

Acute thrombotic events as initial presentation of patients with COVID-19 infection

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ABSTRACT

We describe three patients with COVID-19 who presented with an acute vascular event rather than with typical respiratory symptoms. These patients were all subsequently found to have laboratory-confirmed COVID-19 infections as the likely cause of their thrombotic event. The primary presentation of COVID-19 infection as a thrombotic event rather than with respiratory symptoms has not been described elsewhere. Our cases and discussion highlight the thrombotic complications caused by COVID-19; we discuss management of these patients and explore the role of anticoagulation in patients diagnosed with COVID-19. (*J Vasc Surg Cases and Innovative Techniques* 2020;6:381-3.)

Keywords: COVID-19; Thrombosis; Vascular surgery

COVID-19 is an infectious disease caused by a novel coronavirus. There have been >600,000 cases in the United States, with >200,000 cases in New York City alone.¹ Mount Sinai Health System is in the heart of New York City and as a result has experienced a high volume of COVID-19 patients.

COVID-19 has a wide range of recognized presentations from asymptomatic carriers to upper respiratory symptoms. Critically ill patients with COVID-19 also appear to have significant thrombotic events, and there is increasing evidence that the virus results in a hypercoagulable state.² We describe three of several patients with COVID-19 who presented to our health system primarily with symptoms from an acute vascular event rather than with significant respiratory symptoms. As required by hospital policy, all patients had preoperative COVID-19 testing, the results of which were positive in all cases. To our knowledge, the primary presentation of COVID-19 infection as a thrombotic event rather than with respiratory symptoms has not been described elsewhere. Managing acute thrombotic events from the novel virus presents unprecedented challenges, particularly during the COVID-19 pandemic. Our cases and discussion highlight the thrombotic complications caused by COVID-19, management of these patients, and the role of anticoagulation in patients diagnosed with COVID-19.

CASE REPORTS

We performed a retrospective review of all vascular surgery emergency department and inpatient consultations of patients who presented to the Mount Sinai Health System from March 1, 2020, to April 15, 2020. There were >30 COVID-19 patients; 21 consultations were for acute thrombotic events. Of these patients, we selected cases whose initial presentation with COVID-19 infection was an ischemic event rather than significant respiratory symptoms (Table). We excluded any patients with a history of a hypercoagulable disorder or significant peripheral vascular disease. All patients had a hypercoagulability workup including antiphospholipid antibodies, which were negative. For all cases, electrocardiography was performed and was sinus rhythm. Findings on venous duplex ultrasound were normal, and transthoracic echocardiography was unremarkable without evidence of a patent foramen ovale. All patients consented for this study.

Case 1. A 36-year-old woman presented to the emergency department with acute onset of right foot pain and numbness. She had a remote history of a small stroke but no known hypercoagulable disorder. She complained of mild nasal congestion on further questioning, and a COVID-19 test was performed; the result was positive. On examination, the right lower extremity was cool with monophasic pedal signals. Sensorimotor function was slightly diminished. Computed tomography angiography (CTA) showed acute occlusion of the right common femoral, superficial femoral, and popliteal arteries. She was subsequently taken to the operating room for right lower extremity angiography with AngioJet (Boston Scientific, Marlborough, Mass) thrombectomy. Significant thrombus burden remained, and a lysis catheter was placed and alteplase dripped overnight in the intensive care unit. The following day, repeated angiography demonstrated persistent thrombus burden, and open embolectomy under local anesthesia was performed, which was successful. She had resolution of her symptoms and was ultimately discharged home on warfarin.

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Table. Patients' demographics, preoperative information, and operative management

Patient	Age, years	Sex	Race	Chief complaint	Home anticoagulant and antiplatelet regimen	D-dimer level, mcg/mL	Imaging findings	Operative intervention
1	36	F	African-American	Right leg pain	None	>20	Occlusion of femoral and popliteal artery	AngioJet percutaneous thrombectomy (POD 0), overnight thrombolysis, open embolectomy (POD 1)
2	62	M	Hispanic	Left leg pain	None	7.12	Occlusion of the left common and external iliac artery	Open embolectomy with completion angiography
3	38	M	Hispanic	Right foot pain and numbness	None	0.82	Occlusion of popliteal artery with extension into trifurcation	Open embolectomy with completion angiography

POD, Postoperative day.

Case 2. A 62-year-old man with no significant past medical history presented with 1 week of left leg numbness and calf pain. The patient had no respiratory symptoms on presentation but on further questioning had a cough and headache a few weeks before admission. COVID-19 test result was positive. On examination, he had decreased sensation in his left leg with monophasic pedal signals. CTA demonstrated left external iliac artery and common femoral artery occlusion. The patient underwent successful surgical embolectomy from the common femoral artery. He was subsequently discharged on apixaban.

Case 3. A 38-year-old man with no significant medical problems was referred to the emergency department from urgent care because of right foot pain and numbness for 1 week. He reported having a mild cough 1 week earlier but denied any respiratory symptoms on presentation. On examination, the right foot was cool with monophasic pedal signals. CTA revealed occlusion of the right popliteal artery with extension into the trifurcation. He was subsequently taken to the operating room and underwent surgical embolectomy of the right popliteal, anterior tibial, and peroneal arteries, which was successful. The patient is currently receiving anticoagulation, awaiting discharge from the hospital.

DISCUSSION

Patients with COVID-19 infection typically present to the hospital with respiratory complaints of cough, shortness of breath, and fever. However, we describe three of several cases at our institution in which the primary presentation was an acute thrombotic event rather than typical upper respiratory symptoms. All patients presented with no or mild respiratory complaints and were found to have laboratory-confirmed COVID-19 infections during preoperative testing. Notably, the patients in our cohort were relatively young, with no significant risk factors for thrombosis. None of these patients had a history

of peripheral vascular disease. In all cases, electrocardiography showed sinus rhythm, and both lower extremity venous duplex ultrasound and transthoracic echocardiography were unremarkable. Furthermore, all patients had a hypercoagulability workup including antiphospholipid antibodies, which were negative.

There is increasing evidence that patients with COVID-19 are prone to thrombotic complications. Thrombotic events in patients with COVID-19 disease can in part result from disseminated intravascular coagulation. Disseminated intravascular coagulation is common in critically ill patients with sepsis, which is thought to contribute to these thrombotic complications seen in COVID-19 patients.³ In a study of 184 critically ill COVID-19 patients, arterial thrombosis was 3.7% and venous thrombosis was 28%.⁴ However, in all three of our cases, the COVID-19 infection was asymptomatic or mild at the time of presentation. Interestingly, of all 21 patients with COVID-19 and thrombotic events at our institution, the majority had only mild or moderate symptoms (85.72%) and were not critically ill. Thus, we suspect there may be another underlying mechanism for hypercoagulability in these patients. Hypercoagulability may not correlate with severity of COVID-19 infection.

CONCLUSIONS

Current studies have not delineated the mechanisms of large-vessel arterial thrombosis in patients with COVID-19. Recent reports show localized thrombosis in the small pulmonary vessels as well as diffuse microthrombi in small vessels throughout the body.⁵ There is increasing evidence that thrombosis may be due to endotheliitis.⁶ The authors support the use of therapeutic anticoagulation in admitted patients with COVID-19 infections. In addition, perhaps an anticoagulation regimen for patients who are at high risk for thrombotic complications

and COVID-19 should be considered in the outpatient setting. More data are urgently needed to develop evidence-based guidelines on anticoagulation management of patients with COVID-19 infection.

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