

## Leukemoid Reaction in a COVID-19 Patient

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### INTRODUCTION

A leukemoid reaction (LR) is defined as “a leukocytosis exceeding 50,000 cells / mL accompanied by an increase in neutrophil precursors”. LR is commonly seen in haematological and paraneoplastic syndromes of non-haematological malignancies, and also in certain non-carcinomatous diseases.<sup>1</sup>

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by a virus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>2</sup> COVID-19 has a huge impact on the haematopoietic system. Lymphopenia is an important laboratory finding with prognostic implications. Other entities with prognostic value are the neutrophil / lymphocyte ratio and peak platelet / lymphocyte ratio.<sup>3</sup> COVID 19 involves multiple systems and mainly include the respiratory system. Other systems involved are cardiovascular, gastrointestinal, neurological, immune system, and haematological manifestations.<sup>4</sup>

Hypercoagulability is a common manifestation of COVID-19 patients. D-Dimer levels on the higher side are reported and are not considered to be a prognostic marker especially when the levels keep increasing during the hospital stay. Higher levels of mortality are reported in such cases. Other haematological abnormalities include prolonged prothrombin time (PT) and a partial thromboplastin time (PTT), raised fibrin degradation products (FDP), thrombocytopenia, and disseminated intravascular coagulation (DIC).<sup>3</sup>

COVID-19 presenting as a leukemoid reaction is a rare entity with only a few cases reported to date. Hereby we report this case of COVID 19 positive elderly patient with the leukemoid reaction that later resolved post-treatment.

### PRESENTATION OF CASE

A 60-years-old male patient presented to casualty with complaints of fever, breathlessness, and cough of 5 days duration. There was no history of travel to high-risk areas or any contact history with a COVID-19 positive patient. There was no history of diabetes mellitus, hypertension, ischemic heart disease, or tuberculosis in past.

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*DOI: 10.14260/jemds/2021/88*

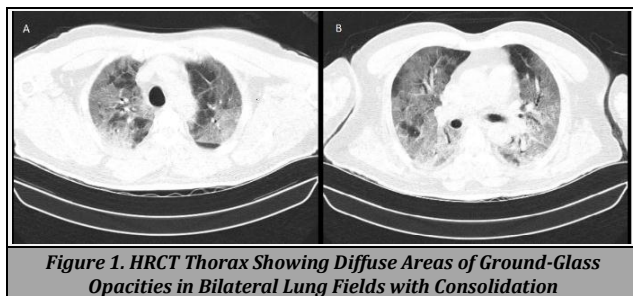
*How to Cite This Article:*

*Godhiwala P, Acharya S, Jagtap G, et al.  
Leukemoid reaction in a COVID-19 patient.  
J Evolution Med Dent Sci 2021;10(06):399-  
400, DOI: 10.14260/jemds/2021/88*

*Submission 03-10-2020,  
Peer Review 08-12-2020,  
Acceptance 15-12-2020,  
Published 08-02-2021.*

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On examination, the patient had a heart rate of 132 / min and a blood pressure of 120.84 mmHg. Oxygen saturation (Spo<sub>2</sub>) on room air was 58 %. Per abdomen examination was normal. No hepatosplenomegaly noted. Immediately his high-resolution computed tomography (HRCT) thorax was done which was suggestive of diffuse areas of ground-glass opacities in bilateral lung fields with consolidation in basal segments. (Figure 1). Computed tomography (CT) severity score was 17 / 25. The patient was subjected to reverse transcription polymerase chain reaction (RT-PCR) for COVID 19, which was positive.

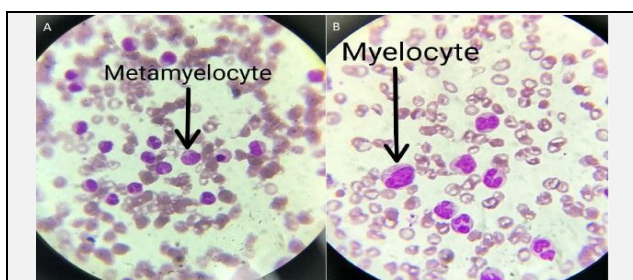


**Figure 1. HRCT Thorax Showing Diffuse Areas of Ground-Glass Opacities in Bilateral Lung Fields with Consolidation**

He was admitted to COVID intensive care unit (ICU) and was managed with antibiotics, anti-viral, steroids, non-invasive ventilation, and other supportive measures.

Laboratory investigations were done that revealed; haemoglobin (Hb) 8.6 gm %, white blood cells (WBC) 81000 cells / cu mm, total platelets- 1.38 lakh / cu mm. Differential leucocyte count (DLC) on peripheral smear showed myeloblasts: 01 %, promyelocytes 06 %, myelocytes 17 %, metamyelocytes 18 %, band forms 16 %, neutrophils 29 %, eosinophils 05 %, basophils 03 %, lymphocytes 05 % (Figure 2). The leukocyte alkaline phosphatase score was normal. Other laboratory investigations; C-reactive protein (CRP)- 7.7, D-dimer positive, lactate dehydrogenase (LDH)- 924, interleukin (IL) - 6 7 IU, ferritin- 822.

After 10 days of treatment in hospital, his WBC count was reduced to 9000 cells / cu mm. His oxygen requirement gradually reduced and was discharged on day 14 with a saturation of 95 % on room air.



**Figure 2. Peripheral Blood Smear Shows a Metamyelocyte (Panel A) at 40x Magnification and Myelocyte (Panel B) at 100x Magnification**

## DISCUSSION

LR was termed by Krumbhaar for various non-leukemic conditions mimicking leukaemia on blood picture. It can be defined as "leukocyte count greater than 50,000 / cu mm, increase in mature leukocytes in the peripheral blood along

with differential count showing a shift to left." Chronic myelogenous leukaemia (CML) and chronic neutrophilic leukaemia (CNL) are the most important differential diagnosis in such cases and needs to be ruled out. Hepatosplenomegaly and bone pain and tenderness are very common in CML, which are not seen in leukemoid reaction. Also, in CML, the peripheral blood shows immature cells, increase in blast cells, and basophils. The most important differentiating factor is the neutrophil alkaline phosphatase (NAP) score is low CML as compared to normal or raised values in LR.<sup>5</sup>

LR is commonly caused by infections, lymphoma, carcinoma, and drugs. Common infections include bacterial diseases such as disseminated tuberculosis (TB), shigella dysentery, clostridium difficile colitis, and pneumonia. Viral diseases include cytomegalovirus (CMV), human immunodeficiency virus (HIV), Epstein-Barr virus (EBV), mumps, parvovirus B19. Parasitic infestation causing LR are malaria, visceral larva migrans, and trichinosis. Solid tumours of gastrointestinal tract (GIT), lung, gut, and pancreas and Hodgkin's lymphoma are frequently associated with LR. Drugs causing LR includes minocycline, steroids, recombinant haematopoietic growth factors.<sup>5</sup>

The world is still understanding various ways in which this virus presents. The spectrum of pathophysiology, clinical features, complications, and outcomes related to this infection will continue to evolve over the months to come.

## CONCLUSIONS

The most commonly encountered haematological manifestations of COVID-19 are leukopenia and thrombocytopenia and uncommon but dreadful conditions are disseminated intravascular coagulation (DIC). Leukemoid reaction is a rare finding in COVID-19. It should be considered while treating patients of COVID-19. The standard treatment protocol should be followed and needs no further intervention. The overall prognosis depends on disease per se.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jemds.com.

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