

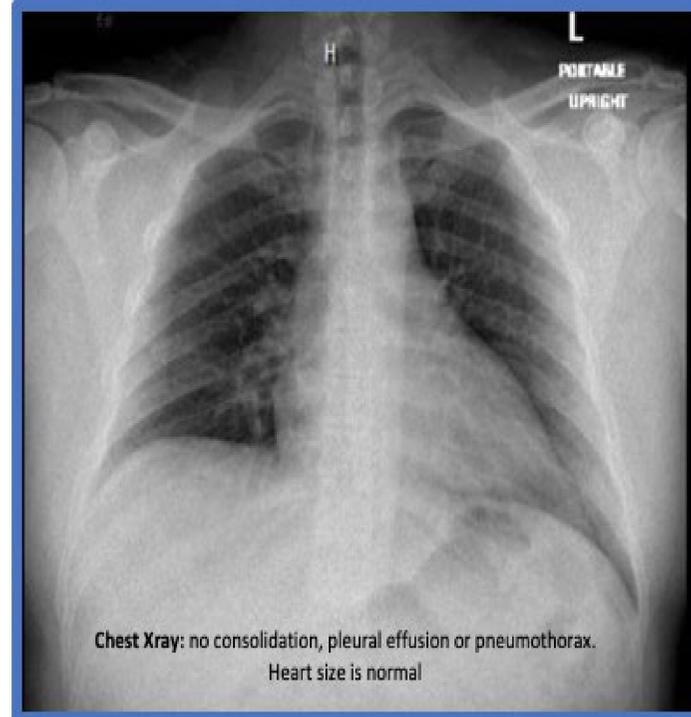
## Introduction

Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first reported in Wuhan, China in the late December 2019. COVID-19 mainly affects the respiratory tract. Mild muscle damage and increased creatine kinase (CK) levels have commonly been observed in Wuhan patient cohorts. Rhabdomyolysis is a life-threatening disorder that manifests with myalgia, fatigue, and hemoglobinuria; it can also manifest as acute renal failure. The inducing factors of rhabdomyolysis include autoimmune myopathies, septicemia, electrolyte abnormalities, substance abuse, or infection. Viral infections, can lead to rhabdomyolysis. In a large series of COVID-19 patients, Guan *et al* reported two cases of rhabdomyolysis in non-severe cases. Likewise, Suwanwongse *et al* described a case of a patient with non-severe COVID-19 pneumonia with rhabdomyolysis as a presenting feature. In patients presenting with myalgias in the setting of COVID-19, distinguishing between Rhabdomyolysis versus Viral Induced Myositis becomes challenging. In any case, rapid clinical recognition and appropriate treatment must be initiated promptly to reduce risk for serious complications.

## Case Study

We present a case of a 31 year old male with past medical history of obesity who presented to the Emergency Department with excruciating pain in the upper and lower extremities bilaterally for one day. Patient had not worked out in a long time and had a strenuous work-out with a trainer the day prior. Symptoms were associated with dark urine. Otherwise, patient denied any other associated symptoms, including fever, chest pain, dyspnea or recent viral infections. In the hospital, he was found to have an initial CK level of 12,000. He incidentally tested positive for COVID-19. He had no pulmonary symptoms at the time of presentation. His oxygen saturation was 96% on room air. Patient was admitted and given aggressive fluid hydration, however, CK levels continued to rise. He remained with persistent severe myalgia for 5 days. On day 5, myositis panel was obtained and patient was started on methylprednisolone 125 mg intravenous bolus followed by 60 mg twice daily given no improvement with aggressive hydration alone. After the initial dose of steroids, CK levels decreased to 7000. With the administration of the subsequent steroid dose, CK levels decreased further to 2000. Patient's myalgia improved significantly, and he was discharged home on 40 mg of Prednisone daily with a taper regimen.

## Results



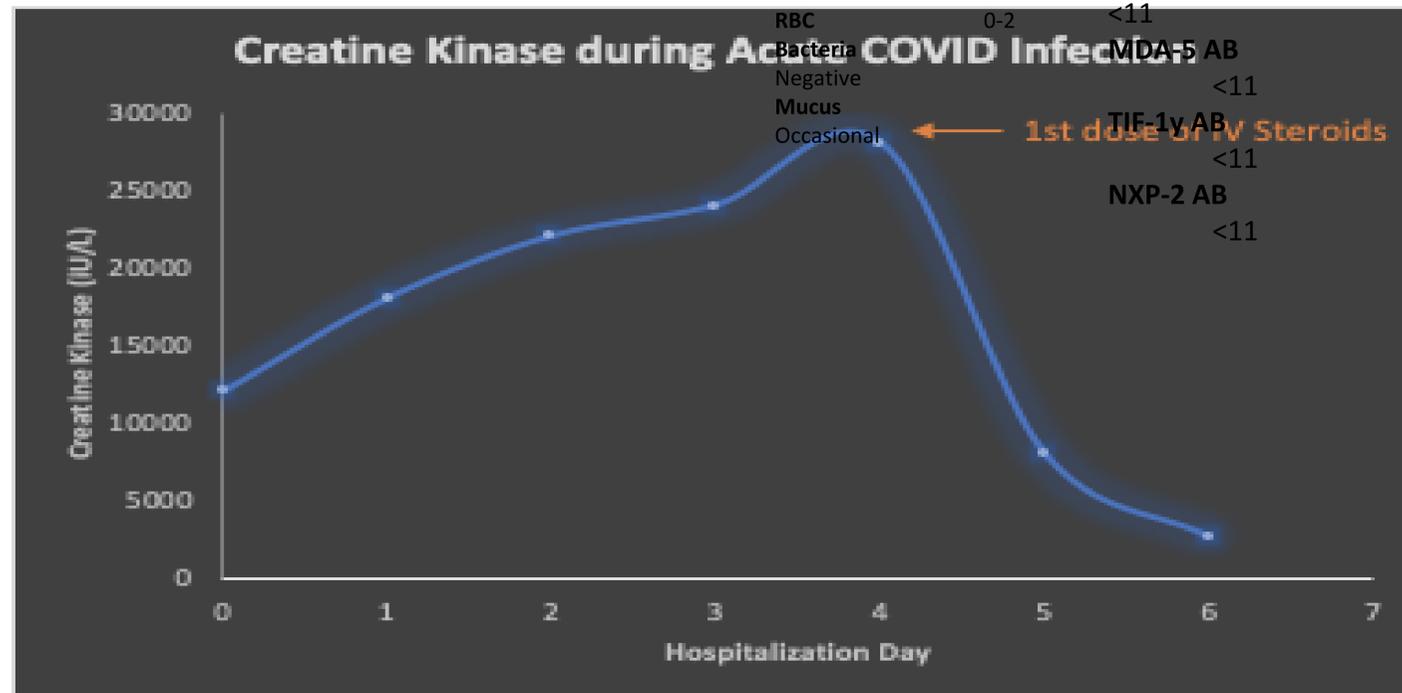
Urine myoglobin: WNL  
UDS: negative  
Creatinine: 0.73  
SARS- COV2 PCR: Positive  
Ferritin: 254  
D-dimer: <215  
CRP: 12.6>3  
ESR: 22>18

UA/MICRO  
Appearance Clear  
Color Amber  
UpH 6  
Glucose Negative  
Blood Large  
Ketones Negative  
Protein 100  
Bilirubin Negative  
Leukocytes Negative  
Nitrites Negative  
Ascorbic Acid Negative

WBC 5-9  
RBC 0-2

Bacteria Negative  
Mucus Occasional

Myositis Panel	
Test Name	Result
JO-1 AB	<11
PL-7 AB	<11
PL-12 AB	<11
EJ AB	<11
OJ AB	<11
SRP AB	<11
MI-2 ALPHA AB	<11
MI-2 BETA AB	<11
MDA-5 AB	<11
TIF-1γ AB	<11
NXP-2 AB	<11



Patient was seen in clinic on day 10 post discharge. Myositis panel found to be negative. (refer to result section) At the time of his visit, he did not report any residual symptoms, and was on 20 mg of Prednisone daily. Given lack of autoimmune etiology, steroids were discontinued with repeat CK levels in 2 weeks. Patient was further instructed to follow up in 2 weeks to assess his clinical status at which time his CK level was found to be 66.

## Discussion

Clinicians should be aware of myositis-induced rhabdomyolysis when patients report myalgias despite them being a common symptom of a viral infection. As stated in the Curious Journal of Medical Science, diffuse myalgias may occur frequently during the prodromal phase of any acute viral infection. Myositis may present with a higher intensity of pain than that of generalized myalgia. Viral myositis is often self-limited, lasting on average 3-5 days but can be complicated by rhabdomyolysis. Recent patient case series published in the setting of COVID-19 infection in China have described myalgia and elevated CK as frequent findings. The Lancet published a report of 41 patients hospitalized with pneumonia: 33% of them showed CK elevation and that number increased up to 46% in intensive care unit patients. Along the same line, muscle pain was present in 11% of patients and 13% had elevated CK in another 99 patient case series. There are currently few published case reports with elevated CK levels without kidney failure and concurrent myalgias. Clinical suspicion of viral myositis-induced rhabdomyolysis should be a part of the clinical differential diagnosis if a patient presents with diffuse body myalgia along with a positive SAR-CoV-2 result. Aggressive fluid resuscitation and daily CK level trending are important to treat and monitor the clinical progression as well as the response to treatment.

## References:

- Guan WJ;Ni ZY;Hu Y;Liang WH;Ou CQ;He JX;Liu L;Shan H;Lei CL;Hui DSC;Du B;Li LJ;Zeng G;Yuen KY;Chen RC;Tang CL;Wang T;Chen PY;Xiang J;Li SY;Wang JL;Liang ZJ;Peng YX;Wei L;Liu Y;Hu YH;Peng P;Wang JM;Liu JY;Chen Z;Li G;Zheng ZJ;Qiu SQ;Luo J;Ye CJ;Zhu SY;Zhon. (n.d.). Clinical characteristics of Coronavirus DISEASE 2019 in China. Retrieved March 31, 2021; <https://pubmed.ncbi.nlm.nih.gov/32109013/>
- Huang, W. C., & X. L. (n.d.). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. March 31, 2021; [www.thelancet.com/journals/lancet/article](http://www.thelancet.com/journals/lancet/article)
- Jin, M., & Tong, Q. (2020). Rhabdomyolysis as potential late complication associated with covid-19. *Emerging Infectious Diseases*, 26(7), 1618-1620.
- Rivas-García, S., Bernal, J., & Bachiller-Corral, J. (2020). Rhabdomyolysis as the MAIN manifestation of CORONAVIRUS disease 2019. *Rheumatology*, 59(8), 2174-2176.
- Zhang, Q., Shan, K. S., Minalyan, A., O'Sullivan, C., & Nace, T. (2020). A rare presentation of Coronavirus DISEASE 2019 (covid-19) Induced Viral MYOSITIS with Subsequent Rhabdomyolysis. *Cureus*.