ISSN: 2755-0125

Journal of Virology Research & Reports

SCIENTIFIC Research and Community

Case Report

Open Access

Novel Coronavirus Disease 2019 (COVID-19) and Combined Autoimmune Neutropenia (AIN) and Thrombocytopenia (ITP): A Case Report and Literature Review

Rizvi M* and Medar S

Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY

ABSTRACT

Combined autoimmune neutropenia (AIN) and Immune thrombocytopenia (ITP) is a rare disease that can present as extremely low neutrophil count and platelet count, respectively [1]. We describe the first case, to our knowledge, of the novel SARS CoV-2 infection and combined autoimmune neutropenia (AIN) and immune thrombocytopenia (ITP) in a healthy 27-year-old male.

***Corresponding author**

Munaza Rizvi, M.D, Department of Pediatric Emergency Medicine, Children's Hospital at Montefiore, 3315 Rochambeau Avenue, 2nd Floor, 10467, New York. Tel: 929-610-0391. E-mail: mbrizvii@gmail.com

Received: November 12, 2020; **Accepted:** November 16, 2020; **Published:** November 26, 2020

Case Description

A 27-year-old male was referred to the emergency room (ER) by an urgent care clinic for evaluation of a very low platelet count. He was in his usual state of health until one week ago when he started having daily fevers of 100.4F. Fevers were followed by a 5-day history of gum bleeding with brushing, twice daily episodes of epistaxis, multiple episodes of black tarry stools, and infrequent non-bloody, non-bilious episodes of emesis. On the fifth day of illness, the patient developed intermittent shortness of breath, which prompted him to go to urgent care. At urgent care, the patient had a complete blood count (CBC) and a chest-x-ray done. CBC did not result during his stay at the urgent care, but the chest x-ray revealed multifocal infiltrates. The patient was given a diagnosis of Pneumonia and was discharged with a prescription for Azithromycin and Cefdinir. The patient received a call from urgent care the following day, advising him to go to the ER as his CBC had returned with a platelet count of zero.

The patient's review of systems included intermittent shortness of breath, which did not improve with antibiotics, loss of smell for one day, malaise, and anorexia. The patient also noticed a developing rash on his body on the day of arrival to the ER [2]. The patient denied any known sick contacts with COVID-19, travel history, weight loss/gain, night sweats, history of easy bruising, nose bleeds, or gum bleeding. There was no past medical history or family history of clotting disorders or coagulopathy.

His physical exam showed an obese man with a weight of 132 kg and a Body Mass Index (BMI) of 37kg/m2. His vital signs were notable for fever Temp of 102.3F, tachycardia of 115 bpm, a normal respiratory rate of 22 per minute, and oxygen saturation of 95% in ambient air. He appeared comfortable with chest clear to auscultation bilaterally. There was minor gum bleeding noted in the upper and lower gums. His skin exam revealed a non-blanching purpuric rash scattered to the abdomen, neck, and upper back (Figure 1, A-E). The rest of the exam was within normal limits.

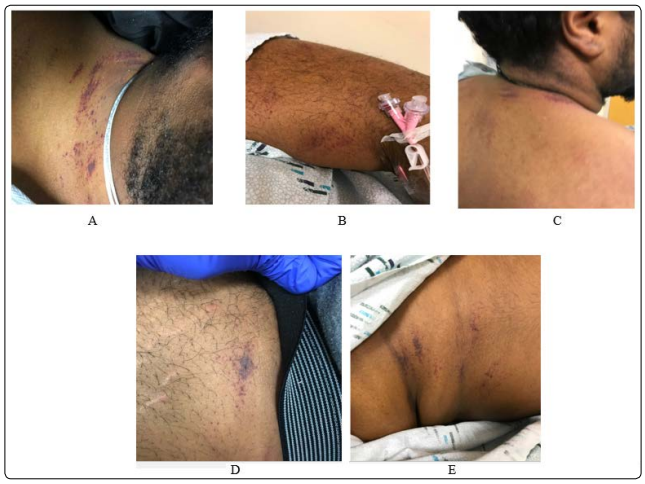

Figure 1: Non-blanching purpuric rash affecting the (A) axilla (B) Antecubital area (C) Posterior neck (D) Lower abdomen (E) Right flank

Laboratory evaluation was significant for neutropenia with ANC of 300 cells/ul, lymphocyte count of 0.8 k/ul (Ref range 1- 4.8 k/uL), eosinopenia of 0 k/uL (Ref range 0.1-0.3 k/uL), a platelet count of 0 k/uL (Ref range 150-400 k/uL), and a normal hemoglobin level of 16 g/dL (Ref 14-17.4 g/dL).

Other pertinent labs included normal partial thromboplastin time (PTT), mildly elevated prothrombin time (PT) at 15.1 (Ref range: 11.8 – 14.8 k/uL), normal INR, normal liver function tests, negative coombs test, and a normal fibrinogen level. LDH was elevated at 429 U/L (Ref <240 U/L) and D-dimer was elevated at 13.1 ug/mL FEU (Ref 0-0.5 ug/mL FEU). Stool Occult test was positive for blood. The patient's nasopharyngeal swab was found to be SARS-COV-2 positive using the real-time PCR assay. A repeat CXR revealed small upper lobe opacity suggestive of Pneumonia. A procalcitonin level was normal, making bacterial

Pneumonia a less likely possibility [3]. An immunoglobulin panel revealed selective IgM deficiency with a of level 28.7 mg/dL (Ref 50-300 mg/dL).

Given severe thrombocytopenia, severe neutropenia, and fever, the patient was admitted for further evaluation and management. Blood culture was obtained, and the patient was started on cefepime for 48 hours for febrile neutropenia. Malignancy was ruled out by flow cytometry, Fluorescence in situ hybridization (FISH), Cytogenic analysis, Myeloid Molecular Profile, and testing for FLT3 TKD mutation, which were all normal. The patient also tested negative for Varicella, HIV, Hepatitis B, and Hepatitis C infections.

A platelet transfusion failed to improve the platelet count. Considering SARS-COV-2 triggered autoimmunity as a possibility, an IVIG infusion at 1g/kg based on ideal body weight was given once. The IVIG infusion improved the patient's platelet count to 53 k/uL, with a marginally increased mean platelet volume 12.2 fL (Ref 8-12 fL), ANC to 494 cells/uL, and lymphocyte count to 1 u/kL, suggesting autoimmune destruction of these cell lines. Bone Marrow Biopsy was not warranted after his response to IVIG. No steroids were given.

The patient's fever resolved by hospital day 2. He did not require any respiratory support throughout the hospital stay. No further gum bleeding or new skin findings were seen. He was discharged on his continued course of azithromycin and iron sulfate.

Discussion

We describe the first case, to our knowledge, of the novel coronavirus causing combined autoimmune neutropenia (AIN) and immune thrombocytopenia (ITP) in a healthy 27-year-old male. Our patient had moderate disease based on the Chest X-ray findings and developing lymphopenia.

The 2019 novel coronavirus 2019-nCoV is an enveloped non-segmented positive-sense RNA virus belonging to the family Coronaviridae [4]. The 2019-nCoV is a zoonotic infection, with the first cases of 2019-nCov linked to direct exposure to the Huanan Seafood Wholesale Market of Wuhan, China. It subsequently had human to human transmission and was found to be extremely contagious, currently responsible for over 240,000 deaths in the U.S alone and more than 51 million cases and 1.2 million deaths worldwide till the end of October, 2020. This spread is believed to occur through respiratory droplets, with aerosol transmission also being a possibility with protracted exposure to high aerosol concentrations [5].

The clinical spectrum of COVID-19 varies from asymptomatic to respiratory failure requiring mechanical ventilation and multiorgan failure due to sepsis and septic shock. The pathogenic mechanism of COVID-19 seems to originate from excessive immune reaction characterized by the production of IL-6, a pro-inflammatory cytokine [6]. Emerging research studies also highlight the role of coagulopathy, causing pulmonary embolisms and worsening respiratory failure [7].

Viruses have been known to trigger autoimmune diseases in people with genetic predisposition [8]. Our patient tested positive for SARS-COV-2. His associated lymphopenia, eosinopenia, increased LDH, Prothrombin time, and increased D-dimer levels were also suggestive of active COVID-19 infection [9]. Although his chest x-ray findings were not characteristic of COVID-19 infection, it can be argued that the clinical presentation of COVID-19 is varied, and in some patients, lungs might not be the targeted organ [10]. There are case reports of COVID-19 triggering thrombocytopenic purpura and possibly Kawasaki disease [11, 12].

We speculate that the patient's selective IgM deficiency predisposed him to have autoimmune cytopenia, and SARS-COV-2 triggered him to acquire combined autoimmune neutropenia (AIN) and immune thrombocytopenia (ITP) [13]. Our hypothesis is supported by a lack of evidence of malignancy, a normal morphology on the smear, and an immediate response to IVIG infusion with significant improvement in platelet and neutrophilic count.

References

1. Mitsogianni M, Mitsimponas N, Haase S, Giagounidis A (2020) Treatment of Combined Autoimmune Neutropenia and Immune Thrombocytopenia with Methotrexate. Acta Haematol, 143: 89-90. doi:10.1159/000500872
2. Yan CH, Faraji F, Prajapati DP, Boone CE, DeConde AS (2020) Association of chemosensory dysfunction and Covid-19 in patients presenting with influenza-like symptoms [published online ahead of print, 2020 Apr 12]. https://onlinelibrary.wiley.com/doi/full/10.1002/alr.22579.
3. Self WH, Balk RA, Grijalva CG, Williams DJ, Zhu Y, et al. (2017) Procalcitonin as a Marker of Etiology in Adults Hospitalized With Community-Acquired Pneumonia. Clin Infect Dis, 65: 183-190.
4. Huang C, Wang Y, Li X, Ren L, Zhao J, et al. (2020) Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China [published correction appears in Lancet. 2020 Jan 30. Lancet, 395: 497-506.
5. Cascella M, Rajnik M, Cuomo A, Dulebohn Sc, Napoli Rd (2020) Features, Evaluation and Treatment Coronavirus (COVID-19), https://www.ncbi.nlm.nih.gov/books/NBK554776/.
6. Andrea T. Cruz, MD, MPH,a Steven L. Zeichner (2020) COVID-19 in Children: Initial Characterization of the Pediatric Disease, 145: e20200834.
7. Casey K, Iteen A, Nicolini R, Auten J (2020) COVID-19 pneumonia with hemoptysis: Acute segmental pulmonary emboli associated with novel coronavirus infection, 38: 1544.e1–1544.e3.
8. Smatti MK, Cyprian FS, Nasrallah GK, Al Thani AA, Almishal RO, et al. (2019) Viruses and Autoimmunity: A Review on the Potential Interaction and Molecular Mechanisms. Viruses, 11: 762.
9. Zhang JJ, Dong X, Cao YY, Yuan YD, Yang YB, et al. (2020) Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China [published online ahead of print, 2020 Feb 19]. Allergy, 75: 1730-1741.
10. Liu J, Yu H, Zhang S (2020) the indispensable role of chest CT in the detection of coronavirus disease 2019 (COVID-19) [published online ahead of print, 2020 Apr 3]. Eur J Nucl Med Mol Imaging, 1-2.
11. Zulfiqar AA, Lorenzo-Villalba N, Hassler P, Andrès E (2020) Immune Thrombocytopenic Purpura in a Patient with Covid-19 [published online ahead of print, 2020 Apr 15]. N Engl J Med, 382: e43.
12. Jones VG, Mills M, Suarez D, Hogan CA, Yeh D, et al. (2020) COVID-19 and Kawasaki Disease: Novel Virus and Novel Case [published online ahead of print, 2020 Apr 7]. Hosp Pediatr, 10: 537-540.
13. Gupta S, Gupta A (2017) Selective IgM Deficiency-An Underestimated Primary Immunodeficiency. Front Immunol, 8: 1056.