

COVID 19 Myocarditis

By

Dr Dan Sado

*Consultant in Cardiology and Cardiovascular MRI Clinical Lead, Kings College Hospital
Honorary Senior Lecturer, Kings College London, UK
Cardiology Co-Lead for Post COVID Syndrome in SE London
Training Programme Director for South Thames Cardiology*



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Outline

- Introduce Myocarditis
- Discuss how we make a clinical diagnosis of Myocarditis
- Discuss COVID Myocarditis in hospital in patients
- Discuss COVID myocarditis in non hospitalised patients

Introduction

- Pre COVID, Myocarditis made up around 0.04% of admissions to hospital in the UK pre COVID.
- It has diverse causes:
 - Infection (usually viral, but can be any type of infection)
 - Drug induced
 - Autoimmune / inflammatory diseases
 - Hormone related

What is Myocarditis and How does it present?

- Heart muscle (Myocardial) inflammation
- In viral disease, most commonly affects younger men
- Typically presents to hospital in 3 ways:
 - New Chest pain (“acute coronary syndrome” like)
 - Heart failure (fluid overloading / shock)
 - Arrhythmia (palpitations / sudden death)
- It can occur with no symptoms in milder forms

Making the Diagnosis in Acute “in Hospital” Presentations

- Blood tests
 - Troponin elevation
- ECG – Often abnormal and often shows ST elevation
- Echocardiogram – Often normal
- Patients will often have a coronary angiogram which would likely show no flow limiting coronary disease
- Where available, cardiovascular magnetic resonance is then the non invasive “test of choice” to make the diagnosis
- Some countries routinely do a cardiac biopsy. Many only do it in severe presentations.

Cardiovascular MRI in Myocarditis

- Fairly new technique (“mainstream” in many 1st world countries in the last 10 years).
- Assessment of:
 - Myocardial T2 pre gadolinium contrast
 - Myocardial T1 pre contrast and Myocardial late enhancement post gadolinium injection with extracellular volume.

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THE PRESENT AND FUTURE

JACC STATE-OF-THE-ART REVIEW

Cardiovascular Magnetic Resonance in Nonischemic Myocardial Inflammation

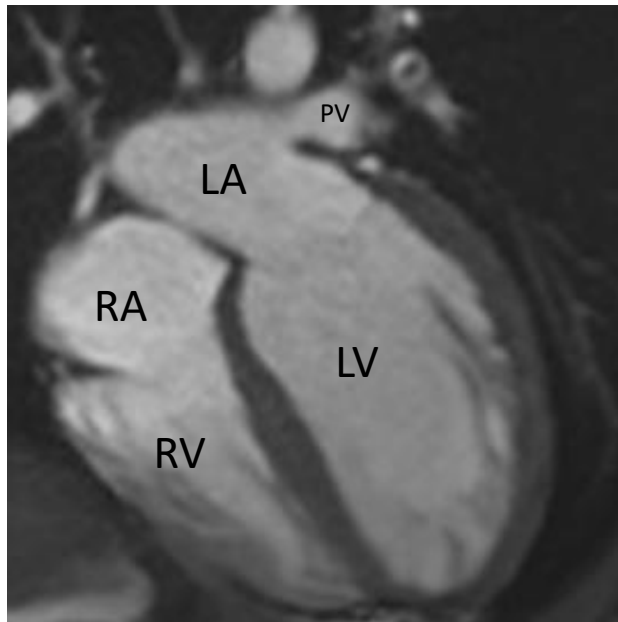
Expert Recommendations

Vanessa M. Ferreira, MD, DPHIL,^a Jeanette Schulz-Menger, MD,^b Godtfred Holmvang, MD,^c
Christopher M. Kramer, MD,^d Iacopo Carbone, MD,^e Udo Sechtem, MD,^f Ingrid Kindermann, MD,^g
Matthias Gutberlet, MD,^h Leslie T. Cooper, MD,ⁱ Peter Liu, MD,^j Matthias G. Friedrich, MD^{k,l,m}

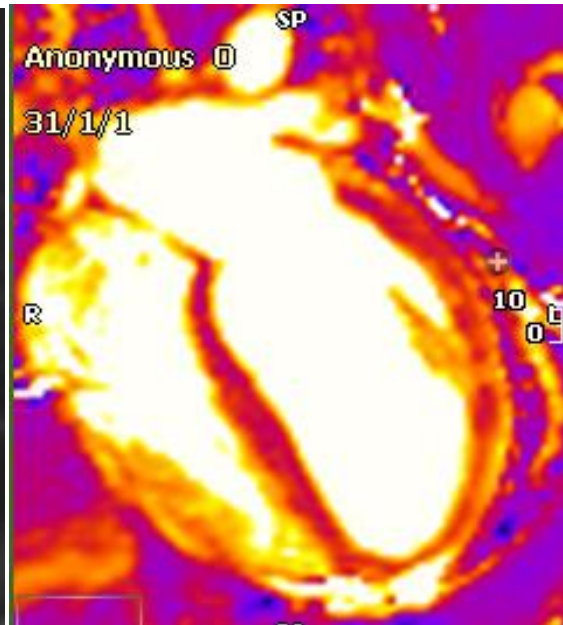


COVID MYOCARDITIS IN HOSPITALISED PATIENTS

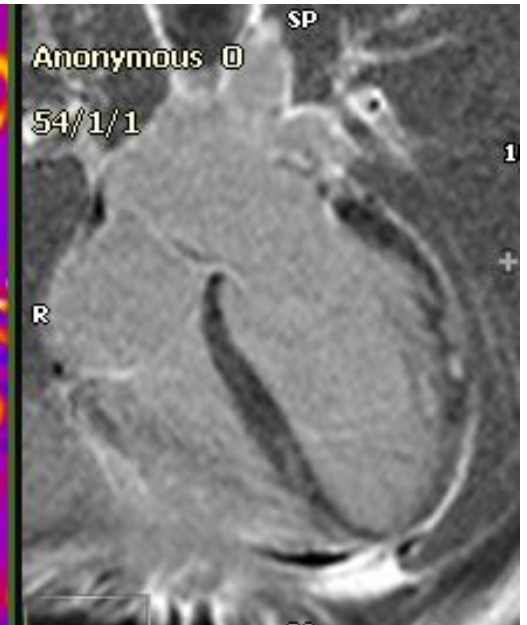
Covid 19 Myocarditis – ACS Presentation with large troponin rise



Cine Image

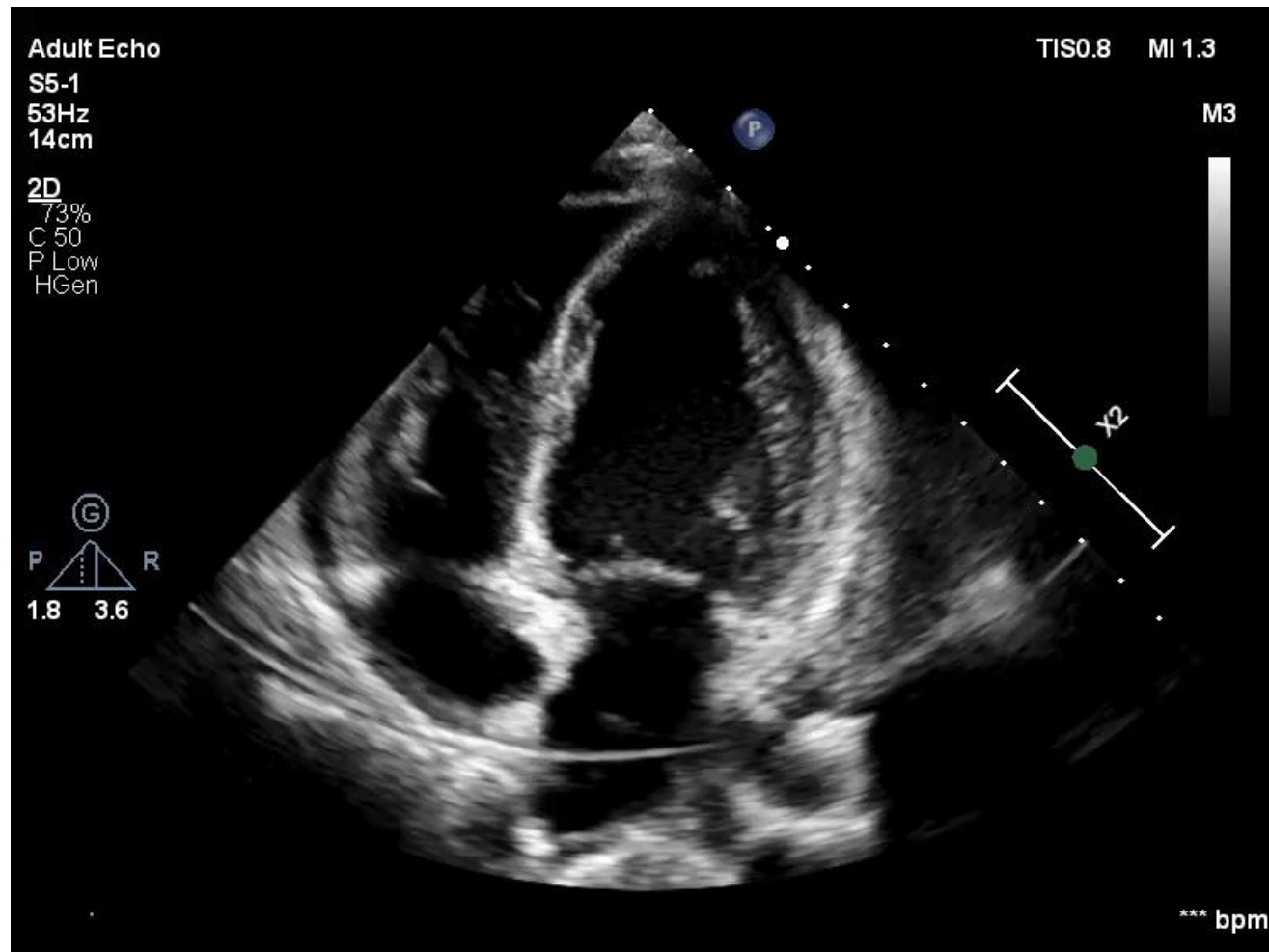


T2: Pre Contrast Inflammatory
Imaging



Post Contrast Inflammatory and
Scar Imaging


Fulminant myocarditis in covid 19 – Cardiogenic Shock



Patterns of myocardial injury in recovered troponin-positive COVID-19 patients assessed by cardiovascular magnetic resonance

Tushar Kotecha^{1 2}, Daniel S Knight^{1 2}, Yousuf Razvi¹, Kartik Kumar³, Kavitha Vimalasvaran³, George Thornton^{2 4}, Rishi Patel^{1 4}, Liza Chacko^{1 4}, James T Brown^{1 2}, Clare Coyle^{3 5}, Donald Leith^{2 4}, Abhishek Shetye^{2 4 6}, Ben Ariff³, Robert Bell^{2 6}, Gabriella Captur^{1 2}, Meg Coleman³, James Goldring¹, Deepa Gopalan³, Melissa Heightman⁶, Toby Hillman⁶, Luke Howard^{3 5}, Michael Jacobs¹, Paramjit S Jeetley¹, Prapa Kanagaratnam^{3 5}, Onn Min Kon^{3 5}, Lucy E Lamb^{1 7}, Charlotte H Manisty^{2 4}, Palmira Mathurdas⁶, Jamil Mayet^{3 5}, Rupert Negus¹, Niket Patel^{1 2}, Iain Pierce⁴, Georgina Russell^{3 5}, Anthony Wolff¹, Hui Xue⁸, Peter Kellman⁸, James C Moon^{2 4}, Thomas A Treibel^{2 4}, Graham D Cole^{3 5}, Marianna Fontana^{1 9}

Discussion

Go to: 

Multi-organ involvement in COVID-19 is recognized, with many patients having troponin release indicative of acute myocardial injury.^{6–11} Here, in a multicentre study across six acute hospitals, we show that myocardial injury during acute COVID-19 infection requiring acute hospital admission is associated with a CMR abnormality in approximately half of patients, with three patterns of injury being observed: non-infarct, myocarditis-pattern injury (27%), ischaemic pathology (22%), and non-ischaemic non-specific scar (5%). Dual pathology with ischaemic and non-ischaemic features was observed in 6%. The different

COVID MYOCARDITIS IN NON HOSPITALISED PATIENTS

JAMA Cardiology | Original Investigation

Outcomes of Cardiovascular Magnetic Resonance Imaging in Patients Recently Recovered From Coronavirus Disease 2019 (COVID-19)

Valentina O. Puntmann, MD, PhD; M. Ludovica Carerj, MD; Imke Wieters, MD; Masja Fahim; Christophe Arendt, MD; Jędrzej Hoffmann, MD; Anastasia Shchendrygina, MD, PhD; Felicitas Escher, MD; Mariuca Vasa-Nicotera, MD; Andreas M. Zeher, MD; Maria Vehreschild, MD; Elke Nagel, MD

CONCLUSIONS AND RELEVANCE In this study of a cohort of German patients recently recovered from COVID-19 infection, CMR revealed cardiac involvement in 78 patients (78%) and ongoing myocardial inflammation in 60 patients (60%), independent of preexisting conditions, severity and overall course of the acute illness, and time from the original diagnosis. These findings indicate the need for ongoing investigation of the long-term cardiovascular consequences of COVID-19.

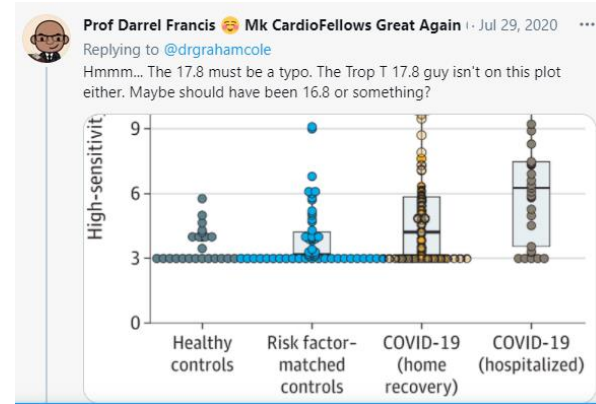
Post covid myocarditis went “viral”

"We did expect high uptake, but we didn't expect that much of a focus," said Eike Nagel, MD, PhD, of University Hospital Frankfurt in Germany, who was the senior author on the German MRI paper. "A lot of papers get downloaded 10 times, maybe 20 times; this paper got downloaded 550,000 times."

Myocarditis is the [top concern around COVID-19 for college athletics](#), due to the risk it poses for cardiac arrhythmia and sudden cardiac death.

HOWEVER....

- Twitter debate...
- Statistics in the paper don't make any sense
- Methodology very odd
- Stats re-done



Venk Murthy @venkmurthy · Jul 29, 2020
Watch @ProfDFrancis & @drgrahamcole unpack impossible stats in recent @JAMACardio on CMR in COVID.
A major correction or even possibly retraction is likely.
Another major issue not covered is the high prevalence of things like moderate to large effusions in the controls. twitter.com/ProfDFrancis/s...

Graham Cole @drgrahamcole · ...
The more I see the less I understand and even @ProfDFrancis can't help. Was the patient in Figure 1 taking part in the study? Figure 1 says they had a Trop T of 17.8pg/mL 78 days after diagnosis. Can anyone show me the point on Figure 3(c) with x=78 and y=17.8?

COVID and CMR Myocardial Involvement

First Author / Yr	Patient Cohort	Controls	Overall LV function	Findings
Puntmann 2020	100 patients 33% hospitalised / 67% Community	Yes (n=50)	Normal	78% abnormal CMR with 60% on going inflammation
Rajpal S 2020	26 College Athletes	No	Normal	15% acute myocarditis and 30% prior myocarditis
Huang 2020	26 Patients	Yes	Normal	54% myocardial oedema and 31% LGE.
Clark 2021	59 Athletes	Yes (athletic and non athletic)	Normal	3% myocarditis
Daniels 2021	1597 Athletes	No	Normal	0.31% clinical myocarditis 2.3% if add CMR to work up
Joy 2021	149 HCPs	Yes	Normal	No difference between controls and patients

Why Has this Divergence in Findings Happened? – This is an Opinion Slide..

- Changes in mindset
- Limitations using T1 and T2 mapping MRI techniques in:
 - Milder disease with lower pre test probability
 - Younger patients, particularly females
 - Faster heart rates
 - Focal disease

Conclusions

- Myocarditis has many causes including COVID 19.
- Around 27% of COVID in patients with a positive troponin will have myocarditis.
- Community COVID myocarditis incidence is unclear with very divergent data to date.
- The majority of patients appear to have a good prognosis with COVID myocarditis.