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Adolescent COVID-19-Associated Fatal Rhabdomyolysis

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Abstract

Coronavirus disease 2019 (COVID-19) has become an urgent global health priority. Although most patients with COVID-19 manifest with fever and respiratory tract symptoms, COVID-19 infections may also involve other organs and extrarespiratory manifestations, including cardiac, gastrointestinal, hepatic, renal, and neurological symptoms. This case describes a 16-year-old boy who presented with fever, sore throat, myalgia, and subsequently with shortness of breath. A diagnosis of COVID-19 was confirmed by polymerase chain reaction. His condition deteriorated and he died within 3 days of admission. An evaluation of his past medical history confirmed an episode of viral illness which had progressed to myositis and rhabdomyolysis 1 year prior. Clinicians should be aware of this complication and maintain a high index of suspicion in cases of COVID-19 presenting with extrapulmonary symptoms.

Keywords

corona virus, COVID-19, myositis, rhabdomyolysis, extrapulmonary manifestations

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Introduction

Coronavirus disease 2019 (COVID-19) is a viral illness caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). According to the European Centre for Disease Prevention and Control, a total of 34 680 199 cases of COVID-19 were reported between December 2019 and October 2020, resulting in 1 029 525 deaths.[1] However, fewer cases of COVID-19 have been reported in children compared to adults; as per statistics reported by the Centers for Disease Control and Prevention, only 7.3% of all COVID-19 cases as of August 2020 constituted children.[2]

Pediatric cases of COVID-19 infection typically present as mild (37%) or moderate (45%) upper respiratory tract infections and are rarely severe or critical.[3] While most patients manifest with fever and respiratory symptoms, other organs and systems can be affected resulting in a wide range of extrapulmonary manifestations, including renal, cardiac, and neurological manifestations.[4] We present a case of COVID-19 infection in an adolescent presenting with respiratory symptoms and muscle weakness which resulted in death within 3 days of admission.

Case Presentation

A 16-year-old Omani boy with no known medical illnesses presented to a healthcare facility in September 2020 with fever, a sore throat, and myalgia. The child had been involved in an exercise class the previous day. He was evaluated by a general practitioner at a small local private clinic and discharged with symptomatic treatment. After 2 days, his symptoms worsened. According to his parents, the boy had demonstrated similar symptoms 1 year prior, including fever, lower limb weakness, and an inability to walk, although he now displayed an additional new symptom of shortness of breath. The child was admitted to a tertiary hospital and tested positive for COVID-19 based on a polymerase chain reaction test. His condition deteriorated and he died within 3 days of admission.

A postmortem investigation was conducted. According to his medical file referred from his regular health institution, the patient had presented in January 2019 to a local health center with leg weakness, fever, and an inability to walk. He was subsequently admitted to a tertiary hospital for 10 days, after which he was discharged with a diagnosis of viral myositis complicated by rhabdomyolysis. Subsequently, the

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child remained stable and appeared to be doing well with no significant medical history until he contracted COVID-19 1 year later. At the time of writing, his 4 surviving siblings were all well with no known hereditary diseases.

Discussion

Here, we present a case of COVID-19-related rhabdomyolysis which led to the death of a 16-year-old boy with clinical features suggestive of myositis. To our knowledge, few cases of COVID-19-associated rhabdomyolysis have been previously reported, of which only 1 involved a pediatric patient.[5,6] Moreover, rhabdomyolysis is rarely seen in COVID-19 cases and was reported in only 0.2% of 1099 patients in China.[5]

Myositis refers to the inflammation or swelling of the muscles and can be due to a variety of causes, including injury, medications, infections, or immune disorders.[7] It can affect people of any age, including children, and the primary muscles affected are those in the shoulders, hips, and thighs.[7,8] Many viral infections, including those caused by the SARS-CoV-2 virus, can present with nonspecific myalgia of varying degrees of severity.[9,10]

In turn, rhabdomyolysis is a serious condition involving the rapid breakdown of skeletal muscle integrity, resulting in the release of electrolytes and intracellular muscle components into the bloodstream and extracellular space.[11] While some patients are asymptomatic, rhabdomyolysis can lead to life-threatening electrolyte imbalances, acute kidney injury resulting in renal failure, and abnormal blood clotting.[12]

Although rhabdomyolysis is most often caused by direct trauma such as crush injuries or thromboemboli, several rare genetic defects which cause neuromuscular and metabolic disorders are also known to be associated with the condition[13]

Common symptoms in both traumatic and nontraumatic rhabdomyolysis include massive necrosis manifesting as limb weakness, muscle pain, edema, and gross pigmenturia without hematuria.[14]

Nevertheless, the diverse etiologies implicated in rhabdomyolysis, they all share a common final pathway, namely increased levels of intracellular free ionized calcium, leading to muscle cell death through the activation of a number of detrimental mechanisms such as Creatinine Phosphokinase (CPK) enzyme activation and prolonged muscle fiber contraction.[13]

While the pathogenesis of rhabdomyolysis in SARS-CoV-2 infection is as yet unclear, possible mechanisms include direct viral invasion of the muscle or an excessive immune response resulting in collateral muscle damage.[15]

As observed in the present case, myalgias in pediatric and adolescent COVID-19 patients can represent frank rhabdomyolysis. It is important that clinicians are aware of this potential manifestation as prompt diagnosis and management with volume administration can prevent severe and potentially fatal consequences such as kidney injuries.[15] Moreover, this case also highlights the importance of proper documentation and comprehensive medical history-taking alongside a detailed physical examination, particularly in cases of neurological involvement.

Unfortunately, the postmortem investigation of the patient's medical records in the primary health care center, did not include laboratory reports. As such, this case report is limited by the lack of important information such as specific creatine kinase levels and renal function.

Conclusion

Viral myositis-induced rhabdomyolysis should be included in the differential diagnosis of pediatric and adolescent patients presenting with diffuse body myalgia along with positive SAR-CoV-2 results or symptoms suggestive of COVID-19 infection. In such cases, early intervention is crucial to prevent further deterioration and potentially fatal complications such as acute renal failure.

Declaration of Conflicting Interests

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