

Is there a relationship between splenic infarction and new coronavirus disease?

S. Alkan¹, U. Küçük², O.N. Gökçe³

¹Department of Infectious Diseases and Clinical Microbiology, Canakkale Onsekiz Mart University, Canakkale, Turkey

²Department of Cardiology, Faculty of Medicine, Canakkale Onsekiz Mart University, Canakkale, Turkey

³Department of General Surgery, Faculty of Medicine, Canakkale Onsekiz Mart University, Canakkale, Turkey

Uğur Küçük and Oruç Numan Gökçe are co-authors in this work

— **ABSTRACT:** The new coronavirus disease (COVID-19) can play a role in the etiology of many different diseases. COVID-19 leads individuals to become hypercoagulable, although the etiology of the thrombotic problems that occur with this condition is unknown. Here we describe a case of COVID-19 with splenic infarction that resolves with anticoagulation and simple analgesia. Our case is very interesting, as splenic infection due to COVID-19 infection is an unusual altitude.

— **Keywords:** COVID-19, New Coronavirus disease, Splenic infarction.

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causes new Coronavirus disease (COVID-19) declared worldwide pandemic¹. Due to the high incidence in critically ill patients and poor treatment outcome, the thrombotic complications of COVID-19 are particularly worrying². COVID-19 leads individuals to become hypercoagulable, although the etiology of the thrombotic problems that occur with this condition is unknown. The etiology is thought to entail a host immunological response that contributes to vascular endothelial cell damage, inflammation, activation of the coagulation cascade *via* tissue factor expression, and fibrinolysis shutdown^{2,3}. In COVID-19, thrombotic complications play a significant role in mortality and morbidity³. To enhance clinical outcomes and reduce overall mortality due to thrombotic problems, treatments targeting these pathways may be needed^{2,3}.

The blood vessels, lungs, heart, liver, digestive system, nervous system, kidneys, skin, and other organs are suspected to be affected by COVID-19⁴. COVID-19

infection has now been linked to hypercoagulability as a complication. Despite this, splenic infarction is uncommon and is frequently discovered by chance, radiologically, or at autopsy⁵.

Here we describe a case of COVID-19 with splenic infarction that resolves with anticoagulation and simple analgesia. Our case is very interesting, as splenic infarction due to COVID-19 infection is an unusual altitude.

CASE PRESENTATION

A 50-year-old immunocompetent male patient with a BMI of 35.8 kg/m² presented with a 1-day history of fever, dry cough, anosmia, arthromyalgia, and fatigue. He was admitted to the emergency room (ER) of Canakkale Onsekiz Mart University, Faculty of Medicine.

He had no comorbidities, no known risk factors, and was not taking any oral medications in his medical history. The patient had no symptoms of shortness of breath. His vital signs were within normal limits. The patient underwent a chest computed tomography (CT)



This work is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/)

scan, a complete blood count, and oral and nasopharyngeal swab tests for the SARS-CoV-2 polymerase chain reaction (PCR) test. A positive SARS-CoV-2 polymerase chain reaction (PCR) result was detected. At the admission, the routine blood examination tests revealed white blood cell: $8.2 \times 10^3 \mu\text{L}$, platelet: $268 \times 10^3 \mu\text{L}$, LDH (Lactate Dehydrogenase): 263 IU/L, CK (creatine kinase): 45.6 IU/L, AST (21 IU/L), ALT (28 IU/L), CRP: 1.1 mg/L, ferritin: 177 ng/mL, D-dimer: 383 ng/mL. The performed chest CT had no infiltration and no pathological findings in the abdominal sections of the chest CT.

He was consulted to infection diseases outpatient clinic of Canakkale Onsekiz Mart University, Faculty of Medicine. He ordered favipiravir tablets for 5 days and home isolation, according to the Turkish Ministry of Health's COVID-19 treatment guideline.

After 7 days, he was admitted to the ER again with complaints of upper abdominal pain. His physical examination revealed a temperature of 37.2°C , a heart rate of 76 beats per minute, a respiratory rate of 14 breaths per minute, and a blood pressure of 120/80 mmHg, and revealed no remarkable findings except for tenderness and rebound pain in the left upper abdomen. There were no aberrant murmurs in any valve location, and his heart rhythm was normal. The liver was not palpable, but the spleen was palpable subcostally. The blood examination tests revealed normal limits. Abdominal ultrasonography (USG) revealed a suspicious lesion in the spleen. A contrast-enhanced abdominal CT was performed. A splenic infarct appearance was detected on CT of the patient (Figure 1). He was diagnosed with splenic infarction. He was hospitalized for further examination. Blood cultures were negative. Both the anti-neutrophil cytoplasmic antibody (ANCA) panel and *Brucella* serology were negative. He had no symptoms of any localized or systemic infection. A genetic test for hypercoagulability was negative. Trans-thoracic echocardiography (ECHO) was performed. No vegetation was detected. Also, transesophageal ECHO had no findings for endocarditis or thrombus. The patient's

CT angiography and Doppler USG revealed no portal or superior mesenteric thrombus. We decided on a cautious approach, using enoxaparin at 1 mg/kg twice a day as a full anticoagulant and analgesic treatment. The patient's abdominal pain gradually reduced after anticoagulation and mild analgesics. On the 7th day of his hospitalization, he was discharged with the recommendation of oral Rivaroxaban and outpatient control. There was no problem with the outpatient follow-up. He was asymptomatic throughout the control examination one month after.

DISCUSSION

In the current literature, COVID-19 related thromboembolic events in atypical locales such as limb and visceral arterial ischemia are mentioned occasionally⁶. However, there are few cases^{5,7-10} in the literature regarding the coexistence of COVID-19 and splenic infarction. We wanted to emphasize this rare concomitant splenic infarction and COVID-19 infection. Autopsies performed on a small number of individuals who died as a result of COVID-19 revealed that the virus can directly assault the spleen, causing cell degeneration and necrosis, which can lead to alterations such as decreased T and B lymphocyte counts and lymphoid follicle atrophy¹¹. Even if there is inadequate proof, the theory is that the infarction formed might be directly targeted by the SARS-CoV-2 virus¹².

In presimilar cases previously reported, splenic infarction had developed as a result of secondary thrombus in the splenic vein, pulmonary artery, aortic or mesenteric thrombosis. However, there is no consensus for all type of COVID-19 patients (asymptomatic mild moderate severe) to receive therapeutic or prophylactic anticoagulation^{5,7-10} or had cardiac abnormalities⁵. However, a thrombus in the splenic vein or other localization was not detected in our case. The patient had no history of infarction or thrombus before. His cardiac functions also revealed no abnormalities.

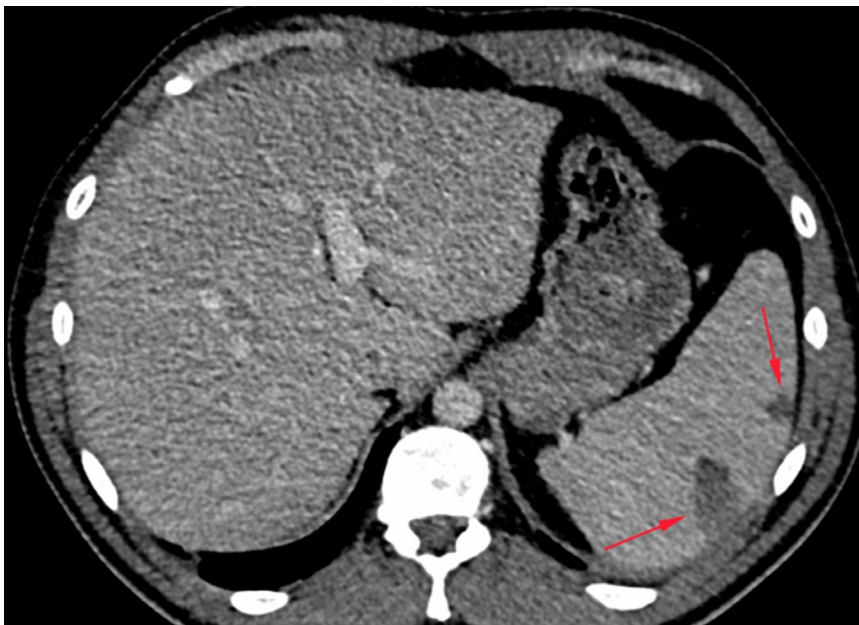


Figure 1. Splenic infarct areas on the abdominal CT.

To determine the frequency of splenic thromboses in COVID-19, we used PubMed to search for relevant medical subject headings phrases such as “COVID-19 and splenic infarcts”. Only a few case reports^{7-10,13,14} were retrieved in the conclusion. The majority of them were men. The average age was over 60 years old. Hypertension was the most common pre-existing medical condition^{7-10,13,14}. Qasim Agha et al¹³ reported a morbidly obese patient with splenic infarction. Our case was 50 year old man with no history of comorbidities. But he was an obese patient, similarly to the case which Qasim Agha et al¹³ reported.

Elevated D-dimer and platelet count with low anti-thrombin levels are the most typically detected abnormal coagulation markers in patients with visceral infarctions in COVID-19¹². But the presented case did not show any abnormal laboratory parameters.

When splenic infarction occurs, left upper quadrant pain may be seen^{7-10,13,14}. However, Kranidiotis et al¹⁵ found that a surprising number of individuals come without abdominal pain. The presented case had severe abdominal pain that did not respond to analgesics.

The diagnosis of splenic infarction is based on the application of imaging techniques. Abdominal CT has high sensitivity in detecting splenic infarction conditions^{7-10,13,14}. The presented case was also diagnosed with abdominal CT.

Ramanathan et al¹⁰ reported a similar case with dual renal and splenic infarction who recovered with anticoagulant therapy. Our patient was not using anticoagulant therapy before the splenic infarction.

The similar cases have been reported to respond well to anticoagulant therapy¹²⁻¹⁴. Our case was also treated with anticoagulant therapy. No indication for splenectomy was required.

CONCLUSIONS

Despite the lack of respiratory symptoms, clinicians should consider abdominal visceral infarctions in COVID-19 patients who present with acute abdominal pain.

ORCID ID:

Sevil Alkan: 0000-0003-1944-2477

Uğur Küçük: 0000-0003-4669-7387

Oruç Numan Gökçe: 0000-0002-9678-7818

AUTHORS' CONTRIBUTION:

All authors had substantial contributions to the conception or design of the work and also to the acquisition, analysis, or interpretation of the data as well as drafting and revising the paper.

FUNDING:

None.

ETHICS APPROVAL:

Ethics approval was not required for the publication of this case report. The patient provided an informed consent form for publication. The reporting of this study conforms to the CARE guidelines for case reports.

CONFLICT OF INTEREST:

The authors declare that they have no conflicts of interest.

PATIENT CONSENT:

Obtained.

REFERENCES

1. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>. Accessed on 15 Feb 2022.
2. Kichloo A, Dettloff K, Aljadah M, Albosta M, Jamal S, Singh J, Wani F, Kumar A, Vallabhaneni S, Khan MZ. COVID-19 and Hypercoagulability: A Review. *Clin Appl Thromb Hemost* 2020; 26: 1076029620962853.
3. Hanff TC, Mohareb AM, Giri J, Cohen JB, Chirinos JA. Thrombosis in COVID-19. *Am J Hematol* 2020; 95: 1578-1589.
4. Saeed S, Hashim AS, Khan H. Global mortality rate and statistical results of Coronavirus. *Infect Dis Trop Med* 2021; 7: e769.
5. Norton EJ, Sheikh N. Splenic Infarct Due to a Patent Foramen Ovale and Paradoxical Emboli Post-COVID-19 Infection: A Case Study. *Cureus* 2021; 13: e14887.
6. Üzümcügil AO, Demirkiran ND, Öner SK, Akkurt A, Alkan Çeviker S. Limb Ischemia Associated With Covid-19 and Its Treatment With Above-Knee Amputation. *Int J Low Extrem Wounds* 2021 Dec 27:15347346211063257. doi: 10.1177/15347346211063257. Epub ahead of print. PMID: 34958256.
7. Sztajn bok J, Brasil LMCR, Romero LA, Ribeiro AF, Vidal JE, Figueiredo-Mello C, Malaque CMSA. Splenic Infarction with Aortic Thrombosis in COVID-19. *Am J Med Sci* 2021; 362: 418-423.
8. Mavraganis G, Ioannou S, Kallianos A, Rentziou G, Trakada G. A COVID-19 Patient with Simultaneous Renal Infarct, Splenic Infarct and Aortic Thrombosis during the Severe Disease. *Healthcare (Basel)* 2022; 10: 150.
9. Yildiz E, Satilmis D, Cevik E. Splenic infarction and pulmonary embolism as a rare manifestation of COVID-19. *Turk J Emerg Med* 2021; 21: 214-216.
10. Ramanathan M, Chueng T, Fernandez E, Gonzales-Zamora J. Concomitant renal and splenic infarction as a complication of COVID-19: a case report and literature review. *Infez Med* 2020; 28: 611-615.
11. Xu X, Chang XN, Pan HX, Su H, Huang B, Yang M, Luo DJ, Weng MX, Ma L, Nie X. [Pathological changes of the spleen in ten patients with coronavirus disease 2019(COVID-19) by postmortem needle autopsy]. *Zhonghua Bing Li Xue Za Zhi* 2020; 49: 576-582.
12. Castro GRA, Collaço IA, Dal Bosco CLB, Corrêa GG, Dal Bosco GB, Corrêa GL. Splenic infarction as a complication of covid-19 in a patient without respiratory symptoms: A case report and literature review. *IDCases* 2021; 24: e01062.
13. Qasim Agha O, Berryman R. Acute Splenic Artery Thrombosis and Infarction Associated with COVID-19 Disease. *Case Rep Crit Care* 2020; 2020: 8880143.
14. Prentice G, Wilson S, Coupland A, Bicknell S. Complete splenic infarction in association with COVID-19. *BMJ Case Rep* 2021;14: e246274.
15. Kranidiotis G, Efstratiadis E, Kapsalakis G, Loizos G, Bilis A, Melidonis A. Splenic infarcts as a rare manifestation of parvovirus B19 infection. *IDCases* 2016; 4: 62-64.