

## Case Report

# A rare case report of bone marrow hypoplasia in pediatric patient with COVID 19 infection


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## Abstract

A rapidly spreading novel coronavirus disease, defined as COVID-19 disease appeared in December 2019. It caused severe acute respiratory syndrome and virus identified as coronavirus 2 (SARS-CoV-2) cases of which emerged unexpectedly in China and spreaded all over the world as pandemic. Although, it can affect patients of all ages, the reports of children with COVID-19 are increasing. The most common symptoms observed in children are fever, cough, diarrhoea and upper respiratory infection. In complete blood count children with COVID-19 have leucopenia and lymphopenia. COVID - 19 infection in pediatric patient can cause bone marrow myeloid suppression which leads to isolated leucopenia. Here we present the case report of a six year old female child with fever, cervical lymphadenopathy and bone marrow hypoplasia who is positive for COVID 19 infection.

## Key words

Coronavirus, Pediatric patient, Leucopenia, Bone marrow hypoplasia.

## Introduction

In Wuhan city of China, many cases of pneumonia of unknown origin were occurred and later identified as novel corona virus. The name

was given as SARS-CoV-2 to the novel virus with the disease termed COVID-19 [1]. Although COVID-19 can occur in patients of all ages, the reports of children with COVID-19 are

increasing. The most common symptoms in pediatric age are fever, cough, diarrhoea, and upper respiratory infection. Few patients are also reporting with fatigue, myalgia, headache, anosmia, and dysgeusia too [2]. The recovery period of COVID-19 infection for pediatric patients is seems to be faster and the severity of the disease is also mild than adults [2]. Severe or critical course of COVID-19 in pediatric patients may leads to acute respiratory distress syndrome (ARDS) as well as toxic shock syndrome. In any viral infection usually total lymphocyte count is increased. Their subsets vary with different virus types, indicating a potential association between lymphocyte subset alteration and viral pathogenic mechanism. There are so many evidences propose that most patients with severe COVID-19 have cytokine storm syndrome and lymphopenia [3].

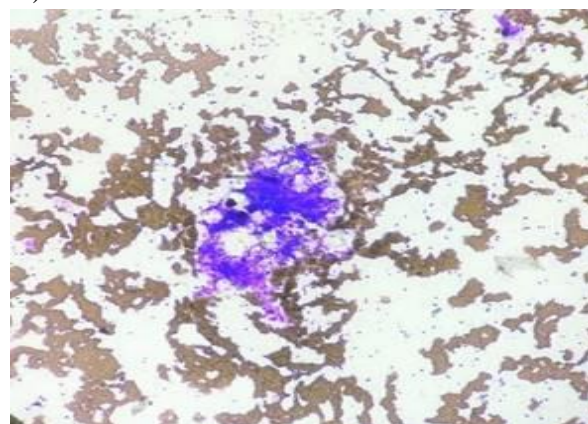
We are presenting this case report because of its rarity as the patient is having a severe myeloid suppression which is rare in COVID infection.

### **Case report**

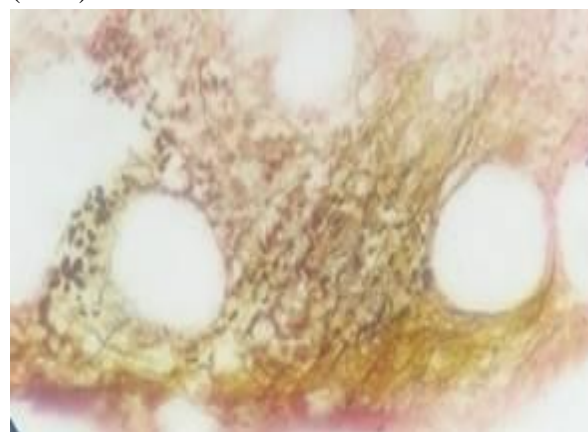
6 years old female child was admitted to GMERS Medical College, Ahmedabad with complaints of high grade fever, cough, generalized body ache, easy fatigability, loss of weight and appetite. On hematological examination she had anemia and leucopenia. All other parameters were within normal limits. Peripheral blood smear examination showed microcytic hypochromic anemia with anisopoikilocytosis, few macroovalocytes, schistocytes and tear drop cells. WBC series showed severe leucopenia and platelets were adequate on smear. Level of C- reactive protein was high which was 9.6 mg/dl. RT-PCR for COVID was done which was negative for COVID antigen but IgG titre for COVID-19 was positive. USG Neck and Thyroid showed multiple conglomerated nodal mass in both side of neck, largest measuring approximately  $2 \times 3$  cm in size. FNAC from swelling on right side cervical region showed Activated lymphocytes (Virocytes). Bone marrow examination was

advised and bone marrow aspiration and biopsy were done. On Bone marrow Aspiration, cellularity was markedly reduced, myeloid cells and Erythroid precursors were decreased and showed normal megaloblastic maturation with few micro normoblasts. Bone marrow aspirate (**Photograph - 1, 2**) showed lymphocytosis with few activated lymphocytes and occasional plasma cells with increased macrophages and fibrosis. Bone marrow biopsy (**Photograph - 3, 4, 5**) also showed hypocellular marrow with increased lymphocytes and few atypical lymphocytes. There were increased macrophages and histocytes. Myeloid series cells were reduced in profound number. Final impression was given as bone marrow hypoplasia and lymphocytosis-suggestive of post- viral bone marrow hypoplasia.

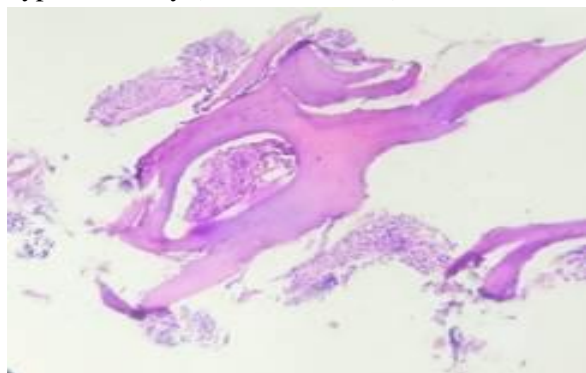
**Photograph – 1:** Bone marrow aspiration with Giemsa stain showing decreased cellularity (4 X).



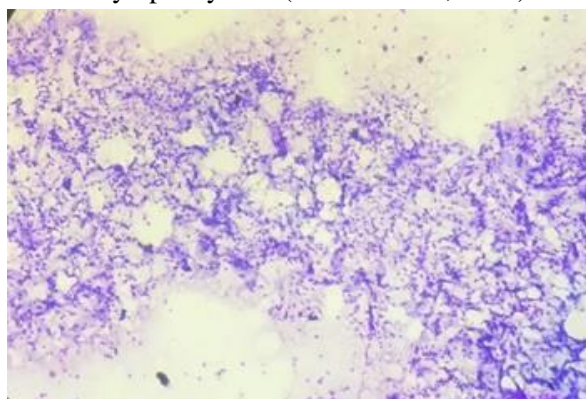
**Photograph – 2:** Reticulin stain showing fibrosis (40 X).



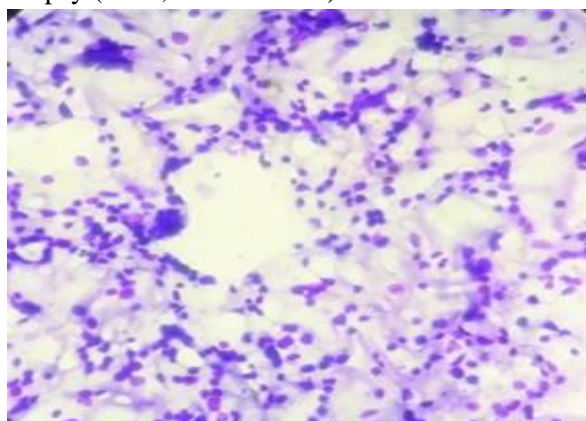
**Photograph – 3:** Bone marrow biopsy with hypocellularity (H & E stain, 4X).



**Photograph – 4:** Imprint of Bone marrow biopsy showed lymphocytosis (Giemsa stain, 10 X).



**Photograph – 5:** showed marked lymphocytosis and occasional macrophages in Bone marrow biopsy (40 X, Giemsa stain).



## Discussion

In year 2020, we all faced COVID-19 outbreak [4, 5]. It is clear that the hematologic laboratory will play a vital role in this crisis, contributing to patient screening, diagnosis, and prognosis. Infection with COVID-19 is not only affecting

lungs but it's a systemic infection with a significant impact on the hematopoietic system and hemostasis. Hematological analysis is recommended as very essential tools for patient monitoring. In most of the patient lymphopenia is the most common laboratory finding which is also useful for prognosis. In many patients with severe disease and fatal outcomes a decreased lymphocyte/white blood cell ratio is seen. There are evidences that pediatric patients mostly present with children with fever and signs of upper respiratory infection in COVID 19 infection [4]. In our case, the child had symptoms like fever, body ache and easy fatiguability with cervical lymphadenopathy. Our patient had anemia and leukopenia with bone marrow hypoplasia with lymphocytes and macrophages. Infection of COVID 19 virus also causes bone marrow suppression and atypical lymphocytosis same as other viral infection. The common peripheral blood smear finding in viral infections are known to be manifested by atypical lymphocytes, monocytes with vacuoles, inclusion bodies and pyknosis in leukocytes. COVID-19 infection is new entity and Information about the morphological changes of in peripheral blood smears is limited. The significance of these morphological changes on the disease's clinical course is also not very much known.

Depend on body's demand, bone marrow (BM) is able to generate copious amounts of blood cells on a highly composed process of proliferation and differentiation of hematopoietic stem and progenitor cells (HSPCs). In special situations like stress and infections, this process can be rapidly adapted under, to meet the specific cellular needs of the immune response and the ensuing physiological changes. Viral infection always causes a significant health risk and demands an adequate, balanced response from our immune system, which always affects the bone marrow. In fact, both the virus itself and the subsequent immune response can have a great impact on the hematopoietic process. Many viral infections causing various pathologies in the bone marrow like aplastic anemia, pancytopenia,



hemophagocytic lymphohistiocytosis (HLH), lymphoproliferative disorders, and malignancies. There are evidences which showed that cytopenia, raised ferritin level and coagulopathy are common findings in patients with severe COVID-19 pneumonia. This is suggesting that a subgroup of cases may have a macrophage activation syndrome [6]. Involvement of lungs is usually found in COVID-19 infection but the classical organomegaly pattern of HLH is rarely reported [7, 8]. Our patient was having marked hypoplasia of bone marrow and specifically myeloid series was predominantly suppressed along with increased number of lymphocytes and macrophages. As COVID 19 is a novel virus we should keep in mind that it can also cause bone marrow suppression and atypical lymphocytosis same as other viruses. It should be documented for further help in treatment.

## Conclusion

We can conclude that leucopenia found in pediatric patient suffering from COVID-19 can be associated with bone marrow myeloid suppression and should be considered as alarming sign. So that we do not miss the diagnosis of bone marrow hypoplasia and patient's treatment can be started as early as possible.

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