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Experience with Circulatory Arrest for an Acute Aortic Syndrome in a Covid 19 Patient

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Abstract

The physiology of Covid 19 and its interaction with common medical conditions and procedures is only beginning to be understood. We present a case of a woman with an acute aortic rupture who required cardiopulmonary bypass with deep hypothermic circulatory arrest. She had no respiratory issues related to Covid, but her post op course was notable for refractory status epilepticus and it is unclear if Covid 19 may have had played a role in exacerbating neurologic injury.

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Running Head: Circulatory Arrest and Covid

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No disclosures or conflicts of interest

This was not a study so IRB approval was not applicable, and no study consent was needed. Informed consent was obtained from patient in the usual fashion via paper institutional procedural consent form.

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Abstract-

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Introduction-

The COVID-19 pandemic has affected every facet of life around the world and has placed an enormous burden on the delivery of healthcare. Although much about this illness has been discovered over the past few months, its potential effect on recovery from cardiopulmonary bypass remains unstudied. We present a case of emergent repair of an ascending aortic rupture requiring circulatory arrest in a patient with COVID-19 infection.

Case Report-

The patient is a 69-year-old woman with a past medical history notable only for remote endovascular embolization of an intracerebral aneurysm. She presented to an outside hospital after syncope while grocery shopping. On arrival she was hypotensive and tachycardic, and a CT scan of the chest demonstrated a free aortic rupture with an associated intramural hematoma in the ascending aorta as well as a large pericardial effusion (Figure 1). Aortic arch anatomy was normal. After partial resuscitation she was transferred to our institution. Despite denying dyspnea, fevers, cough or any other symptoms suspicious for viral illness, she tested positive for COVID-19 via nasal swab PCR at the outside facility, and we were notified of this result as she was en-route to our center. He CT did not demonstrate any infiltrates suspicious for viral infection.

On arrival the patient was mentating, but mottled and hemodynamically unstable requiring norepinephrine 50 mcg/min to maintain a systolic blood pressure of 60 mmHg. Given her presentation, she was emergently taken to the operating room. The patient was prepped and draped awake, and cardiopulmonary bypass was established via the femoral vessels prior to induction of anesthesia. After successful intubation, the chest was entered. Large amounts of mediastinal blood and clot were evacuated and the rupture site was controlled with packing behind the base of the ascending aorta. Cooling was immediately initiated and the ascending aorta was replaced with a 24 mm woven vascular tube graft under deep hypothermic circulatory arrest at 18 degrees Celsius. No antegrade or retrograde cerebral perfusion was used. Circulatory arrest time was 26 minutes, and total cardiopulmonary bypass time was 161 minutes. The patient separated from bypass with minimal inotropic support, displayed no significant coagulopathy and had no difficulty with oxygenation or ventilation. Postoperatively, the patient remained on minimal ventilator settings (30% FiO2 and PEEP 5) with an unremarkable chest radiograph (Figure 2). Her barrier to extubation, however, was seizure activity documented by continuous electroencephalogram monitoring which required four anti-epileptic agents in order to achieve suppression. Multiple head CT scans were unrevealing, and MRI of the brain showed only punctate micro-hemorrhages that our neurologists felt were related to her aortic operation and likely not causative of her seizures. She eventually regained a normal mental status and a non-focal neurological examination and was discharged to a long-term care facility.

Comment

We believe that this case represents the first reported successful repair of a free aortic rupture in a COVID-19 positive patient. This patient presented in extremis and required emergency surgical therapy in accordance with the recently published triage guidelines related to COVID-19 status[1] .

An aortic center in the United States has reported a similar case of aortic dissection in a patient who was suspected (but not confirmed) to be COVID-19 positive prior to admission[2]. The patient was repaired in a similar manner as ours, but unfortunately developed respiratory failure and progressive multi system organ failure postoperatively, ultimately leading to their demise. Our patient did not show any evidence of postoperative respiratory dysfunction despite their known COVID-19 infection.

Our patient did suffer considerable morbidity due to status epilepticus. While we have no definite evidence that seizures were a result of Covid in this patient, there are reports in the literature of COVID-19 invading the central nervous system and subsequently causing neurologic injury manifesting as seizures[3]. It may be that the known deleterious effects of cerebral ischemia, despite hypothermia, meticulous deairing and

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acid/base management during cardiopulmonary bypass may be exacerbated by viral-mediated neurologic injury. Based on our single-case experience we recommend surgeons remain vigilant for seizure activity in these patients.

Finally, is it possible that COVID-19 predisposes patients to developing acute aortic syndromes? The anecdotal decrease in the number of patients presenting to hospitals with acute aortic pathologies during this pandemic would suggest not, but this is thought to be due to the reluctance of symptomatic patients to seek care for fear that they will contract COVID-19 at the hospital. There is data showing that patients with influenza can develop inflammatory states that may promote acute vascular events such as myocardial infarction[4]. It remains to be seen if a pattern of aortic and vascular injury develops as the Covid pandemic progresses.

Figure 1-

Sagittal CT image demonstrating a contained aortic rupture with intramural hematoma as well as pericardial tamponade

Figure 2-

Post-Operative Day 2 portable Chest X-Ray without evidence of infiltrates

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