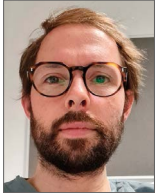
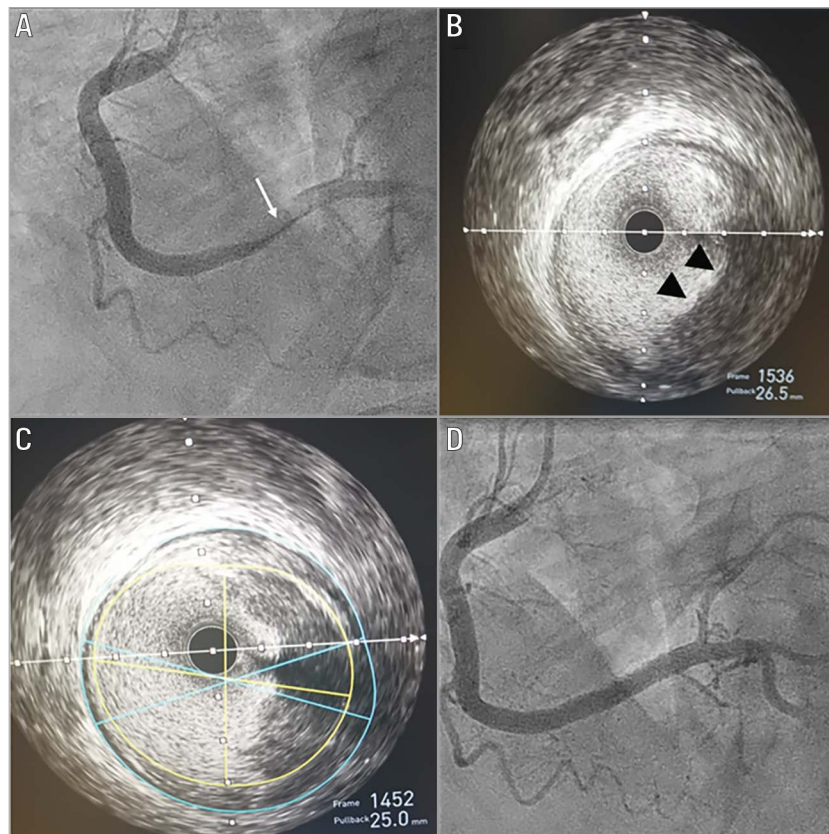


# Coronary thrombosis in a patient with COVID-19 and haemophagocytic lymphohistiocytosis



Luke H. Dancy<sup>1,2</sup>, MBBS, MRCP; Huda Abu-Own<sup>1,2</sup>, MBBS, MRCP;  
Jonathan Byrne<sup>1,2</sup>, PhD, FRCP; Nilesh Pareek<sup>1,2\*</sup>, MA, MBBS, MRCP

1. King's College Hospital NHS Foundation Trust, London, United Kingdom; 2. School of Cardiovascular Medicine & Sciences, BHF Centre of Excellence, King's College London, London, United Kingdom



**Figure 1.** Extensive right coronary artery thrombosis associated with COVID-19. A) Angiogram of the right coronary artery showing large thrombus (arrows) with subtotal occlusion of the distal vessel. B) & C) Intravascular ultrasound of the same vessel showing fresh thrombus (arrowheads) with a minimal lumen area of 21.7 mm<sup>2</sup> and only 29% plaque burden (C). D) Coronary angiography following successful PCI to the distal vessel but with distal thrombotic pruning.

\*Corresponding author: School of Cardiovascular Medicine and Sciences, BHF Centre of Excellence, King's College, Strand, London, WC2R 2LS, United Kingdom. E-mail: [nileshpareek@nhs.net](mailto:nileshpareek@nhs.net)

A 51-year-old male with hypertension, established type 2 diabetes mellitus and hypercholesterolaemia presented with acute respiratory distress syndrome. A chest radiograph showed bilateral infiltrates, and a real-time polymerase chain reaction nasopharyngeal swab was positive for severe acute respiratory syndrome Coronavirus 2. This was initially complicated by pulmonary embolism, apical pneumothorax and pneumomediastinum as a result of ventilation-induced barotrauma. After a four-day intensive care unit (ICU) stay at a local hospital, he developed chest pain with inferior ST-segment elevation and was transferred for percutaneous coronary intervention (PCI).

Coronary angiography revealed smooth vessels, but the right coronary artery demonstrated large thrombus with subtotal occlusion of the distal vessel (**Figure 1A**, arrow). Thrombectomy was undertaken extracting white and red thrombus. Intravascular ultrasound (IVUS) confirmed the presence of extensive fresh thrombus with minimal atheroma (minimal lumen area 21.7 mm<sup>2</sup>) and plaque burden of 29% with no evidence of rupture (**Figure 1B**, arrowheads, **Figure 1C**). PCI was performed successfully but with residual thrombotic pruning of the distal vessel (**Figure 1D**). The post-procedural ICU course was complicated by the development of secondary haemophagocytic lymphohistiocytosis (HLH) (ferritin 42,000 ug/L, AST 18,000 IU/L, fibrinogen 3.6 g/L, platelets 91[10<sup>9</sup>/L]), a hyperinflammatory syndrome characterised by fulminant hypercytokinaemia and multiorgan failure for which he required anti-IL-6 therapy with tocilizumab.

We present a case of COVID-19 with extensive thrombus in a coronary artery with minimal atherosclerotic disease. Although plaque erosion cannot be completely ruled out using IVUS, the association of a prothrombotic and hyperinflammatory state with COVID-19, particularly with concomitant HLH, implicates these processes pathophysiologically. In particular, endothelial dysfunction and Von Willebrand factor activation have been observed with COVID-19 infection and may reflect the underlying mechanism<sup>1</sup>. To our knowledge, this is the first case of COVID-19-related *in situ* thrombosis imaged using intravascular imaging techniques.

## Funding

This work was part funded by a King's College Hospital R&D Grant and was supported by the Department of Health via a National Institute for Health Research Biomedical Research Centre award to Guy's & St Thomas' NHS Foundation Trust in partnership with King's College London and King's College Hospital NHS Foundation Trust.

## Conflict of interest statement

The authors have no conflicts of interest to declare.

## Reference

1. Ciceri F, Beretta L, Scandroglio AM, Colombo S, Landoni G, Ruggeri A, Peccatori J, D'Angelo A, De Cobelli F, Rovere-Querini P, Tresoldi M, Dagna L, Zangrillo A. Microvascular COVID-19 lung vessels obstructive thromboinflammatory syndrome (MicroCLOTS): an atypical acute respiratory distress syndrome working hypothesis. *Crit Care Resusc.* 2020;22:95-7.