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Post COVID-19 Thrombocytosis in a Child with B-cell Acute Lymphoblastic Leukemia

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We report a pediatric B cell ALL case who developed thrombocytosis on chemotherapy with a high titer of SAR-CoV-2 IgG antibody.

Patients with COVID-19 infections present with abnormalities in the coagulation system, including elevated D-dimer and fibrinogen, and usually have mild thrombocytopenia. There are a few reports of thrombocytosis due to COVID-19 infection in children.[1] We report a child with high-risk B cell acute lymphoblastic leukemia (ALL) in the consolidation phase of chemotherapy presenting with thrombocytosis.

The SARS-CoV-2 infection causes a wide range of clinical symptoms. It causes inflammation which in severe cases, progresses to cytokine storm, with frequent involvement of the hemostatic system.[2] SARS-CoV-2 infects the human body by binding with the angiotensin-converting enzyme-2 (ACE-2) receptor and can directly enhance platelet activation.[3] It leads to abnormal coagulation findings, e.g., elevated d-dimer and fibrinogen and mild thrombocytopenia.[1] The majority (58–95%) of COVID-19 patients may have mild thrombocytopenia, with the severe disease having a lower platelet count than non-severe disease by 23000–31000/µL.[4] Thrombocytosis due to COVID-19 infection has been reported and increased thrombopoietin levels after pulmonary inflammation is considered one of the possible mechanisms.

In our case, a 6 year old girl, a case of B cell ALL on the consolidation phase was found to have thrombocytosis (absolute platelet count [APC] – 11,47,000/µL) with a normal peripheral smear. The child was asymptomatic with a normal systemic examination. The child had documented severe thrombocytopenia during induction chemotherapy and had received multiple platelet transfusions. Post-induction bone marrow evaluation showed negative minimal residual disease (MRD) and normal platelet counts. The child had not received steroids post-induction chemotherapy. On further evaluation, COVID antibodies were positive (78.00 AU/mL). The child did not suffer from an overt COVID infection in the past or have received a COVID vaccination yet. Inflammatory markers were within normal limits (total leukocyte count-4100, C-reactive protein, 0.06 mg/dL, procalcitonin-0.05 ng/mL, serum fibrinogen-2.1 g/L, D-dimer-412 µg/L). Infective workups were negative and the iron studies were within normal range. The child was managed conservatively and serial monitoring of platelet counts with ongoing chemotherapy was done, which showed a decreasing trend over a period of time and platelet counts returned to normal range after 4 weeks. There are several mechanisms that contribute to thrombocytopenia-direct infection of the megakaryocytes and platelets in the bone marrow, peripheral destruction of platelets, decreased production of endothelial damaged induced platelet activation that leads to its removal from circulation.[5] Thrombocytosis in COVID-19 infection can occur secondary to thrombocytopenia as a part of homeostatic compensation to platelet consumption due to inflammatory response by COVID-19 infection; however, the exact cause is yet to be defined. COVID-19 infection is a state of cytokine excess and can reactively enhance the production of thrombopoietin (TPO), which in turn leads to secondary thrombocytosis.[5] Thrombocytosis in cancer patients can occur as a reactive phenomenon with the disease in remission and a regenerating marrow but such high levels of platelets are unusual in the initial phase of therapy. Thrombocytosis can also occur due to endothelial injury that stimulates the von Willebrand factor (vWF) release. It binds with platelet membrane glycoprotein Ib (GPIb) vWF and leads to increased platelet production.[5]

Our case highlights thrombocytosis post-COVID infection in a child on cytotoxic therapy. Post COVID thrombocytosis needs

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attention in children with cancer (a prothrombotic state) due to the additional risk of thrombotic events.

Availability of Data and Materials
Available.

Ethics Approval and Consent to Participate
Ethics approval was obtained from the parents.

Consent for Publication
Consent for publication was obtained from the parents.

Conflict of Interest
None declared.

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