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Austin Schatzman  
Lehigh Valley Health Network, Austin.Schatzman@lvhn.org

Julia Vandenheuvel MD  
Lehigh Valley Health Network, julia.vandenheuvel@lvhn.org

Tibisay Villalobos MD  
Lehigh Valley Health Network, tibisay.villalobos@lvhn.org

Kris Rooney MD  
Lehigh Valley Health Network, kris.rooney@lvhn.org

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Transient Leukopenia, Thrombocytopenia, and Severe Neutropenia Associated With Acute SARS-CoV-2 Infection

Austin Schatzman, DO, Julia Vandenheuvel, MD, Tibisay Villalobos, MD, Kris Rooney, MD
Department of Pediatrics, Lehigh Valley Reilly Children’s Hospital, Allentown, Pa.

Introduction
- Infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been reported to cause a myriad of manifestations and complications.
- There are several documented cases of idiopathic thrombocytopenia purpura (ITP) as well as autoimmune hemolytic anemia (AIHA).
- Xu et al. described the mechanism of thrombocytopenia related to COVID-19 as multifactorial including lung injury resulting in increased platelet consumption, direct infection of bone marrow stromal cells, and cytokine storm resulting in destruction of bone marrow progenitor cells.
- There are documented cases of lymphocytopathy due to cytokine storms.
- Two cases of severe neutropenia in neonates have been reported by Venturini et al. in association with mild COVID-19.

Case Description
- A 17-year-old female with a history of trisomy 21, aortic insufficiency, celiac disease, and obesity.
- Transferred with complaints of dehydration, fever, diarrhea, and a recent, known household member positive for SARS-CoV-2.
- 5-day history of fever, lethargy, mucopurulent nasal secretions, reduced oral intake, and decreased urine output prior to admission.

Clinical Course
- Placed on empiric antibiotics secondary to severe neutropenia.
- Nasopharyngeal swab detected SARS-CoV-2.
- Developed hypoxemia requiring escalation of care to our pediatric intensive care unit and high flow oxygen therapy was initiated.
- Corticosteroids and antiviral (remdesivir) initiated.
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HOSPITAL DAY 3 LABORATORY FINDINGS
- Absolute neutrophil count: 1,568
- Hospital day 5 transferred to general pediatrics floor and weaned off oxygen support.
- Discharged home the following day.

CONCLUSIONS
- Previous cases of bone marrow suppression related to COVID-19 include:
  - 33-year-old female patient who underwent extensive evaluation for myelodysplasias including bone marrow biopsy and ultimately received granulocyte colony-stimulating factor (G-CSF) for severe neutropenia that resolved following acute SARS-CoV-2 infection.
  - 5-month-old diagnosed with multisystem inflammatory syndrome in children (MIS-C) in the setting of 36-hour history of persistent fever, perinatal cellulitis, and lip ulceration with a negative SARS-CoV-2 PCR but positive IgG and IgM was noted to have severe neutropenia treated with G-CSF.
  - 23-day-old and a 39-day-old neonate with mild COVID-19 were noted to have severe neutropenia that resolved without intervention.
- Bone marrow suppression by well-known viruses could explain the hematologic manifestations of SARS-CoV-2.
- Individuals with trisomy 21 are at increased risk of developing hematologic disturbances.
- 5%-10% of infants with trisomy 21 develop transient myeloproliferative disease.
- Mutations in GATA4 are well recognized in trisomy 21 to cause megalakaryocyte and erythroid abnormalities but not myeloid.
- Leukopenia, thrombocytopenia, and severe neutropenia remain novel findings.
- Bone marrow biopsy may not be indicated in patients with SARS-CoV-2 infection and hematologic abnormalities given the transient suppression of blood cell lines.

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REFERENCES

Figure 1: Chest radiograph revealed bilateral pneumonia visualized in the lower lung fields.

CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

ADMISSION VITAL SIGNS
- Temp: 99.4°F
- Pulse: 102
- Resp: 20
- BP: 98/82
- SpO2: 97%
- BMI: 34.73

ADMISSION LABORATORY FINDINGS
- Absolute neutrophil count: 351

ADMISSION IMAGING
- Absolute neutrophil count: 351

No morphological abnormalities were observed on peripheral blood smear.

Figure 1: Chest radiograph revealed bilateral pneumonia visualized in the lower lung fields.

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