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Bilateral Lower Extremity Compartment Syndrome Secondary to COVID-19 Myositis in a Young Vaccinated Woman

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Abstract

Coronavirus disease 2019 (COVID-19) typically manifests with respiratory symptoms and can ultimately progress to severe multiorgan failure. Viral myositis, systemic capillary leak syndrome, and arteriovenous thrombosis are atypical manifestations of COVID-19. We present a case of a 33-year-old woman, fully vaccinated against COVID-19, who developed myositis and shock. She ultimately required bilateral lower extremity fasciotomies secondary to compartment syndrome, presumably from COVID-19 myositis. Although compartment syndrome from COVID-19 myositis has been reported for ocular, hand, and thigh compartment syndromes, this is the first case report showing bilateral lower extremity compartment syndrome secondary to COVID-19 myositis in a fully vaccinated individual. As we learn more about COVID-19 and its extrapulmonary effects, it is imperative to consider all working diagnoses when working up patients. Providers must be aware of extrapulmonary effects of COVID-19, particularly in individuals who might deviate from traditional symptoms.

Keywords

COVID, compartment syndrome, myositis, vaccinated

Coronavirus disease 2019 (COVID-19) largely manifests with respiratory symptoms, and often severe multiorgan failure. Commonly reported mild symptoms include upper respiratory congestion, cough, fatigue, and muscle aches.[1] While clinical evidence of the disease ranges from largely asymptomatic to severe multiorgan failure, some atypical manifestations of COVID-19 have also been reported. Viral myositis, systemic capillary leak syndrome, and arteriovenous thrombosis have been identified in rare cases of COVID-19.[2,3] Compartment syndrome due to elevated pressure within a confined fascial compartment can have multiple etiologies—traumatic injury, vascular compromise and ischemia, reperfusion injury, and myositis. COVID-19 has been shown to cause viral myositis through direct invasion of myocytes, or by auto-immune induced pathways.[4] We present a case of breakthrough COVID-19 despite vaccination, resulting in bilateral lower extremity compartment syndrome requiring fasciotomies for limb salvage.

A 33-year-old female with a history of obesity and hepatic steatosis, who received the single-dose Janssen vaccine against COVID-19 in April 2021, presented to an urgent care in September 2021 with upper respiratory symptoms including congestion, cough, sinus pressure, and sore throat. After testing positive for COVID-19, she was instructed to quarantine and educated on symptom management. The following day, she presented to the emergency department complaining of bilateral calf pain, shortness of breath and fevers. Initial mild hypotension resolved with a crystalloid bolus and laboratory workup was unremarkable. Without any neurovascular deficits, only mild swelling of the legs, ultrasound negative for venous thrombosis, and no pulmonary embolism found on CT, she was discharged home with instructions for supportive care.

The following day, she returned to the ED in septic shock—tachycardic and hypotensive, afebrile with

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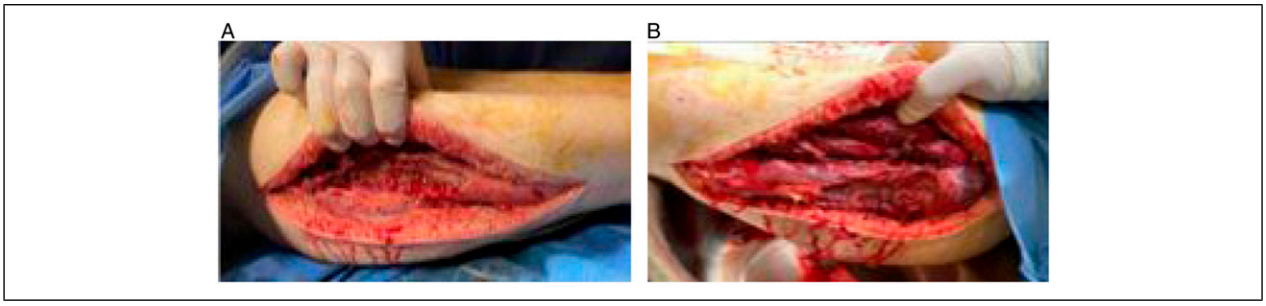

Figure 1. Intraoperative findings of anterior and lateral compartment necrotic muscle in right (A) and left (B) legs 1 week from index operation. Right leg pathology revealed skeletal muscle necrosis and acute inflammation.

leukocytosis of 23.4 × 10^3/uL, and a lactic acidosis of 6.4 mmol/L. After admission to the medical intensive care unit, aggressive resuscitation with 250 mL albumin and 5 L of crystalloid, and continued monitoring, her lower legs were noted to be firm with worsening swelling. Trauma surgery was consulted for evaluation for compartment syndrome. On exam, both feet were cold, left notably worse than right, with left foot completely insensate, mottled and paralyzed. No doppler signals were appreciable in the dorsalis pedis, posterior tibial, or popliteal arteries bilaterally; a left femoral signal was undetectable by doppler and the right femoral signal was faint and confirmed with color doppler ultrasound. Her compartment pressures were measured and found to be elevated: right anterior 109, lateral 90, deep posterior 59, and superficial posterior 50 mmHg; left anterior 119, lateral 85, deep posterior 76, and superficial posterior 73 mmHg.

The decision was made to proceed with bilateral lower extremity fasciotomies given evidence of compartment syndrome, however before she could be consented for anesthesia and transferred to the operating room, she rapidly deteriorated, requiring emergent intubation, mechanical ventilation, and four-agent pressor support. Given the immediate limb threatening compartment syndrome and her instability, operative staff was mobilized to the patient's ICU room where four-compartment bilateral fasciotomies were performed bedside, revealing dusky and minimally contractile muscle.

A CT arteriogram was obtained to evaluate for vascular etiology of compartment syndrome, which revealed patency from aortoiliac to digital vessels, although vessels appeared vasoconstricted and diminutive. She slowly stabilized however required multiple operations for further debridement of necrotic anterior and lateral compartment musculature (Figure 1). Muscle biopsy revealed skeletal muscle with necrosis and acute inflammation. She ultimately underwent total removal of necrotic anterior lower leg compartments with wound closure bilaterally. After a long recovery and rehabilitation, the patient has residual deficits including foot drop and limited plantarflexion bilaterally. At the time of publication, she is ambulatory with limited assistance from a cane and ankle-foot orthosis and she continues to work with physical therapy.

While COVID-19 is most commonly known to have severe respiratory manifestations, multiple other organ systems and manifestations are being identified, even in lieu of severe respiratory compromise. Compartment syndrome mainly manifests itself after a trauma but has been shown in case reports to happen secondary to viral myositis, including case reports about Human Immunodeficiency Virus, and now COVID-19.[2] To date, compartment syndrome has been documented in COVID-19 infected individuals in the upper extremities and thigh, but this is the first known report of lower leg and bilateral involvement. Reports of COVID-19 induced arterial and venous thrombosis with concomitant compartment syndrome have also been documented.[2] Of note, there are many potential causes of compartment syndrome. In this particular case, vascular compromise, traumatic or crush injury were ruled out as the cause of compartment syndrome. By diagnostic exclusion and clinical history, as well as surgical pathology revealing necrosis and acute inflammation, acute COVID-19 myositis was determined to be the most likely etiology.

As we learn more about COVID-19 and it is extrapulmonary effects, it is imperative to consider atypical manifestations of the disease when working up patients. Compartment syndrome is an atypical manifestation that can be limb threatening, and prompt recognition and treatment is critical. Providers must be aware of the myriad presentations of COVID-19, regardless of vaccination status, and maintain a wide differential when evaluating patients, especially when the clinical presentation does not meet typical COVID symptoms.

Author Contributions

KB, JW, CB and ER participated in the direct care of this patient, manuscript preparation, and critical revisions of this manuscript.

Declaration of Conflicting Interests

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