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CASE REPORT

RHEUMATOID ARTHRITIS AND COVID-19 ACUTE RESPIRATORY DISTRESS SYNDROME

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ABSTRACT
Rheumatoid arthritis (RA) is a progressive and systemic inflammatory disease of unknown cause that usually enters a chronic phase. Treatment of rheumatoid arthritis mostly consists of immunosuppressive agents and corticosteroids. These agents put patients at risk of infection (COVID-19). RA disease in common with coronavirus infection can trigger immune system for cytokine storm that is potentially a manifestation of systemic inflammation. We report an unusual case of rheumatoid arthritis with a combination of COVID-19 respiratory distress and its successful management in critical care settings. It seems that an early intubation strategy would be beneficial for young RA COVID-19 patients with severe leukocytosis. Also, patients with leukocytosis should be closely monitored for early detection of acute respiratory distress syndrome. As RA patients are at risk of co-infection, it is recommended to keep them in a separate room (preferably an isolated room).

KEYWORDS: Rheumatoid arthritis, Critical Care, COVID-19, Respiratory Distress Syndrome, Cytokine Release Syndrome.

BACKGROUND

COVID-19 undoubtedly threaten the treatment strategy of rheumatoid arthritis (RA), whose are highly at the risk of infection because of the nature of autoimmune diseases combined with the adverse effect generated by corticosteroids and immunosuppressive medications [1].

RA is a progressive and systemic inflammatory disease of unknown cause that usually enters a chronic phase [2]. The disease is characterized by symmetrical inflammation, joint destruction, and extra-articular manifestations involving several systems. One of the rare manifestations commonly seen in the late stages of acute RA is Felty's syndrome, which is associated with leukopenia, splenomegaly, and nodular RA. It is believed that [3] neutropenia, which is the most important consequence of Felty's syndrome is the main cause of increased infection in patients. Neutropenia in these patients may be due to:

[1] impaired granulocytopoiesis [2] peripheral destruction and increased sequestration [3] excessive margination of neutrophils [4] varying combinations of these three possibilities.

Due to cytokine storm in COVID-19, both leukopenia and leukocytosis depend on the stage of the disease. However, leukopenia might be a warning for early acute respiratory distress syndrome development [9]. We hereby report an unusual case of rheumatoid arthritis with a combination of COVID-19 respiratory distress and its successful management in critical care settings.

CASE REPORT

A 17 years old male (189 centimeters height, 115-kilogram weight) with a history of rheumatoid arthritis diagnosis (1 month before) was admitted to the intensive care unit for fever, cough, and dyspnea that started 7 days before. Real-time PCR Sars-cov2 was positive. Due to the diagnosis of arthritis rheumatoid, in the last 1 month ago, the patient was treated with Azathioprine 50 mg TDS and Prednisolone 5 mg BD. There was no history of drug allergies. Vital sign at the ICU admission Heart rate = 110/min, Temperature= 37.8, SPO2=78%, and blood pressure= 124/78 mmHg.

At the beginning of ICU admission, he developed respiratory distress (respiratory rate =48/min), intolerance of face mask, and high flow nasal cannula (Venous blood gases, PH = 7.38, PCO2 = 37.7, PO2 =50, HCO3=23) (PF ratio = 150 and ROX index= 1.625) and loss of consciousness. Chest CT scan of the lungs reported bilateral infiltration, with about 50% involvement of both lungs. Patient intubated (Early intubation) and undergone invasive mechanical ventilatory support on synchronous intermittent mandatory ventilation (SIMV-VC) mode of ventilation, (Tidal Volume=550 ml, Respiratory Rate= 16/minute, I: E= 1:2, FIO2=80%, PEEP=5cm H2O, Pressure support=3 cm H2O). His blood lab tests demonstrated white blood cell =300000 micro/L, Neutrophil count 86% (258000), Lymphocyte count 7% (21000), Monocyte count 3% (9000), Basophil count 2% (6000), platelet= 47000, Hemoglobin=9 g/dl, C-reactive protein= 221 mg/L, Erythrocyte sedimentation rate= 62 mm/hr. Other lab tests were in the normal range. The results of blood culture two times were negative. There was no sign of sepsis and the patient was systemic inflammatory response syndrome (SIRS) negative.

He was given antibacterial therapy, including Levofloxacin, Ceftriaxone, Piperacillin-Tazobactam, and Meropenem. He has also been prescribed Methylprednisolone (40 mg/day, 3 days). The patient continued on invasive mechanical ventilation support with supportive treatment. After 24 hours post-admission in ICU (and also post-intubation), his hemodynamic parameters and mentation level improved. Fever subsided thereafter in the next 12 hours. On the third day in ICU, the patient was extubated after meeting the standard extubation criteria. The patient was kept under observation for the next 48 hours post-extubation and then shifted to the ward and later discharged from the hospital uneventfully.

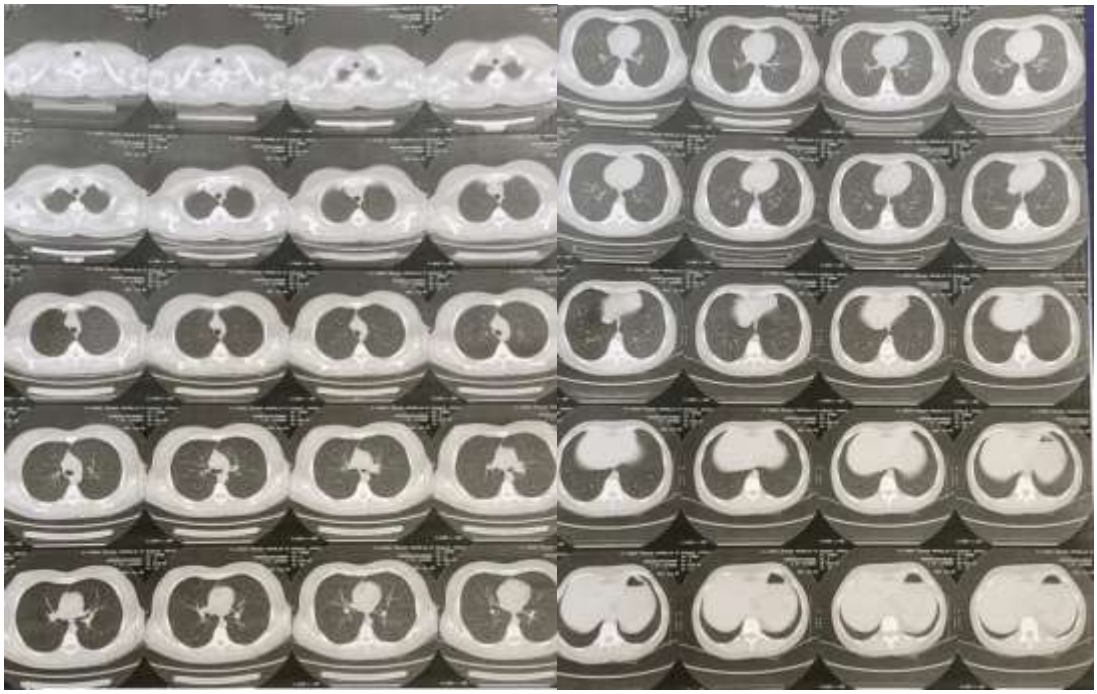

FIGURE 1- The chest Computer tomography (CT) scan result

DISCUSSION

Leukocytosis might be result in leukostasis [5]. In COVID-19 pathogenesis, it might induce pulmonary infiltration and finally pulmonary edema and acute respiratory distress [6]. Therefore, patients with leukocytosis are at the risk of ARDS particularly in COVID-19 era. In this case it seems that leukocytosis in common with cytokine storm induced acute respiratory distress. Also, it should be kept in mind that leukostasis can damage the pulmonary capillary so that the oxygenation will be interrupted. In COVID-19

patients keeping safe airway for ventilation and oxygenation is highly important [7]. It should bear in mind that, RA patients have some degree of inflammation for their disease, and COVID-19 can exacerbate the inflammation and trigger cytokine storm. This can result in ICU admission and swift progress of the disease. The cytokine release syndrome symptoms can be overlapped with COVID-19 infection. These symptoms may be dyspnea, fever, hypotension, tachycardia, and hypoxia [8] that are common findings in critically ill COVID-19 patients. Therefore, patients with autoimmune diseases such as RA should be under close monitoring at the time of hospitalization and ICU admission.

On the other hand, treatment of rheumatoid arthritis mostly consists of immunosuppressive agents [4]. These agents might induce leukopenia which puts patients at the risk of infection particularly "COVID-19 infection". Clinician should be aware of this risk and consider any preventive action for survival benefits. This may be ranging from non-invasive oxygen therapy to considering the tracheal tube insertion.

Increasing Neutrophil–lymphocyte ratio and platelet–lymphocyte ratio has been shown to be strongly associated with rheumatoid arthritis. It can be said that it is a suitable and cheap indicator for following up RA patients [10]. In reported patient the Neutrophil–lymphocyte ratio was 12.28 and platelet–lymphocyte ratio was 0.44. So, both of these ratios confirmed that patient was in severe stage of disease. Higher platelet and lower lymphocyte counts are associated with adverse chronic diseases. So, critical care strategy like intubation and putting central venous line were highly needed for the patient.

It was reported that the risk factors of severe COVID-19 outcomes in RA patients consist of higher ages and comorbidities, similar to those in the general public [11]. Also, Glucocorticoids seems to be associated with a higher risk of poor COVID-19 outcomes. RA patients may suffer from changes in access to care, telemedicine, medication shortages, anxiety, and social isolation that may associate with disease exacerbation. It should be stated that this is the primary finding regarding risk factors associated with RA patients' outcomes and it does not mean any causation and more studies are needed.

CONCLUSION

Although both leukopenia and leukocytosis have been seen in COVID-19 critically ill patients, we reported a RA young patient with severe leukocytosis. This leukocytosis might be due to the COVID-19 cytokine storm or even the diverse effects of immunosuppressive medications. It seems that an early intubation strategy would be beneficial for young rheumatoid arthritis COVID-19 patients with severe leukocytosis. Also, patients with leukocytosis should be closely monitored for early detection of ARDS. As RA patients are at risk of co-infection, it is recommended to keep them in a separate room (preferably an isolated room).

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