



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

(Ref range 1-4.8 k/ μ L), eosinopenia of 0 k/ μ l (Ref range 0.1-0.3 k/ μ l), a platelet count of 0 k/ μ l (Ref range 150-400 k/ μ l), and a normal hemoglobin level of 16 g/dl (Ref 14-17.4 g/dl).

Other pertinent labs included normal partial thromboplastin time, mildly elevated prothrombin time (PT) at 15.1 (Ref range: 11.8-14.8 k/ μ l), normal International Normalized Ratio (INR), normal liver function tests, negative coombs test, and a normal fibrinogen level. Lactate Dehydrogenase (LDH), was elevated at 429 U/l (Ref <240 U/l) and D-dimer was elevated at 13.1 μ g/ml Fibrinogen equivalent units (FEU), (Ref 0-0.5 μ g/ml FEU). Stool Occult test was positive for the blood. The patient's nasopharyngeal swab was found to be SARS-COV-2 positive using the real-time Polymerase Chain Reaction (PCR), assay. A repeat Chest X-Ray (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). IgG and IgA levels were within normal

limits (IgG 752 mg/dl, Ref 700-1600 mg/dl, IgA 118 mg/dl, Ref 60-400 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 intravenous immunoglobulin (IVIG) infusion at 1 g/kg based on ideal body weight was given once. The IVIG infusion improved the patient's platelet count to 53 k/ μ L, with a marginally increased mean platelet volume 12.2 fl (Ref 8-12 fl), ANC to 494 cells/ μ l, and lymphocyte count to 1 μ /k, 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.

On 2-week follow up, patient reported being at his baseline without any further episodes of bleeding or petechiae. Patient missed his scheduled appointment for repeat CBC.

Discussion

We describe the first case, to the authors' knowledge, of the novel coronavirus causing combined AIN and 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][9]. 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 [10]. 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 [11]. There are case reports of COVID-19 triggering thrombocytopenic purpura [12] and possibly Kawasaki disease [13].

Conclusion

We speculate that the patient's selective IgM deficiency predisposed him to have autoimmune cytopenia, and SARS-COV-2 triggered him to acquire combined AIN and ITP. 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.

What is new?

As we know, the world is in the midst of one of the worst pandemics in recent history regarding the number of cases, deaths, and geographical areas involved. We report a case of a 27-year-old male with COVID-19, neutropenia, and "zero" platelets, who showed a significant response with one dose of IVIG. To the authors' knowledge, this is the first report of Combined AIN and ITP due to COVID-19 from the United States. This case is also unique as it occurred in a patient with no prior medical history of autoimmunity. We hope this case will bring awareness to the prompt recognition and appropriate treatment of patients in this group.

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None.

Conflict of interests

The authors declare that there is no conflict of interest regarding the publication of this article.

Consent for publication

Written Consent was obtained from the patient.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

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Summary of the case

1	Patient (gender, age)	27-year-old male
2	Final diagnosis	Combined Autoimmune Neutropenia (AIN) and Thrombocytopenia (ITP) in a patient with COVID-19
3	Symptoms	Fever, cough, gum bleeding with brushing and a petechial rash
4	Medications	Intravenous Immunoglobulin (IVIg)
5	Clinical procedure	None
6	Specialty	Infectious Diseases