

Acute coronary artery thrombosis presenting as asymptomatic ST-elevation myocardial infarction in a patient with COVID-19 pneumonia

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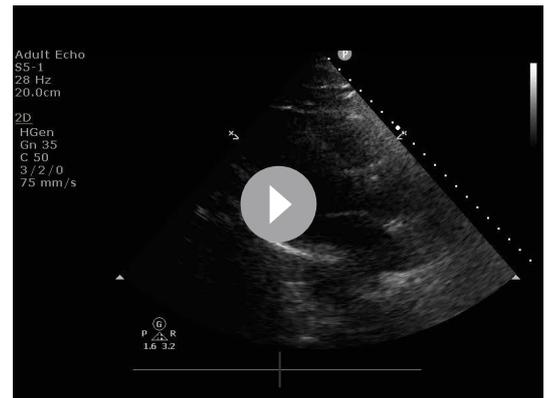
Accepted 12 February 2021

DESCRIPTION

A 55-year-old man with no cardiovascular comorbidities was admitted to the intensive care unit (ICU) with severe COVID-19 pneumonia requiring ventilatory support. Blood results showed a white cell count of $7.39 \times 10^9/L$ (normal $4-11 \times 10^9/L$), a d-dimer level of 1392 ng/mL (normal $<500 \text{ ng/mL}$), a C reactive protein concentration of 60 mg/L (normal $<5 \text{ mg/L}$) and a high-sensitivity troponin-T (hsTnT) level of 4 ng/L (normal $<14 \text{ ng/L}$). An ECG was normal, and a CT pulmonary angiogram (CTPA) showed interstitial changes typical of COVID-19 pneumonia with no pulmonary embolus. He was treated with ceftriaxone 2 g once a day, dexamethasone 6 mg once a day and tinzaparin 5000 units two times per day.

On day 5 of his ICU admission (day 13 of COVID-19 symptoms), a routine 12-lead ECG identified new ischaemic changes in keeping an acute inferior ST-elevation myocardial infarction (STEMI) (figure 1). The patient denied chest pain. Echocardiography demonstrated a basal-inferior regional wall motion abnormality with impaired left ventricular systolic function (video 1) and an hsTnT was elevated at 333 ng/L . Emergency invasive coronary angiography showed extensive thrombosis of the right coronary artery (RCA) with distal thrombus embolisation (figure 2; video 2). The left anterior descending and left circumflex arteries were normal.

At the time of angiography, there was Thrombolysis in Myocardial Infarction (TIMI) grade 3 flow beyond the RCA thrombus. Given the risk of thrombotic embolisation, we elected not to instrument the vessel or proceed to thrombus aspiration or angioplasty. While intravascular imaging was not used, the angiographic appearances with a lack of coronary atheroma in the culprit vessel and the absence of bystander disease in this patient with no



Video 1 Parasternal long axis view demonstrating basal-inferior regional wall motion abnormality.

cardiovascular risk factors suggested that this was not plaque rupture.

The patient was initiated on combination anti-thrombotic therapy including ticagrelor, aspirin, intravenous glycoprotein IIb/IIIa inhibitor and intravenous unfractionated heparin. He returned to ICU for ongoing respiratory support and remained pain free with further echocardiography demonstrating improvement in left ventricular systolic function.

To the best of our knowledge, this is the first reported case of asymptomatic thrombotic STEMI

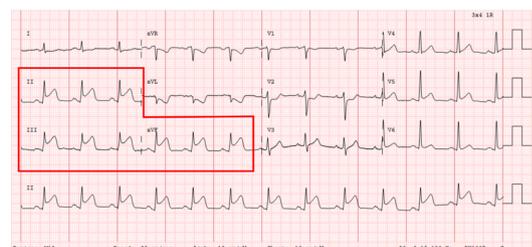


Figure 1 12-Lead ECG demonstrating inferior territory ST-segment elevation (leads II, III and aVF, highlighted in red box) with high-lateral (I and aVL) reciprocal changes.



Figure 2 Coronary angiogram of the right coronary artery in the left anterior oblique projection. Thrombotic coronary debris highlighted with black arrow. Loss of distal right coronary perfusion highlighted with black asterisks.



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To cite: Bussmann BM, Shabbir A, Warwick A, et al. *BMJ Case Rep* 2021;**14**:e241856. doi:10.1136/bcr-2021-241856



Video 2 Cine coronary angiogram of the right coronary artery demonstrating thrombotic debris.

in a patient with COVID-19. COVID-19 is associated with increased incidence of venous and arterial thrombosis, including coronary artery thrombosis in patients with no underlying cardiovascular risk factors.^{1,2} Furthermore, STEMI in patients with COVID-19 is associated with high thrombus burden and poorer overall outcomes.³ While the European Association of Percutaneous Cardiovascular Interventions advises emergency reperfusion in STEMI with COVID-19,⁴ the optimal strategy to manage coronary thrombosis in the absence of plaque rupture is yet to be determined.

Thrombus aspiration, angioplasty with drug eluting stents and thrombolytic therapy have been used with success.² Here, we elected not to cross the lesion with a wire or use intravascular imaging owing to potential embolisation. Thrombotic complications of COVID-19 in the absence of atherosclerosis may result from vascular endotheliitis or platelet dysfunction,⁵ but the mechanism by which this results in cardiac injury current and ST-segment elevation without symptoms remains unknown. We advocate a high index of suspicion for cardiac involvement in patients with COVID-19 regardless of symptoms and

recommend regular ECGs. Second, we demonstrate that a conservative approach in stable patients with thrombotic STEMI and COVID-19 may be considered an alternative to percutaneous coronary intervention.

Learning points

- ▶ COVID-19 may be associated with coronary artery thrombosis in the absence of underlying atherosclerosis or plaque rupture.
- ▶ Acute thrombotic myocardial infarction in COVID-19 may be asymptomatic, warranting routine 12-lead ECG for hospitalised patients.
- ▶ There is no clear evidence-based treatment strategy for the management of thrombotic ST-elevation myocardial infarction associated with COVID-19. Reperfusion decisions should be made on a case-by-case basis with cardiology input.

Contributors BMB and AS: drafted the manuscript. BMB, AS, AW and WO: involved in the editing and proof reading of the manuscript for final submission. All authors certify that they have participated sufficiently in the work to take public responsibility for the content in line with criteria set out.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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REFERENCES

- 1 Klok FA, Kruip MJHA, van der Meer NJM, *et al.* Incidence of thrombotic complications in critically ill ICU patients with COVID-19. *Thromb Res* 2020;191:145–7.
- 2 Kelham M, Choudry FA, Hamshere S, *et al.* Therapeutic implications of COVID-19 for the interventional cardiologist. *J Cardiovasc Pharmacol Ther* 2020;1074248420982736:1074248420982736.
- 3 Choudry FA, Hamshere SM, Rathod KS, *et al.* High Thrombus Burden in Patients With COVID-19 Presenting With ST-Segment Elevation Myocardial Infarction. *J Am Coll Cardiol* 2020;76:1168–76.
- 4 Chieffo A, Stefanini GG, Price S, *et al.* EAPCI position statement on invasive management of acute coronary syndromes during the COVID-19 pandemic. *Eur Heart J* 2020;41:1839–51.
- 5 Libby P, Lüscher T. COVID-19 is, in the end, an endothelial disease. *Eur Heart J* 2020;41:3038–44.

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