

An Atypical Case of SARS-CoV 2-Induced Pancytopenia

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ABSTRACT

The SARS-CoV-2 pandemic has grown to become a major global concern with unprecedented effort to understand the disease. Essentially, COVID-19 can affect many organs, with case reports showing various organ involvements. Thus, atypical presentations can be challenging to identify clinically and approach. We present an unusual presentation of COVID-19 infection. An 81 year-old male patient with COVID-19 presented with acute change in mental status. He was found to have worsening pancytopenia. The patient responded symptomatically to corticosteroids and supplemental oxygen. The worsening pancytopenia was attributed to COVID-19 infection. The exact mechanism behind this phenomenon is still unclear but might be similar to other viral infections causing pancytopenia. More studies and reports can help in identifying the mechanism and recommend proper therapeutic intervention.

Keywords: SARS-CoV-2; Pancytopenia; Coronavirus; Dexamethasone

Introduction

The SARS-CoV-2 pandemic has grown to become a major global concern with huge scientific effort to understand the disease and its pathogenesis [1]. Exaggerated inflammatory response plays a major role in alveolar destruction that happens in moderate-to-severe Coronavirus disease (COVID-19) as shown by many studies [2]. Moreover, the literature is constantly growing as the understanding of the disease advances. Multiple approaches to treat COVID-19 have been implicated. Antiviral therapy with Remdesivir is one approach. It works by interfering with viral RNA polymerase replication [3]. It was approved by the FDA in October 2020 and has shown to improve recovery time in hospitalized patients [4]. Dexamethasone was also found to decrease death risk in critically-ill COVID-19 patients [5]. Essentially, COVID-19 can affect many organs, with many case reports showing various organ involvements [6]. For this reason, atypical presentations pose a challenge to identify clinically and approach therapeutically. In this report, we present an unusual presentation of COVID-19 infection. This 81 year-old male patient presented with acute change in mental status. He was initially hypoxic and was found to have pancytopenia that continued to worsen during his hospital stay. The main objective of this case report is to identify possible unusual presentations and their response to the mainstay therapeutic intervention.

Case Presentation

This is an 81-year-old male who was brought to the emergency

department with a chief complaint of acute change in mental status. His past medical history is significant for type 2 diabetes, hypertension, hyperlipidaemia, hypothyroidism, coronary artery disease with stent placement, and liver disease. His symptoms started gradually one week prior to admission when he was diagnosed with COVID-19. His initial symptoms were low-grade fever, dry cough, shortness of breath at rest, and diarrhoea. On initial assessment, his vital signs were significant for oxygen saturation of 85% on ambient air requiring 4 litres of oxygen, temperature of 98.1 degrees, respiratory rate was 18 breaths/minute, and heart rate of 87 beats/minute. Physical examination was notable for confusion, he was disoriented to self, time, and location. Lung examination showed decreased air entry bilaterally with fine crackles. Heart, Abdominal and neurological examinations were unremarkable. Initial laboratory workup on admission was notable for low white blood cell (WBC) count of $3.4 \times 10^3/\text{mcl}$, low haemoglobin of 8.4 g/dL, a low platelet count of 105 g/dL. Basic metabolic panel was within normal limits. Liver function test showed alkaline phosphatase level of 136 U/L.

He was started on a 10-day course of 6 mg dexamethasone and received convalescent plasma on the 2nd day of admission. Of note, his pancytopenia was persistent and continued to worsen even with treatment. Additional workup was pursued for pancytopenia and showed normal Vitamin B12 level, Ferritin of 10 ng/ml consistent with iron deficiency anaemia, and hypo proliferation based on a reticulocyte index less than 2. On the 4th day of admission, his

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Received: November 13, 2021; Accepted: November 27, 2021; Published: December 03, 2021

Citation: AlKaabba F, Li H, Patel N, Ibrahim F (2021) An Atypical Case of SARS-CoV 2-Induced Pancytopenia. J Hematol Thrombo Dis 9:471. DOI: 10.24105/2329-8790.2021.9.471

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WBC trended down to $1.05 \times 10^3/\text{mcl}$, as well his platelets to 75 g/dL. His haemoglobin dropped to 7.2 g/dL which required one unit of packed red blood cells transfusion. Given his worsening laboratory results, hemato-oncology specialists were consulted. Per their assessment, his pancytopenia was chronic with no clear etiology. The patient had a bone marrow biopsy in 2014 which was negative for pathology and had an unremarkable flow cytometer 4 months prior to his presentation. It was initially concluded that this chronic pancytopenia was from his liver disease. However, this current episode was significantly worse comparatively. As per hemato-oncology assessment, the pancytopenia was likely exacerbated by COVID-19 infection. Fortunately, upon completion of the COVID-19 treatment regiment, the patient's mental status improved and returned to baseline. However, pancytopenia persisted with no recovery. He was discharged with close outpatient follow-up.

Discussion

Coronaviruses belong to the Coronaviridae family of the subfamily Coronavirinae. These viruses have a large group of animal hosts where zoonotic transfer can commonly happen. They have non-segmented positive-sense RNA viruses [7]. The genome is covered with a solar-shaped envelope, thus the name coronavirus. SARS-CoV-2 is a coronavirus that is responsible for the COVID-19 pandemic. The pandemic has grown into a global concern with rapidly evolving literature [8].

COVID-19 can essentially affect any organs including the bone marrow [6]. The exact underlying mechanism behind this is still unclear. However, this could be similar to other viral infections causing pancytopenia. One mechanism is bone marrow suppression which is seen in various viral infections like EBV, HIV, Parvovirus B12 and CMV. During viral infection, myelocytic antigenic epitopes are exposed, which lead to production of autoantibodies and destruction [9,10]. The angiotensin-converting enzyme 2 receptor has been identified in bone marrow albeit at a low level, this is a target of the SARS-CoV-2 [11]. Immune thrombocytopenia due to COVID-19 is also a frequently reported phenomenon [12]. Multiple hypotheses for the mechanism of this phenomenon exist; including direct cellular and platelet infiltration, viral-mediated liver damage causing decreased thrombopoietin production, and immune-mediated platelet destruction [13,14].

We report an atypical presentation of COVID-19 infection with evidence of viral-induced myelosuppression with pancytopenia. COVID-19-induced pancytopenia has not been commonly reported, with a scarce number of cases found in literature [13,14]. Our patient did not require bone marrow biopsy during his admission given prior biopsy with no clear pathology. However, reported cases in literature showed that SARS-CoV 2 can infiltrate bone marrow, which may play a role in COVID-19 induced pancytopenia [13]. The patient laboratory workup including basic chemistries was generally within normal limits except chronic pancytopenia. However, during his stay, his pancytopenia continued to worsen without concurrent liver function worsening. COVID-19 is associated with lymphopenia, a finding present in this patient. Given the lack of other causes of pancytopenia except a new SARS-CoV-2 infection; it was concluded that the most likely contributing factor to worsening pancytopenia is COVID-19.

Bone marrow biopsy to investigate the cause of pancytopenia in COVID-19 patients remains an open question. One case report published in *Annals of Oncology* recommended against obtaining

bone marrow biopsy. Based on the biopsy they obtained, it found nonspecific reactive changes, with no sign of lymphoma, fibrosis or myelodysplasia. Moreover, RT-PCR analysis of bone marrow aspirate was negative for SARS-CoV-2. Another case report by Issa et al. suggested convalescent plasma for patients with COVID-19 concurrent persistent B-cell immunodeficiency. One therapeutic intervention that has been consistent in the literature for COVID-19 induced thrombocytopenia is short courses of corticosteroids and intravenous immunoglobulin [14]. Overall, more reports of such atypical presentations will help in understanding the mechanism and the response to different treatments.

Conclusion

In conclusion, COVID-19 can involve theoretically any organ in the body including the bone marrow. We report a case of an 81 year-old male patient with atypical presentation of COVID-19 with worsening pancytopenia with symptomatic improvement with corticosteroid treatment and supplemental oxygen. The exact underlying mechanism explaining COVID-19 pancytopenia remains unclear but it could resemble other viral infections causing pancytopenia. Reports of a similar presentation remain scarce. More studies and reports can help clarify the mechanism and recommend proper treatment.

Data availability statement

All data underlying the results are available as part of the article and no additional source data are required.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors

Disclosure

The authors have declared no conflicts of interest.

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