

Prosthetic aortic valve endocarditis complicated by COVID-19 and hemorrhage

Azhar Hussain MRCS  | Neil Roberts FRCS (CTh) | Aung Oo FRCS (CTh)

Department of Cardiac Surgery, St.
Bartholomew's Hospital, London, UK

Correspondence

Azhar Hussain, MRCS, Department of Cardiac
Surgery, St. Bartholomew's Hospital, W
Smithfield, London EC1A 7BE, UK.
Email: azharhussain@nhs.net

Abstract

The novel coronavirus, now termed SARS-CoV-2, has caused a significant global impact in the space of 4 months. Almost all elective cardiac surgical operations have been postponed with only urgent and emergency operations being considered in order to maximise resource utilisation. We present a case of a 69-year old lady with an infected prosthetic aortic valve for consideration of urgent inpatient surgery. Despite being asymptomatic and testing negative initially for COVID-19 RT-PCR swab, further investigations with CT revealed suspicious findings. She subsequently tested positive on a repeat swab and unfortunately deteriorated rapidly with complications including gastro-intestinal and intracerebral haemorrhage.

KEYWORDS

cardiac surgery, COVID-19, endocarditis

1 | CASE REPORT

On 17 March 2020, a 69-year-old lady presented to the Emergency Department feeling generally unwell with a cough. She reported a 1-week history of fevers associated with shortness of breath. Blood cultures taken on admission revealed *Staphylococcus aureus* on culture and she initially tested negative for coronavirus disease 2019 (COVID-19) on an oronasopharyngeal reverse transcriptase-polymerase chain reaction (RT-PCR) swab test at the referring institution. The patient was febrile (38.4°C) with a heart rate of 84. She was saturating at 96%, a respiratory rate of 18, with no supplemental oxygen and clinically very stable from a respiratory point of view. Physical examination was unremarkable except for an ejection systolic murmur. There was no clinical evidence of heart failure. She was transferred to our institution for surgical management a week later.

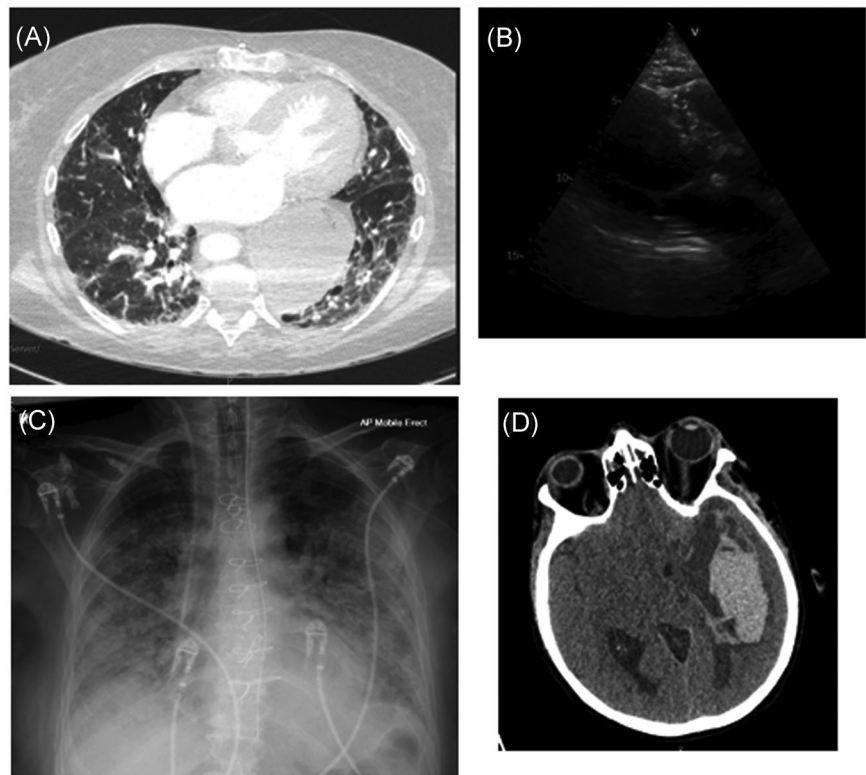
Her past medical history is significant for a tissue aortic valve replacement in 2012 (23 mm Hancock II porcine valve), recently diagnosed impairment of ejection fraction (January 2020) of 40% while under valve surveillance and chronic back pain.

2 | MANAGEMENT AND INVESTIGATIONS

She was started on intravenous (IV) antibiotics (gentamicin 70 mg and flucloxacillin 2 g) to treat suspected infected endocarditis at the referring hospital. Initial transthoracic echocardiogram revealed a normal functioning and well seated aortic valve replacement with a reduced (40%) left ventricular ejection fraction. Repeat transesophageal echocardiography a week later revealed vegetations on all three cusps, with no significant aortic regurgitation, but suspicious appearances of an early root abscess. Computed tomography (CT) on presenting admission revealed a heavily calcified prosthetic aortic valve with low attenuation material around the root with a mass effect on the anterior wall of the left atrium. She was subsequently transferred to the regional cardiac surgery center for consideration of a redo aortic valve operation. Due to the unprecedented COVID-19 pandemic, our institution mandated that all hospital transfer patients for consideration of surgery receive a repeat COVID-19 swab test as well a repeat CT thorax on arrival.¹

On initial clinical assessment at our institution, she remained clinically well with no respiratory compromise. There was no orthopnea or shortness of breath on exertion. She was provisionally

FIGURE 1 A, CT chest showing early signs supportive of COVID-19 pneumonia when the patient was COVID-19 swab negative and clinically stable. B, Transthoracic echocardiogram on day 7 after admission to our institution. C, CXR showing widespread infiltrative changes on day 10, intubated and ventilated. D, CT head on day 18 of admission before death. COVID-19, coronavirus disease 2019; CT, computed tomography; CXR, chest X-ray



placed on an urgent operating list for a redo aortic valve replacement pending our mandatory investigations.

Unfortunately, she tested *positive* for the routine RT-PCR nasopharyngeal swab for COVID-19 at our institution on admission. She underwent a routine CT thorax which demonstrated widespread bilateral reticular enhancement of the lung parenchyma (see Figure 1) not seen at her referring institutions CT. An urgent heart team meeting involving cardiology, anesthesiology, and cardiac surgeons unanimously agreed that operating in a COVID-19 positive patient with evidence of radiological respiratory compromise would constitute a high-risk approach despite being clinically stable. This was on the basis that COVID-19 is, as of yet, an unknown disease entity and the outcomes of emergent cardiac surgery in a clinically stable patient is unpredictable.

Initial management involved continuing IV antibiotics and she remained stable clinically without respiratory compromise. Unfortunately, 4 days after admission to our hospital, she had a significant hemoglobin drop to 47 g/L (baseline of 95 g/L). She underwent urgent oesophagogastroduodenoscopy after transfusion, which revealed a bleeding point and a Dieulafoy's lesion in the second part of the duodenum. Adrenaline and a clip were deployed to the lesion with good effect and she was started on IV pantoprazole. She had no previous history of gastrointestinal (GI) bleed.

Her oxygen requirements progressively increased and she was intubated 9 days after her positive swab. Serial bedside echocardiography showed no significant cardiac changes to her baseline function from admission. She developed fast atrial fibrillation (rate 120) controlled by IV amiodarone and anticoagulated with low

molecular weight heparin. Unfortunately, her pneumonia got significantly worse with multiorgan failure including severe acute kidney injury requiring heparin for renal replacement therapy. She developed an acute dilated left pupil on day 17. CT head revealed a large acute intracerebral hematoma, with an appearance possibly secondary to the heparin, and midline shift. She died 18 days after her admission to our hospital.

3 | DISCUSSION

The novel coronavirus, now termed severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has caused a significant global impact on the economy, politics, and health in the space of 4 months. COVID-19 (the clinical syndrome from the virus) has been declared a pandemic by the World Health Organization. In most cases, fever is the most common presenting symptom followed by cough.² The natural disease process can be complicated by acute respiratory distress syndrome, multiorgan failure, and ultimately death. The prevalence of COVID-19 in patients with underlying cardiovascular disease is under-reported with evidence that pre-existing cardiac disease can render patients more vulnerable to the disease process.³ We report the first case of active prosthetic valve endocarditis complicated by COVID-19.

Establishing a diagnosis of COVID-19 using RT-PCR is not without its limitations. The availability of testing, clinical suspicion complicated by active endocarditis and a high false-negative rate with the current test have made it difficult to diagnose in a timely

fashion.⁴ Initial swab test was negative at the referring institution, which raises concerns that this may have been a false negative result. However, contact with multiple health workers and the inter-hospital transfer itself may have inadvertently exposed her to iatrogenic COVID-19 contraction. Given the patient's clinical history and presentation, it is likely that the endocarditis almost certainly preceded COVID-19, rather than COVID-19 complicated by endocarditis.

CT thorax changes may even precede RT-PCR findings and clinical signs of COVID-19 as alluded to in a recent study; the inclusion of CT thorax has now become part of routine preoperative cardiac surgical workup in our institution during this pandemic.⁵ The standard of treatment in active prosthetic valve endocarditis with suspicion of a developing aortic root abscess almost always necessitates surgical replacement. The CT findings, however, played an instrumental role in the heart team's decision to continue medical therapy initially, as the effects of COVID-19 pneumonia on bypass followed by mechanical ventilation during recovery are unknown. In hindsight, this was most likely the correct decision given that the patient deteriorated ultimately from respiratory COVID-19 complications rather than a cardiac complication.

Recent studies from Wuhan, China, have suggested that COVID-19 could also manifest in significant abnormal coagulation parameters, particularly longer prothrombin (PT) and activated partial thromboplastin (APTT) times.⁶ In contrast, during the SARS-CoV-1 epidemic of 2014, a higher risk of vessel thrombosis predisposed to a worse prognosis, and patients were routinely anticoagulated, a theme which is continuing in current patients with COVID-19. Our patient had mildly elevated APTT (35 seconds) with normal PT values throughout and it is unlikely that these would have caused her sudden GI bleed. More likely, it was a stress injury that precipitated an acute rupture from an existing Dieulafoy's lesion, a well-documented phenomenon in patients with acute hospitalization.⁷ She was started on IV heparin post endoscopy for atrial fibrillation and subsequent requirement for renal replacement therapy. It is postulated that her acute intracerebral bleed is likely secondary to heparin therapy (based on the CT report) and possibly an as yet unknown clinical disease manifestation of COVID-19.

Our case highlights important facets of managing complex cardiac surgical patients during this pandemic. First, patients who fall into the high-risk surgical category should be discussed at an extended heart team meeting particularly during this crisis. We involved radiologists in these discussions due to the addition of

routine CT to help clarify image interpretation, which was done remotely via video conferencing of all specialists. This proved invaluable in our case where the patient initially tested negative for COVID-19. Second, it is important to be vigilant about the extra-cardiac clinical manifestations of COVID-19, whether specific or nonspecific to the COVID-19 disease process. The role of cardiac surgery and bypass in active COVID-19 infection is still yet to be determined and further studies are clearly needed to determine the right approach.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

ETHICS STATEMENT

Individual consent was obtained from each patient. Local institutional ethical processes were followed.

ORCID

Azhar Hussain  <http://orcid.org/0000-0003-3941-4553>

REFERENCES

1. SCTS. SCTS cardiothoracic practice during Covid-19 outbreak. 2020. <https://scts.org/scts-cardiothoracic-practice-during-covid-19-outbreak/>. Accessed 20 April 2020.
2. Guan W, Ni Z, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020. <https://doi.org/10.1056/NEJMoa2002032>
3. Khan IH, Zahra SA, Zaim S. At the heart of COVID-19. *J Card Surg*. 2020. <https://doi.org/10.1111/jocs.14596>
4. Li Y, Yao L, Li J, et al. Stability issues of RT-PCR testing of SARS-CoV-2 for hospitalized patients clinically diagnosed with COVID-19. *J Med Virol*. 2020. <https://doi.org/10.1002/jmv.25786>
5. Xie X, Zhong Z, Zhao W, Zheng C, Wang F, Liu J. Chest CT for typical 2019-nCoV pneumonia: relationship to negative RT-PCR testing. *Radiology*. 2020. <https://doi.org/10.1148/radiol.2020200343>
6. Tang N, Li D, Wang X, Sun Z. Abnormal coagulation parameters are associated with poor prognosis in patients with novel coronavirus pneumonia. *J Thromb Haemost*. 2020;18:844-847.
7. Baxter M, Aly EH. Dieulafoy's lesion: current trends in diagnosis and management. *Ann R Coll Surg Engl*. 2010;92:548-554.

How to cite this article: Hussain A, Roberts N, Oo A. Prosthetic aortic valve endocarditis complicated by COVID-19 and hemorrhage. *J Card Surg*. 2020;35:1348-1350. <https://doi.org/10.1111/jocs.14643>