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Case Report

Splenic Infarction Secondary to COVID-19 and Malaria Co-Infection: A Case Report

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Abstract
Splenic infarction is a rare complication of both malaria and COVID-19. We report a splenic infarction case due to COVID-19 and malaria co-infection. A 35-year-old male with no known chronical disease tested positive for both COVID-19 and malaria in Turkey in 2022. Oral artemether and lumefantrine treatment was started. On the third day of the treatment, he complained about a severe left upper quadrant pain. A repeated abdominal CT showed splenomegaly and 8 cm diameter hypodense areas throughout the spleen consistent with splenic infarction. The patient was discharged with low molecular weight heparin. A rare complication that can be seen in both diseases developed a more rigorous recommendation for anticoagulant therapy is needed for co-infections of COVID-19 with diseases that may present similar thrombotic complications.

Introduction

Coronavirus Disease-19 (COVID-19) pandemic has a major impact on health worldwide. COVID-19 has a negative effect on control programs other existing health problems that are endemic, such as malaria, human immunodeficiency virus, hepatitis B virus and tuberculosis (1). Another impact of COVID-19 on other diseases is co-infection related increased morbidity and mortality. Since the beginning of the pandemic, COVID-19 co-infection has been reported with many diseases. Malaria and COVID-19

co-infections have been reported in endemic areas (2). Prompt diagnosis of these diseases may be difficult in endemic areas due to similar symptoms such as fever and myalgia and delayed treatment may result in complications.

Splenic infarction is a rare complication of both malaria and COVID-19. We report a splenic infarction case due to COVID-19 and malaria co-infection.

Case

A 35-year-old male with no known chronical disease visited an emergency department of Ordu Fatsa State Hospital in Turkey with fever in 2022. His SARS-CoV-2 PCR test resulted positive and he was hospitalized.

The patient was referred to Fatsa State Hospital due to persistent fever on the 4th day of admission. Past medical history revealed that the patient came from Sierre Lione 20 days ago and two months ago before arrival to the county; he was diagnosed with malaria and typhoid fever and had treatment. He did not take malaria chemoprophylaxis. His vital signs were body temperature: 39 °C, heart rate: 102 per min, oxygen saturation: 97% on room air and the others were normal. On physical examination, the spleen was palpable and the sclera was icteric. The remainder of the examination was normal.

A blood examination revealed the following: hemoglobin level, 9.4 g/dL (reference range RR; 11.7-18) white blood cell count, 4.28 × 10^3 µl/L (RR:4-12× 10^3); and platelet count, 72 × 10^3 µl/L (RR: 150-450 × 10^3). Serum aspartate aminotransferase:44 U/L (RR:0-32), alanine aminotransferase:22 U/L (RR: 0-33), C-reactive protein:127 mg/L (RR: 0-5), total bilirubin level:1,05 mg/dL (RR:0-1.2), direct bilirubin level:0.53 mg/dL (RR:0-0.30), d-dimer:7383 µg/L (RR:0-500) and procalcitonin level:14,83 ng/mL (RR:0-0.5).

Thorax computerized tomography (CT) scan for COVID-19 involvement and abdominal CT scan for enteric fever and malaria was performed for patient with fever for 5 days. No pathological appearance was detected in the thorax CT of the patient and there was no pathological finding in the abdominal CT except for splenomegaly. As the patient had a history of malaria and typhoid fever, blood culture was taken, peripheral blood examination was studied, and empirical piperacilin-tazobactam was started. Trophozoites of *Plasmodium falciparum* were seen on peripheral blood examination (Fig.1) and malaria antigen test was positive.

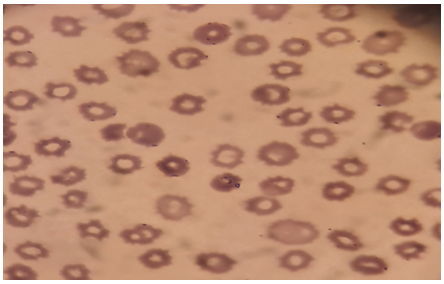

Fig. 1: Peripheral smear of the patient consistent with the diagnosis of malaria (Original)

Oral artemether and lumefantrine treatment was started. On the second day of the treatment, the patient became afebrile. On the third day of the treatment, he complained about a severe left upper quadrant pain. A repeated abdominal CT showed splenomegaly and 8 cm diameter hypodense areas throughout the spleen consistent with splenic infarction (Fig. 2).

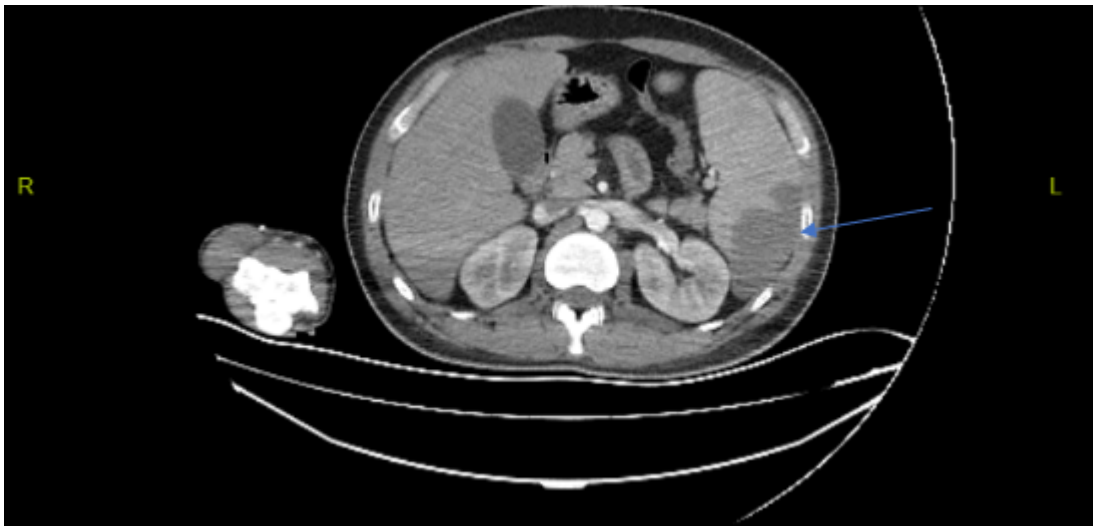

Fig. 2: Abdominal computerized tomography showing splenomegaly and 8 cm diameter hypodense areas throughout the spleen consistent with splenic infarction (Original)

His hemodynamic status was stable and the general surgeon evaluated the patient and did not need for emergency surgery. Antipyretics and low molecular weight heparin (LMWH) were started. No malarial trophozoites were observed on the peripheral blood smear obtained post-treatment. There was no microorganism growth in the blood culture. On 4th day of admission, hemoglobin level, 9.2 g/dL, CRP, 46 mg/L and the other laboratory results were normal. The patient was discharged with LMWH.

Ethics approval

Written informed consent was obtained from the patient.

Discussion

COVID-19 is responsible for an important morbidity and mortality due to co-infection and superinfection in addition to its primer damage. COVID-19 co-infection with many diseases such as dengue fever, malaria, tuberculosis has been reported. As in the case we presented, overlapping symptoms in co-infections may make the prompt diagnosis difficult, delay the initiation of appropriate treatment, and increase the complication rate.

The prevalence of COVID-19 and malaria co-infection appears heterogeneous, it is reported as %1-%11 in different studies (2,3). In Türkiye, this was the second reported co-infection since malaria is not endemic in the country (4). Both of cases were imported malaria cases.

COVID-19 and malaria co-infection may cause many interactions in human body. Malaria may be a protective role for COVID-19 with developing anti-GPI antibodies, which could identify SARS-CoV-2 glycoproteins (5). However, coinfection may result in a more severe degree of coagulopathy and more severe disease than with either one alone because of excessive proinflammatory response (5).

There are conflicting hypotheses on the positive and negative effects of co-infection on the course of diseases. Osei et al (6) reported low incidence and mortality rate of COVID-19 in malaria endemic regions. Co-infection with COVID-19 and malaria is associated with increased all-cause in-hospital mortality compared to mono-infection with SARS-CoV-2 in a retrospective cohort study (7). These conflicting results may depend on the period of

studies, testing strategies in countries, risk factors of patients such as age, underlying disease, and time of infection.

Splenic complications such as infarction, rupture, hypersplenism can be seen in malaria. Splenic infarction is a rare complication of malaria and incidence of malaria-associated splenic infarction remains unclear because of underdiagnosis and underreporting (8).

COVID-19 has been associated with infarction of many organs such as myocardial infarction, kidney infarction, cerebral infarction (9-11). Although splenic infarction has been reported in COVID-19 patients, its exact frequency is unknown. COVID-19-associated coagulopathy including endothelial activation and damage explain these thrombotic complications.

In this case, splenic infarction may have been a complication of only malaria or COVID-19. Another possibility is a synergistic effect on endothelial damage and activation of coagulation cascade by both infections. Thrombocytopenia as a common laboratory result of malaria and COVID-19 may prevent or delay the initiation of anticoagulant therapy.

Although the reported case was not mortal, a rare complication that can be seen in both diseases developed a more rigorous recommendation for anticoagulant therapy is needed for co-infections of COVID-19 with diseases that may present similar thrombotic complications.

Conflict of interest

The authors declare that there is no conflict of interest.

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