

Community acquired COVID-19 related complications after coronary artery bypass grafting.

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Abstract

Many hospitals will continue to see a surge in COVID-19 cases and halt of elective cases, while others pass the surge and begin to restart elective surgeries. Regardless of the phase each hospital encounters, the safety of both patients and staff must be taken into account.^{1,2} This case report describes a patient who underwent urgent coronary artery bypass grafting (CABG) at the beginning of the COVID-19 surge. The initial postoperative course was uneventful and the patient was discharged on postoperative day 4. The patient presented nearly two weeks later with a subsequent severe COVID-19 infection complicated by STEMI and stroke. This case not only demonstrates the risks and potential complications of caring for cardiac surgery patients during the COVID-19 pandemic, it is the only known reported case of a patient developing severe COVID-19 infection after a CABG resulting in STEMI and stroke due to hypercoagulable state associated with COVID-19.

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ABSTRACT

Many hospitals will continue to see a surge in COVID-19 cases and halt of elective cases, while others pass the surge and begin to restart elective surgeries. Regardless of the phase each hospital encounters, the safety of both patients and staff must be taken into account.^{1,2} This case report describes a patient who underwent an urgent CABG at the beginning of the COVID-19 surge. The initial postoperative course was uneventful and the patient was discharged on postoperative day 4. The patient presented nearly two weeks later with a subsequent severe COVID-19 infection complicated by STEMI and stroke. This case not only demonstrates the risks and potential complications of caring for cardiac surgery patients during the COVID-19 pandemic, it is the only known reported case of a patient developing severe COVID-19 infection after a CABG resulting in STEMI and stroke due to hypercoagulable state associated with COVID-19.

CASE REPORT

Informed consent was obtained from the patient for publication of this case report and any accompanying images and was approved by the New York Presbyterian-Queens Institutional Review Board.

A 60 year-old male with hypertension, hyperlipidemia, non-insulin dependent diabetes, initially with unstable angina and associated dyspnea. Catheterization revealed severe triple vessel coronary artery disease. The following day he underwent an urgent three-vessel CABG (left internal mammary to left anterior descending, and separate saphenous vein grafts to posterior descending and first circumflex marginal). The postoperative echocardiogram showed normal ventricular function. His postoperative course was uncomplicated and he was discharged on postoperative day 4. Thirteen days following discharge he presented the emergency department with 4 days of progressive shortness of breath associated with a productive cough and intermittent blood tinged sputum. He denied any chest pain on presentation. His vital signs were significant for mild tachycardia and hypoxia requiring a 100% nonrebreather mask to obtain a saturation of 97%. Admission electrocardiogram (EKG) showed anterior and inferior ischemia with ST elevations (Figure 1). Pertinent laboratory blood work showed initial troponin-t of 0.537 ng/ml with a peak of 4.1 ng/ml, a D-Dimer of 11,344 ng/ml, and a C-reactive protein 5.55 mg/dl. A chest radiograph revealed bilateral pulmonary infiltrates typically seen with COVID-19 (Figure 2). His presentation to the ED occurred at the very beginning of the COVID-19 surge. Given his community risk of exposure to COVID-19 in Queens, NY, a SARS-CoV-2 RT PCR was performed and detected the presence of the virus. A transthoracic echocardiogram demonstrated new severe left ventricular global hypokinesis with akinesis in the basal inferior and inferolateral segments. The estimated ejection fraction was 20%.

He was started on intravenous heparin and dual antiplatelet therapy (with aspirin and clopidogrel) for the STEMI for high suspicion of a COVID-19 associated hypercoagulable state. Given the patient's hemodynamic stability, absence of chest pain, and scarcity of resources during the initial COVID-19 surge, a cardiac catheterization was deferred. During the early period of the initial COVID-19 surge, his treatment included a five-day course of hydroxychloroquine and azithromycin with close monitoring for hypoxia with supplemental oxygen as needed.

The patient's subsequent hospital course over the next week was complicated by ventricular tachycardia requiring electrical cardioversion and subsequent paroxysmal atrial fibrillation. The patient continued treatment with heparin anticoagulation and dual antiplatelet therapy. Despite therapeutic anticoagulation his hospital course was further complicated by emboli to his toes and a left hemiparesis. Computerized axial tomography and magnetic resonance imaging of the brain were consistent with acute embolic infarcts involving both cerebellar hemispheres, right thalamus, left temporal lobe and both occipital/frontal and parietal lobes. A repeat echocardiogram was performed which ruled out both apical and left atrial thrombus.

Repeat imaging showed no hemorrhagic conversion of the stroke allowing for transition to oral anticoagulation for his atrial fibrillation. The patient continued to require supplemental oxygenation and hospital admission. He remained asymptomatic from his STEMI, with residual left sided motor weakness. He continued to work with physical and speech therapy and was discharged to a skilled nursing facility on hospital day 45. Two months following discharge he was noted to have made a near full recovery. He is ambulatory without assistance. Transthoracic echocardiogram demonstrated an ejection fraction of 40% with inferior hypokinesis.

DISCUSSION

Whether the initial surge in COVID-19 patients has subsided and hospitals expand their operative caseloads or there is a subsequent increase in COVID-19 cases, there will inevitably be some degree of COVID transmission within healthcare setting and community. Surgeons should be cognizant of the prevalence of COVID-19 in their community and institution, and include it in their differential should postoperative complications arise.^{3,4,5} In our case report, the patient recovered from an uncomplicated CABG but experienced severe sequelae of COVID-19 disease.

On presentation to the emergency department, the patient was found to have a STEMI. Given his high risk of exposure to COVID-19 and absence of chest pain at the peak of the pandemic he was treated medically. Other stricken localities have experienced similar decision making processes.⁶

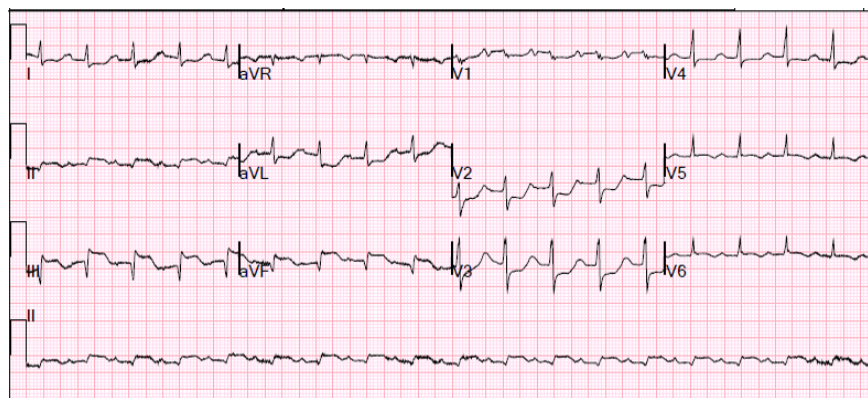
The patient was found to have elevated d-dimers, a marker of a hypercoagulable state, which is consistent with reports of severe hypercoagulability seen in COVID-19.^{7,8} While there have been reports of patients contracting COVID-19 after undergoing CABG, our case demonstrates the first report of thrombotic complications due to COVID-19 in a patient after CABG.⁴

Our patient's hypercoagulable state may have predisposed him to graft thrombosis leading to a STEMI. Other causes of STEMI have been reported in patients with COVID-19 including direct viral entry through the angiotensin-converting enzyme 2 receptor leading to cellular toxicity, hypoxic related myocyte injury and immune-mediated cytokine storm.⁹ His presentation with a STEMI is likely to be multifactorial, however without a catheterization we are unable to confirm if this was due to graft/native vessel thrombosis or direct myocyte injury.

Our patient's hospital course was complicated by other events that may be attributed to the hypercoagulable state associated with COVID-19. He experienced an acute embolic stroke with residual left hemiparesis and blue toes thought to be due to microthrombi. The events occurred despite being fully anticoagulated with heparin. Possible sources of the emboli are the brief episode of atrial fibrillation or the formation of thrombi in the hypokinetic left ventricle in combination with hypercoagulable diathesis.

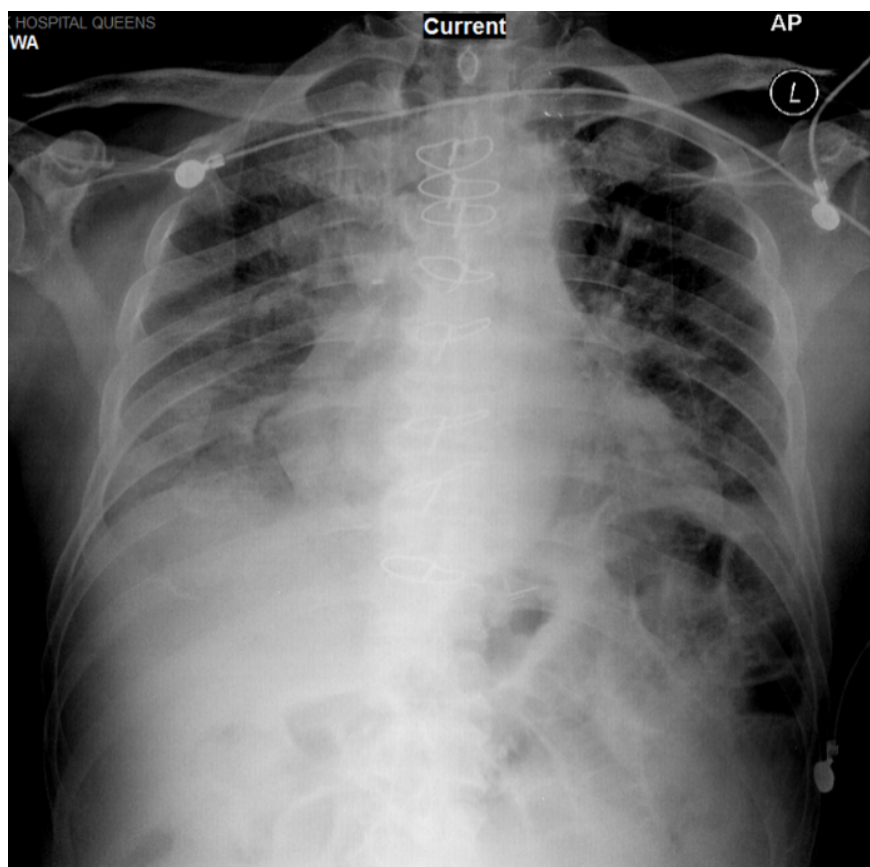
As hospitals begin to transition back to an increased operative case load, surgeons will have to be aware of both community and hospital acquired COVID-19 infection. In addition, they should be cognizant of the potential thrombotic sequelae of COVID-19 in patients undergoing CABG. With relation to cardiac surgery outcome and quality reporting, COVID-19 may affect publicly reported patient outcomes and may require new risk adjustments.

Figure 1



Admission EKG showing inferior lead ST elevation and anterior/septal ST depression

Figure 2



Chest radiograph demonstrating bilateral pulmonary infiltrates typically seen with COVID-19

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