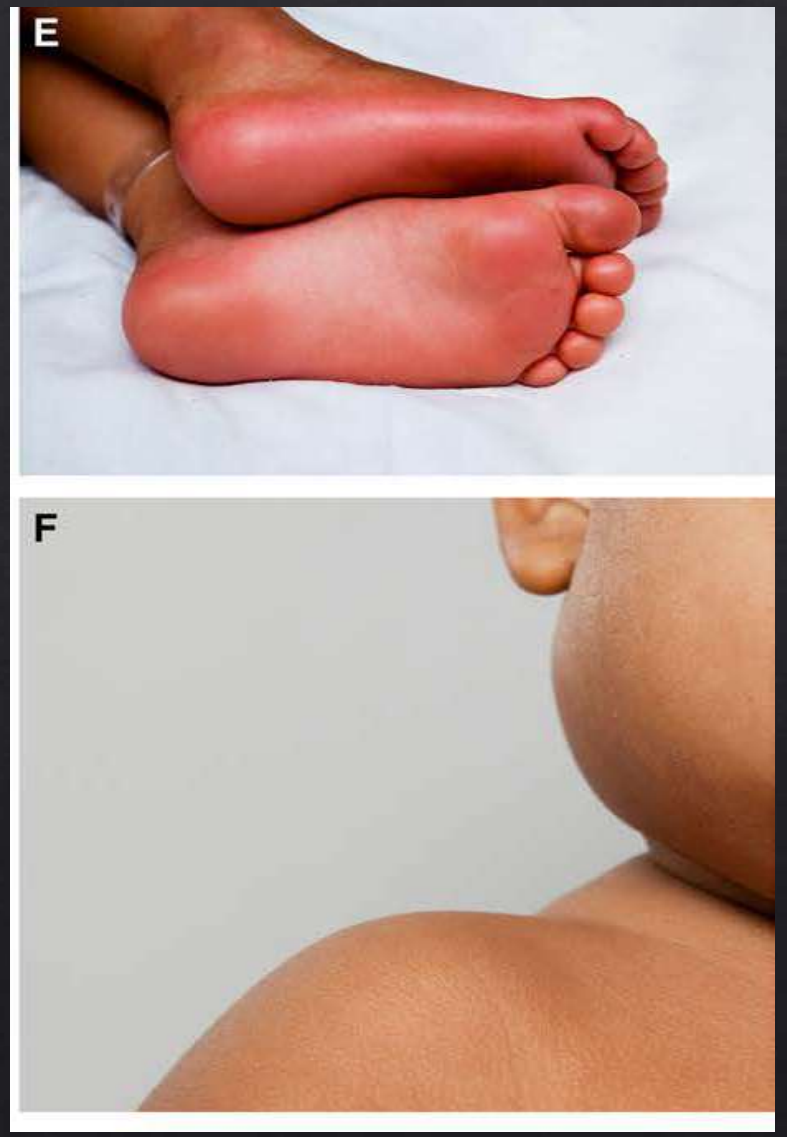
Kawasaki disease

Kawasaki disease : en chiffres

- 1 ère cause d'atteinte coronaire chez l'enfant
- Etio pathogenie peu connue
- 25 % de complication coronaire si non traité
- Très forte incidence au Japon :243.1 per 100 000 children<5 years of age in 2011 vs white children had the lowest incidence 13.7 per 100 000 children <5 years of age).
- Recurrence 1,5% a 1,5 an
- Histoire familiale : RR *10 dans la fraterie

Les principaux symptômes

- Fièvre de plus de cinq jours avec irritabilité constante d'apparition brutale
- Conjonctivite bilatérale bulbaire non purulente
- Atteinte muqueuse : pharyngite, chéilite, langue framboisée, stomatite
- Exanthème polymorphe
- Atteinte des extrémités : érythème des paumes des mains et/ou des plantes des pieds, l'œdème palmo-plantaire, desquamation palmo-plantaire secondaire en « doigt de gant »)
- Atteinte unilatérale des ganglions cervicaux, de plus de 1.5 cm de diamètre, ferme



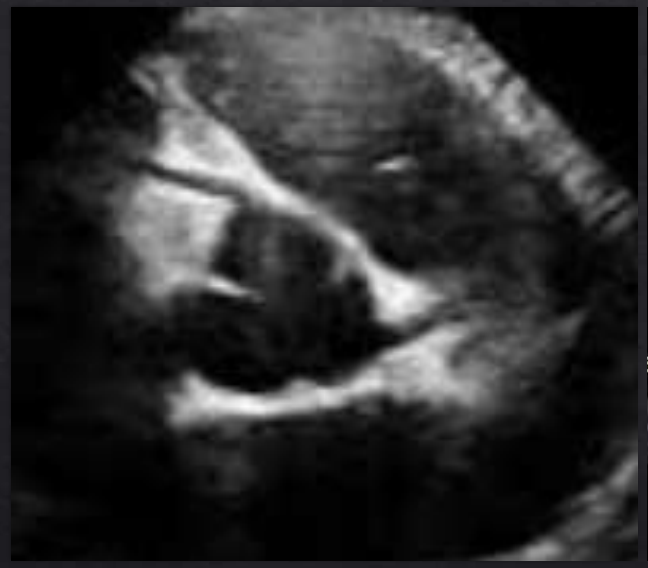
Mc Crindle et al, Circulation. 2017

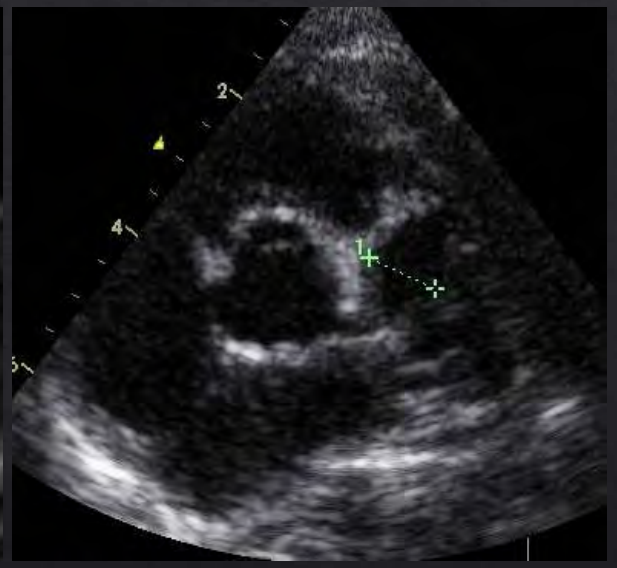
Kawasaki : atteintes cardiaques

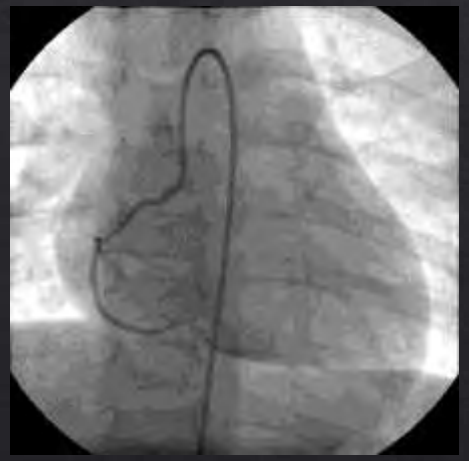
- Coronarite avec dilatation des artères coronaires, anévrismes coronaires, infarctus, rupture d'anévrysmes ++

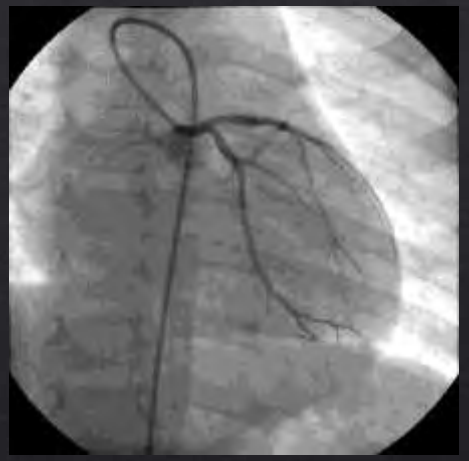
- Myocardite-péricardite-coronarite
- Myocardite avec possible insuffisance ventriculaire gauche sévère (état de choc: 7% des Kawasaki)
- Troubles conductifs et troubles du rythme par inflammation du tissu de conduction
- Péricardite et épanchement péricardique
- Fuites valvulaires par inflammation des valves cardiaques et particulièrement la valve mitrale (1 %) mais aussi de la valve aortique

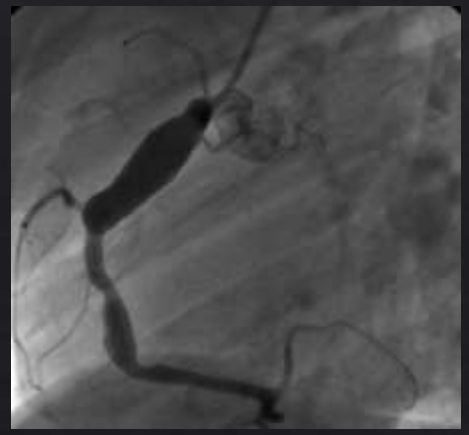
Dilatations coronaires

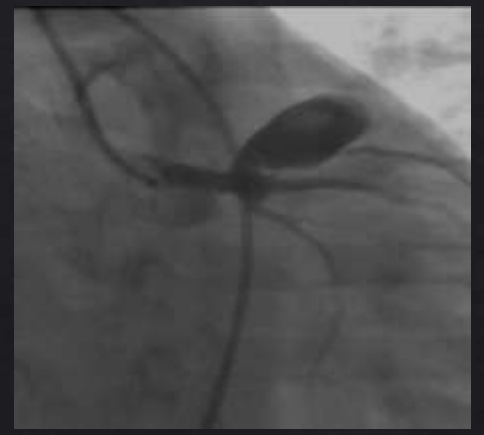




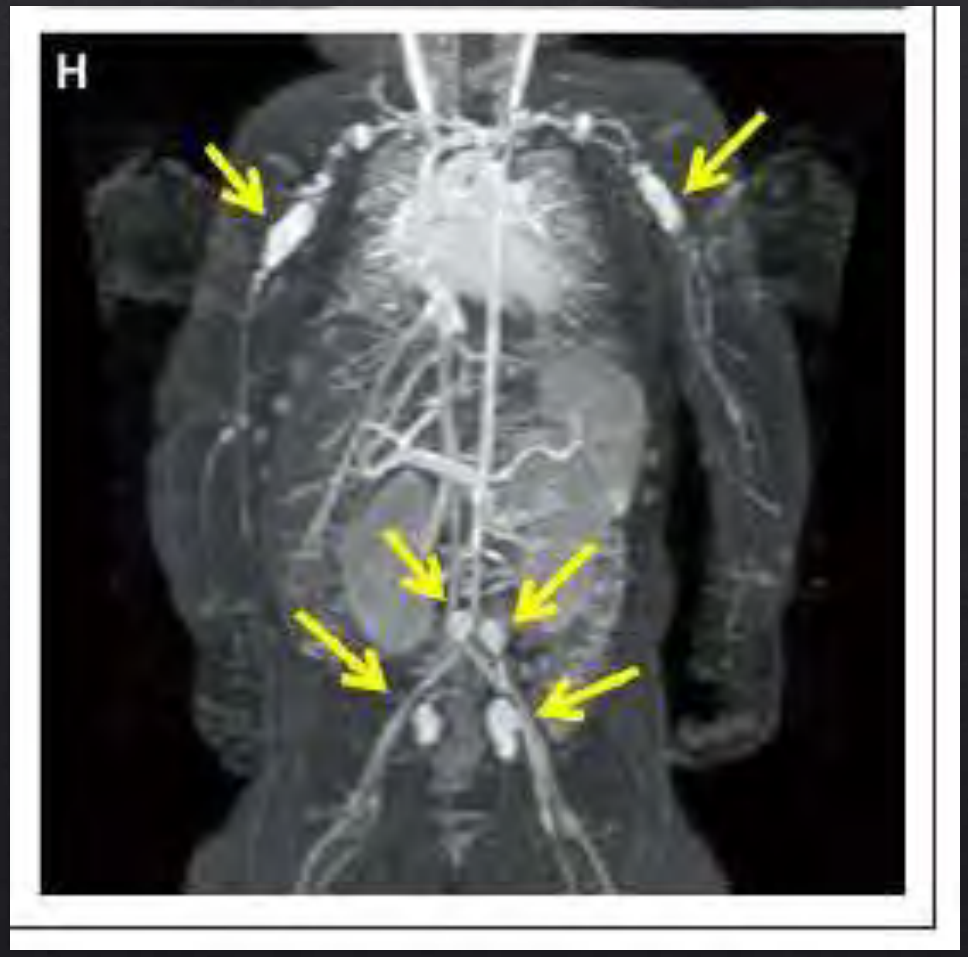


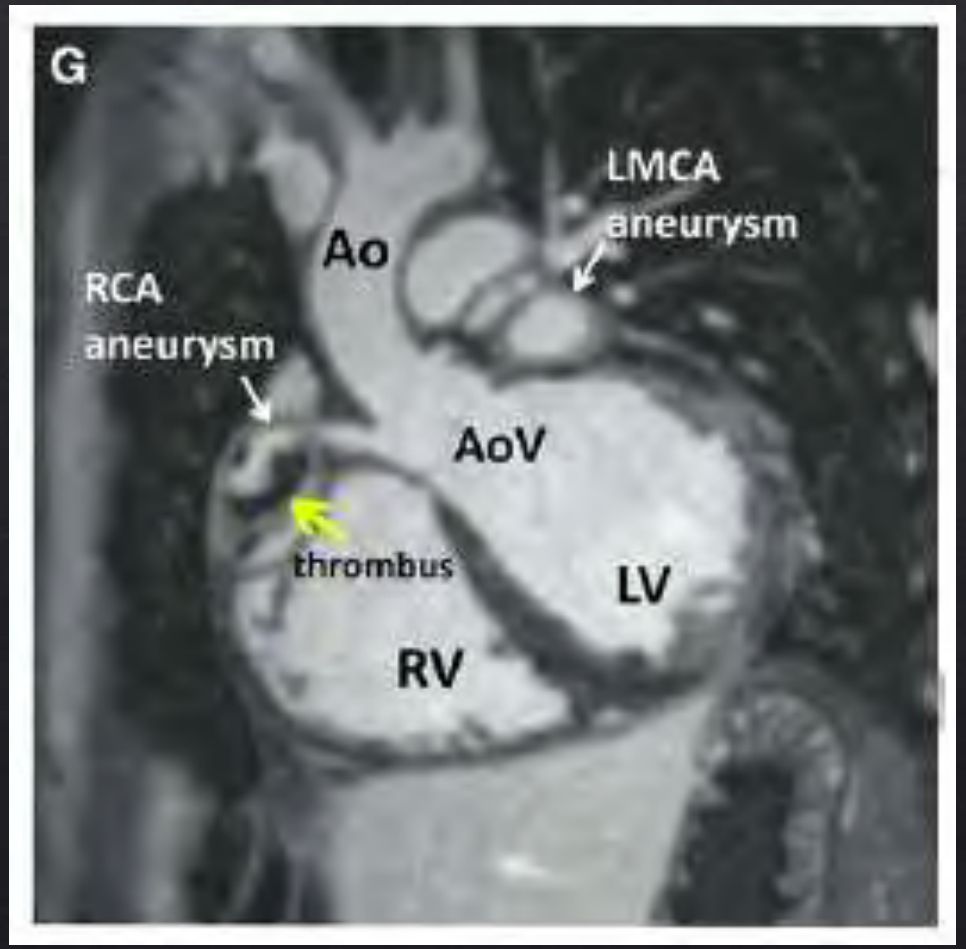


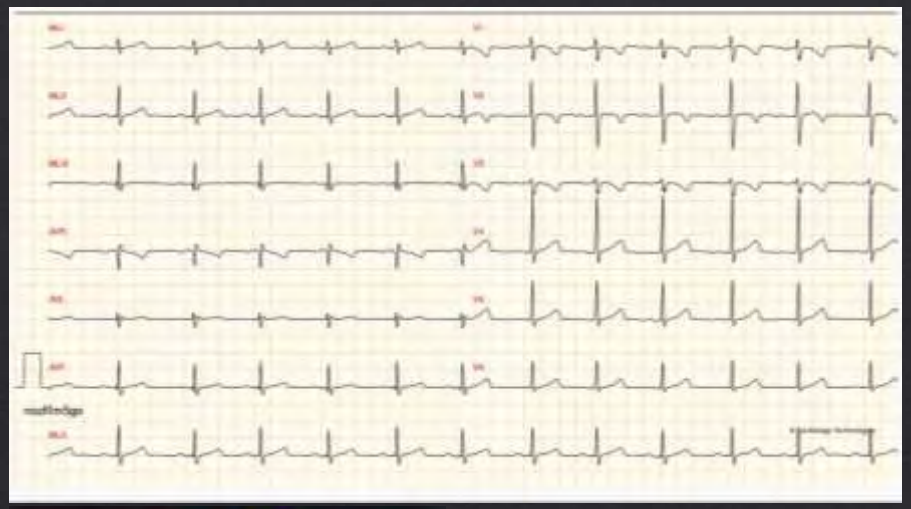


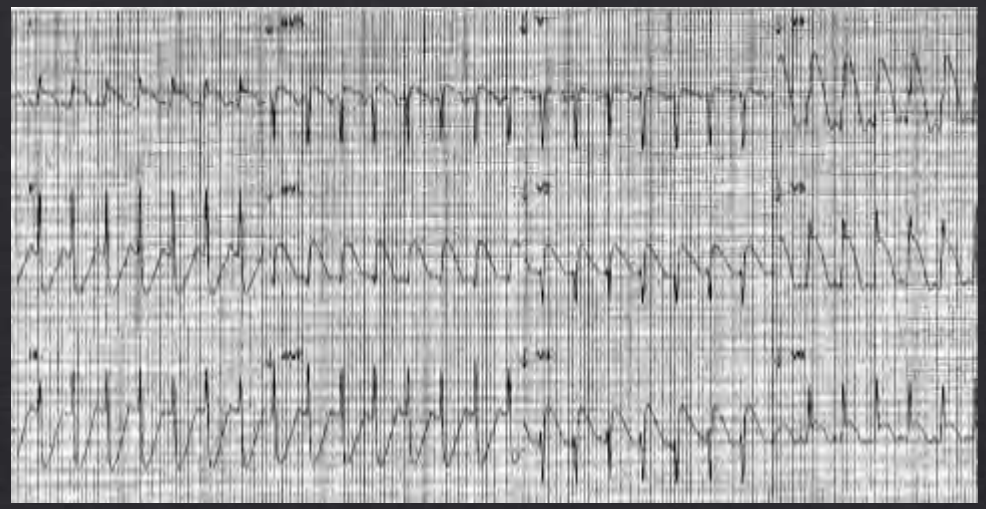


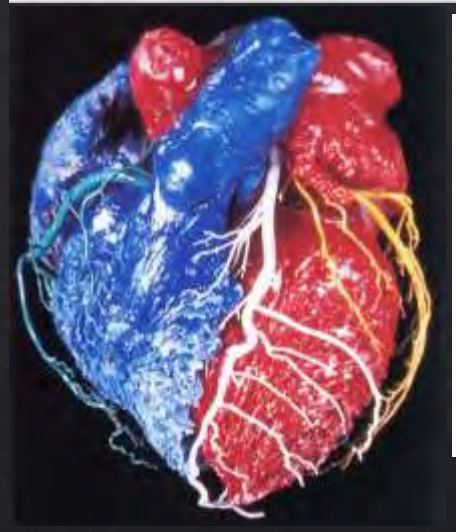
Vascularite artères moyen calibres

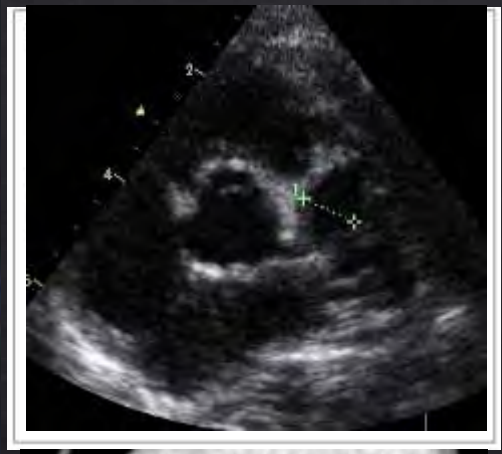


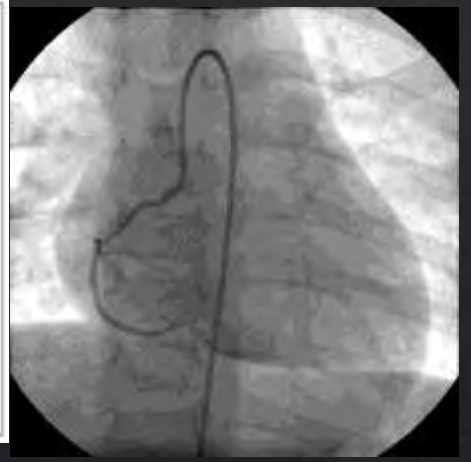


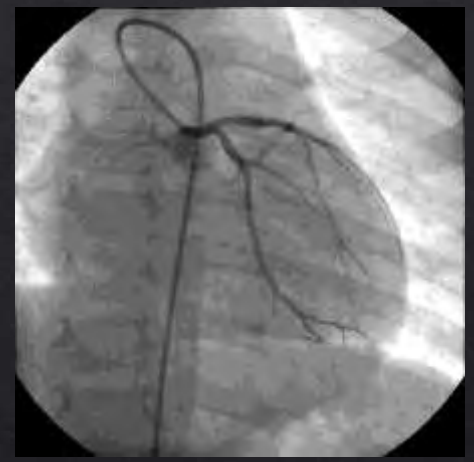


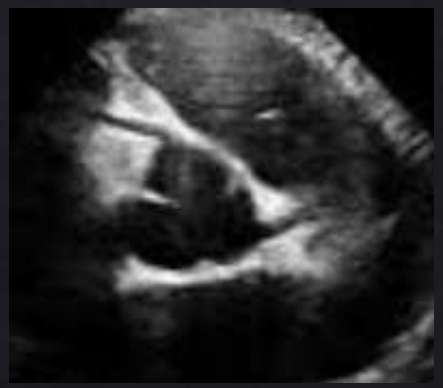


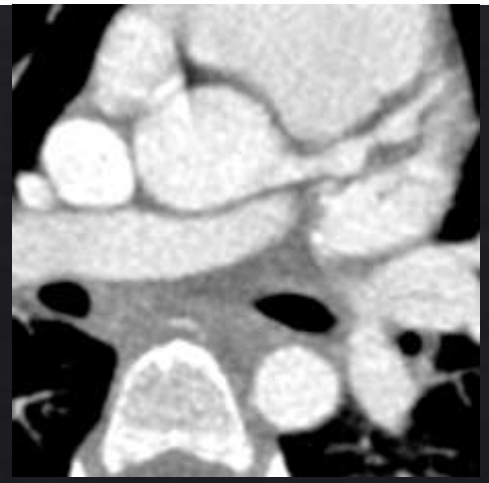


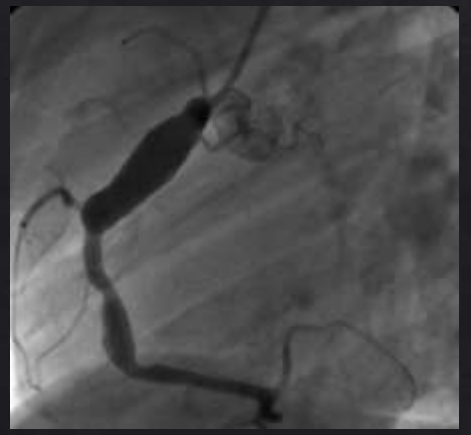


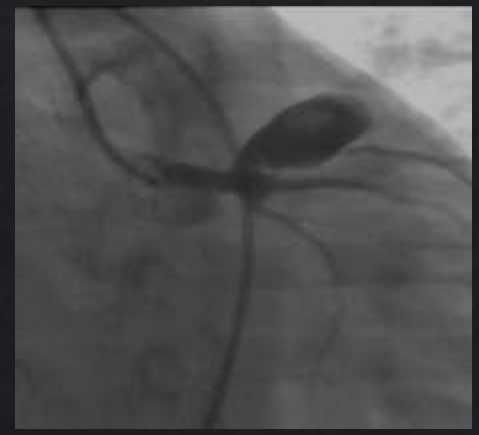












Recommandations de mar

AHA SCIENTIFIC STATEMENT

Diagnosis, Treatment, and Long-Term Management of Kawasaki Disease

A Scientific Statement for Health Professionals From the American Heart Association

Table 1. Applying Classification of Recommendations and Level of Evidence

ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT / SIZE OF TREATMENT EFFECT	CLASS I *Benefit >>> Risk* Procedure/Treatment **SHOULD** be performed/ administered	CLASS IIa *Benefit >> Risk* *Additional studies with focused objectives needed* **IT IS REASONABLE** to perform procedure/administer treatment	CLASS IIb *Benefit ≥ Risk* *Additional studies with broad objectives needed; additional registry data would be helpful* Procedure/Treatment **MAY BE CONSIDERED**	CLASS III *No Benefit* or CLASS III *Harm* Procedure/ Test / Treatment COR III: No benefit — Not Helpful — No Proven Benefit COR III: Harm — Excess Cost w/o Benefit or Harmful — Harmful to Patients
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	■ Recommendation that procedure or treatment is useful/effective ■ Sufficient evidence from multiple randomized trials or meta-analyses	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from multiple randomized trials or meta-analyses	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Sufficient evidence from multiple randomized trials or meta-analyses
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is useful/effective ■ Evidence from single randomized trial or nonrandomized studies	■ Recommendation in favor of treatment or procedure being useful/effective ■ Some conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation's usefulness/efficacy less well established ■ Greater conflicting evidence from single randomized trial or nonrandomized studies	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Evidence from single randomized trial or nonrandomized studies
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	■ Recommendation that procedure or treatment is useful/effective ■ Only expert opinion, case studies, or standard of care	■ Recommendation in favor of treatment or procedure being useful/effective ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation's usefulness/efficacy less well established ■ Only diverging expert opinion, case studies, or standard of care	■ Recommendation that procedure or treatment is not useful/effective and may be harmful ■ Only expert opinion, case studies, or standard of care
Suggested phrases for writing recommendations	should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established	COR III: No Benefit: is not recommended; is not indicated; should not be performed/ administered/ other; is not useful/ beneficial/ effective COR III: Harm: potentially harmful; causes harm; associated with excess morbidity/mortality; should not be performed/ administered/ other
Comparative effectiveness phrases†	treatment/strategy A is recommended/indicated in preference to treatment B treatment A should be chosen over treatment B	treatment/strategy A is probably recommended/indicated in preference to treatment B it is reasonable to choose treatment A over treatment B		

Mc Crindle et al. , Circulation 2017

Qui sont les patients à haut risque?

Score d'Egami (2006)	Score de Kobayashi (2006)	Score de Sano (2007)
Age ≤ 6 mois (2 points)	Age ≤ 12 mois (1 point)	Bilirubine totale ≥ 0.9mg/dL (1 point)
≤ 4 jours de fièvre (1 point)	Traitement dans les 4 premiers jours de fièvre (2 points)	CRP ≥ 7mg/dL (1 point)
Plaquettes ≤ 300.10^9/L (1 point)	Plaquettes ≤ 300.10^9/L (1 point)	ASAT ≥ 200 U/L (1 point)
CRP ≥ 8mg/dL(1 point)	CRP ≥ 10mg/dL (1 point)	
ALAT > 100 U/L (1 point)	ASAT ≥ 100 U/L (1 point)	
	≥ 80% neutrophiles (2 points)	
	Na+ ≤ 133 mmol/L (2 points)	
Haut risque si ≥ 3 points	Haut risque si ≥ 5 points	Haut risque si ≥ 2 points

Shohai O et al., Pediatrics 2011; Egami K et al., J Pediatr 2006 ; Chen S, et al. JAMA 2016; Mc Crindle Circ 2017

Atteintes coronaires :Z score (Haycock)

- Classification selon le Zscore
- Aucune atteinte coronaire : Zscore < 2
- Dilatation coronaire : $2 \leq$ Zscore $< 2{,}5$
- Anévrysme coronaire de petite taille : $2{,}5 \leq$ Zscore < 5
- Anévrysme coronaire de taille moyenne : $5 \leq$ Zscore < 10 et valeur absolue < 8 mm
- Anévrysme coronaire géant : Zscore 10 ou valeur absolue 8 mm

Fréquence des atteintes coronaires (Japon)

Dans 95 % des cas

- Jamais atteinte coronaire (75%) ou
- Dilatation transitoire (20%)

Dans 5% des cas

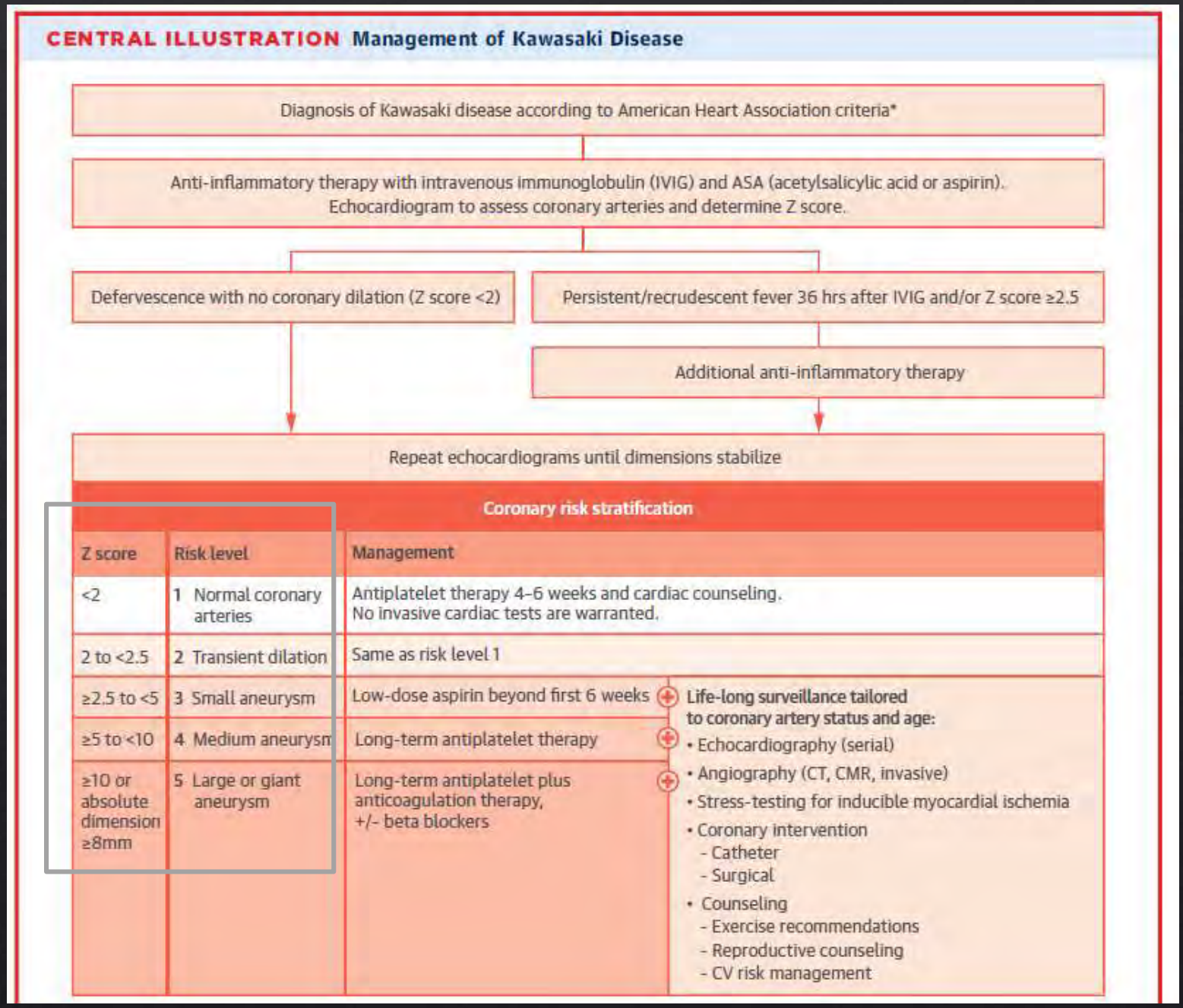
- Présence d'anévrysmes coronaires
- Dont 1% d'anévrysmes géants (risque majoré d'IDM et Mort subite dans les 2 premières années

Surveillance échographique

TABLE 1 Principles in Acute Management of KD

1. The goal of therapy is to reduce systemic and tissue-level inflammation as rapidly as possible. For this reason, patients should be treated as soon as diagnosis can be confidently established.
2. All patients within the first 10 days of fever onset should be treated with IVIG. Patients diagnosed after 10 days should receive IVIG treatment if they are still febrile, have markedly elevated inflammatory parameters, or have coronary artery dilation.
3. Recrudescent fever at least 36 h after the end of IVIG infusion without other explanation is a marker for persistent inflammation and should prompt immediate and aggressive anti-inflammatory therapy
   a. Antibody-mediated hemolysis has become common in KD patients who have received IVIG retreatment and have type A or B blood; rescue therapies other than IVIG (e.g., infliximab, corticosteroids) should be considered.
4. Patients with coronary artery dilation (*z*-score >2.0) should be followed with a repeat echocardiogram at least twice a week until dimensions stabilize; additional anti-inflammatory therapy should be considered.
5. Patients with giant aneurysms should have frequent echocardiograms in the first 3 months of illness for thrombus surveillance, even after dimensions stabilize.
6. Infants under 6 months of age are at extremely high risk of aneurysm formation, even with timely therapy. They require echocardiograms every few days until dimensions have stabilized.
7. Patients with giant CAA (*z*-score ≥10) are at highest risk for thrombosis during the first 3 months after fever onset
   a. Systemic anticoagulation together with an antiplatelet agent should be administered until coronary dimensions improve.
   b. Low-molecular-weight heparin is easier to regulate than warfarin in infants, as well as in patients of any age, during the acute phase of illness or until hsCRP normalizes.

Newburger J, et al. JACC 2016



Newburger J, et al. JACC 2016

Management cardiologique à court terme

- Consultation cardiologique

- Pour les patients sans complication
- 1 écho entre 1 et 2 semaines et 1 écho entre 4 et 6 semaines (classe I)

- Pour les patients avec un Zscore > 2,5 à la phase aiguë
- 2 échos par semaine jusqu'à ce que les mesures des dimensions luminales arrêtent de progresser (classe I)

- Pour les patients avec anévrysmes géants
- 2 échos par semaine tant que les lésions progressent puis
- 1 écho/sem pdt 45 jours puis
- 1 écho/mois pdt 3 mois (classe IIA)

Newburger J, et al. JACC 2016 Mc Crindle et al. , Circulation 2017

Antiagrégation et anticoagulation

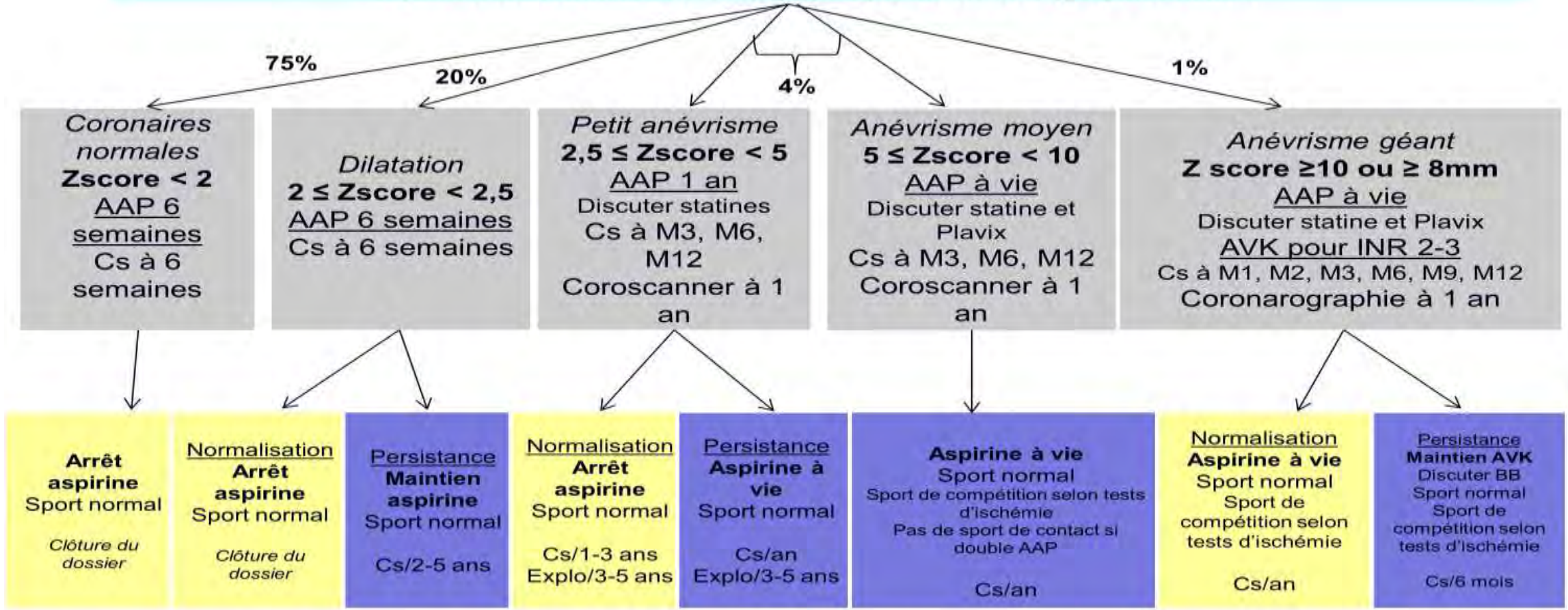
- Pour les patients sans atteinte coronaire
  - AAP pendant 6 semaines (classe I)

- Pour les patients avec une atteinte coronaire d'aggravation rapide
  - Hospitalisation pour HBPM avec antiXa entre 0,5 et 1 (Classe II a)
  - Arrêt si Zscore < 10 ou valeur absolue < 8 mm
  - AAP au moins un an

- Pour les patients avec anévrysmes géants (Zscore ≥ 10 ou taille ≥ 8 mm)
  - Hospitalisation pour HBPM et relai AVK avec INR cible entre 2 et 3
  - AAP à vie

Mc Crindle et al. , Circulation 2017

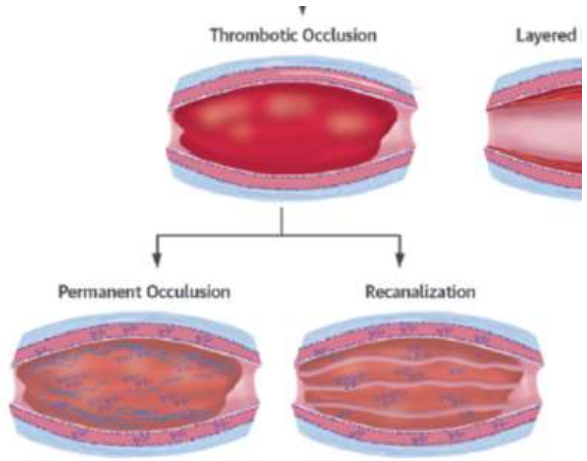
Immunoglobulines IV à 2g/kg sur 12h
Aspirine à dose anti-inflammatoire 60mg/kg/j jusqu'à disparition de la fièvre
Puis relai par dose anti-aggrégante plaquettaire (AAP) 3-5mg/kg/j
Rythme de surveillance échographique selon échographie initiale



Education et Prévention des FDRCV pour tous !

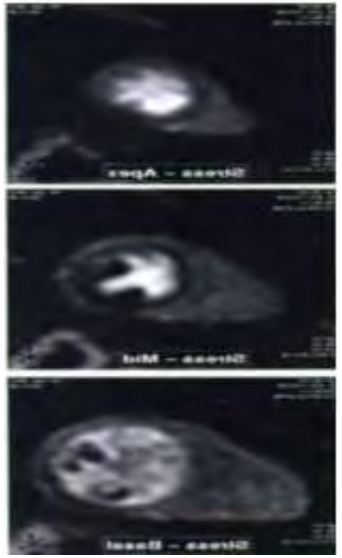
Bajolle F, Réalités pédiatriques 2018

A long terme



- Mortalité et morbidité+++
- Survie à 30 ans: 88-90%
- Cardiac event free à 30 ans : 30%
- 26% d'infarctus
- Risque accru dans les 2 ans qui suivent le diagnostic
- Puis à long terme avec 50% de pontage à 30 ans
- Mauvais pronostic si atteinte bilatérale

- Développement de l'IRM pour la surveillance de la perfusion coronaire



Newburger J, et al. JACC 2016; Vijarnsorn 2016 Mc Crindle et al. , Circulation 2017

Modalités de surveillance à long terme

- Pour les patients sans atteinte coronaire ou dilatation transitoire
  - Pas de surveillance à long terme, pas d'AAP
  - mais prévention FDRCV
- Pour les patients avec une atteinte coronaire persistante à distance
  - Surveillance à vie
  - Traitement AAP selon algorithme
  - Prévention FDRCV
- Pour les patients avec anévrysmes géants persistants
  - Surveillance à vie et contrôle par imagerie régulière
  - Traitement médical : AAP ou biAAP +/- AVK, BB, IEC…
  - Traitement chirurgical ou par cathétérisme
  - Prévention FDRCV

Mc Crindle et al. , Circulation 2017

Conclusion

- MIS-C and Kawasaki disease are two different entities
- MIS-C results from a cytokine storm
- Heart : myocardial edema diastolic then systolic dysfunction
- First-line treatment : IV corticosteroids vs Ig IV
- Rapid resolution of symptoms vs coronary aneuvrism

Merci