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Leukemoid reaction in a patient with COVID-19 infection: A case report

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ABSTRACT

Rationale: COVID-19 usually presents with flu-like symptoms and signs, but some rare presentations like leukemoid symptoms cannot be ignored.

Patient's concerns: A 37-year-old female presented to the outpatient department with flu-like symptoms.

Diagnosis: The RT-PCR test for SARS-CoV-2 infection was positive, while complete blood cell and peripheral blood smear showed leukemoid reaction.

Intervention: Paracetamol and fexofenadine for flu-like symptoms and leukemoid presentation.

Outcomes: On the 10th day, the patient was asymptomatic and RT-PCR was negative. So the patient was discharged and leukemoid presentation subsided after clearance of viral disease.

Lessons: COVID-19 has a myriad of presentations, and unusual symptoms/signs especially in this pandemic could be induced by COVID-19 infection.

KEYWORDS: COVID-19; Leukemoid reaction; Atypical presentation; Abnormal total leucocyte count; Leukocytosis

1. Introduction

In December 2019, a worldwide outbreak of the coronavirus disease 2019 (COVID-19) outbreak and swept over the whole world, which became an emergency of major international concern. The SARS-CoV-2 infection causes clusters of severe respiratory illness similar to the severe acute respiratory syndrome. Typical symptoms include fever, cough, dyspnea, fatigue, and myalgia. However, we found some atypical presentations of COVID-19 that make timely diagnosis challenging. In this case report, we reported an unusual case of COVID-19 with leukemoid reaction (LR).

2. Case report

This study was approved by the Institutional Ethical Committee and informed consent was obtained from the patient.

A 37-year-old lady was presented to our triage outdoor department with complain of high-grade fever (37.7 °C), sore throat, and dry cough for last 3 days. She was advised symptomatic treatment. According to our triage protocol we labeled her as red tag (COVID-19 suspect) and advised her complete blood count, C-reactive protein test, blood sugar test, serum ferritin test, and True-Nat test. RT-PCR result showed positive COVID-19. Other laboratory parameters were as follows: hemoglobin of 12.3 g/dL, total leukocyte count (TLC) of 68 100 cells/mm³ (normal range: 4000-11 000 cells/cm³), polymorphs of 66% (normal range: 40%-80%), lymphocyte of 12% (normal range: 20%-40%), monocyte of 6% (normal range: 2%-10%), eosinophils of 1% (normal range: 1%

Significance

COVID-19 usually presents with flu-like symptoms and signs, but some rare presentations like leukemoid symptoms cannot be ignored. We reported an unusual case of COVID-19 with leukemoid reaction. We highlight that unusual symptoms and signs especially in this pandemic could be induced by COVID-19 infection.

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-6%), myelocytes of 7% (normal range: 0%), metamyelocyte of 4% (normal range: 0%) and stab cells of 4% (normal range: 0%), platelet count of 1.66 L, random blood sugar of 94 mg/dL, serum ferritin of 468 ng/mL, C-reactive protein of 36 mg/L (normal range: <5 mg/L).

The patient was hospitalized in an isolation ward because of COVID-19 infection and leukocytosis. Despite being febrile (37.7 °C) and tachycardia (110 per minute), other vitals were normal. General examination and systemic examination were unremarkable (no peripheral palpable lymph nodes); there was no splenomegaly as confirmed by ultrasonography of the abdomen. There was no history of dysuria, loose motions, and rash in the recent past. Her X-ray chest was normal at the time of admission. There was no history of any medical illness. Obstetrics and menstrual history were insignificant. On day 2 of admission, her routine blood investigations were sent and it showed raised total leukocyte count of 46 500 cells/mm³ (normal range: 4 000-11 000 cells/cm³). On examining peripheral blood smear it showed increased leukocytosis with a shift to the left as evident by a few immature cells like myelocytes, metamyelocytes and there were no toxic granules and Döhle bodies. Tests of HIV, anti HCV, HbsAg and Venereal Disease Research Laboratory test were negative. Because of her increased TLC, an extensive workup was done however flu-like symptoms were resolved on the 4th day of admission. Her blood and urine culture was sent that out to be sterile. Serology for parvovirus B19 was negative. She was worked up for Koch's and malignancy by computed tomography of abdomen and thorax was done, and the result was unremarkable. She denied any history of steroid intake. Her bone marrow examination was done and showed hypercellular marrow and increased Monocyte: Eosinophil ratio (15:1) (normal ratio: 1.2:1 to 5:1) and reactive changes (Figure 1).

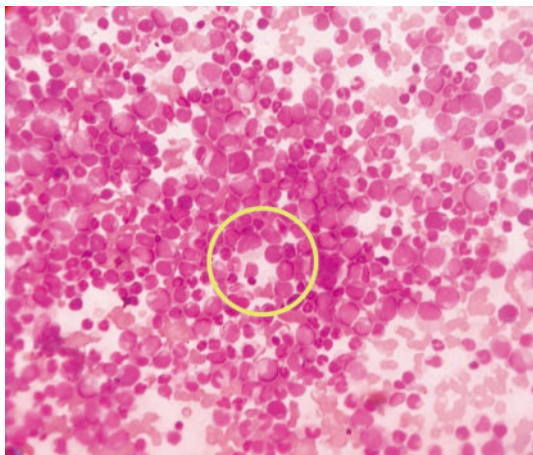


Figure 1. Bone marrow aspiration of a 37-year-old lady showing: hypercellular marrow with increased Monocyte: Eosinophil ratio (15:1) and reactive marrow changes (yellow circle)(MGG Stain, ×40).

Her leucocyte alkaline phosphatase was 390 (normal range: 20-100). During admission subsequent TLC on 5th day was 28 000 cells/mm³ (normal range: 4 000-11 000 cells/cm³) and on 8th day was 11 100 cells/mm³ (4 000-11 000 cells/cm³). As per our institutional policy we repeated RT-PCR for COVID-19 on the 10th day after the first positive report, the result was negative and TLC was 7 600 cells/mm³. We could not find any reported cases (literature) of leukemoid reaction as leukocytosis is resolved with the eliminating of COVID-19 infection. So a consensus was made that this leukemoid reaction was due to COVID-19 infection. After discharge Jak-2 mutation was done which turned out to be negative.

3. Discussion

The term LR was coined by Krumbhaar in 1926 to describe the leukemia-type blood picture that was found in several non-leukemic conditions[1]. It is defined by leukocyte count greater than 50 000 cells/mm³, increase in mature leukocytes in the peripheral blood along with differential count showing a shift to left^[2]. The common causes of LR are infections, carcinoma, lymphoma, drugs, and ingestion of ethylene alcohol. Infections causing LR are bacterial diseases like disseminated tuberculosis, *Clostridium difficile* colitis, *Shigella dysentery*, and pneumonia. Rarely viral diseases like parvovirus B19, HIV, mumps, CMV, EBV, and parasitic infestation (malaria, visceral larva migrans) can cause LR. In addition, a few drugs (steroids, minocycline) can cause LR. Sometimes stressful conditions (severe pain, trauma) precipitate LR. Solid tumors (lung, gastrointestinal, genitourinary, pancreas) and Hodgkin's lymphoma are associated with LR[3]. As SARS-CoV-2 keeps evolving, more atypical presentations may be found in practice. Any atypical presentations in this pandemic must be suspected of COVID-19 infection. There was rare literature reporting leucoerythroblastic reaction as presentation of COVID-19[4], and this presentation can't be ignored. LR usually see an increase in the white blood cell count, which can mimic leukemia. The reaction is induced by an infection or another disease and is not a sign of cancer. Blood counts often return to normal when the underlying condition is treated. SARS-CoV-2 has varied presentations with or without flu-like symptoms[5]. Usually, viral infections are associated with leucopenia and bacterial infections with leukocytosis. In this pandemic case with any uncommon presentations, COVID-19 should be thought of.

Conflict of interest statement

The authors report no conflict of interest.

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Authors' contributions

P.A. and A.P. helped in manuscript preparation; H.K. provided pathological support and helped in laboratory testing; N.P. and A.G. helped in critical revision of article.

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