

# A Rare Vascular Complication After Treatment In A Covid-19 Patient: Renal Artery Thrombus

COVID-19 HASTASINDA TEDAVİ SONRASI NADİR GÖRÜLEN VASKÜLER KOMPLİKASYONU:  
RENAL ARTER TROMBOZU

**Semih SAĞLIK<sup>1</sup>, Necip NAS<sup>2</sup>, Mehmet ÖZTÜRK<sup>3</sup>**

<sup>1</sup>Siirt Üniversitesi Tıp Fakültesi Radyoloji Anabilim Dalı, Türkiye

<sup>2</sup>Siirt Eğitim ve Araştırma Hastanesi Dahiliye Bölümü, Türkiye

<sup>3</sup>Selçuk Üniversitesi Tıp Fakültesi, Radyoloji Anabilim Dalı, Konya, Türkiye

## ABSTRACT

Although respiratory symptoms are dominant in COVID-19 (coronavirus disease-2019) infection, extrapulmonary systemic findings may be seen in the extremely sick group. Studies are showing that patients have a high incidence of arterial and venous thrombotic complications in COVID-19. Acute renal artery thrombosis represents a rarer type of arterial thromboembolism, even among the thrombotic complications of COVID-19 disease. Such complications appear especially during the active phase of the infection. In this article, a rare case of renal artery thrombus in a discharged patient after treatment for COVID-19 pneumonia despite prophylactic antithrombotic treatment is offered.

**Keywords:** Renal artery thrombus, Covid, CT, renal infarct

## ÖZ

COVID-19 (koronavirüs hastalığı-2019) enfeksiyonunda solunum semptomları baskın olsa da, ağır hasta grubunda ekstrapulmoner sistemik bulgular görülebilir. COVID-19'da hastaların yüksek arteriyel ve venöz trombotik komplikasyon insidansına sahip olduğunu gösteren çalışmalar mevcuttur. Akut renal arter trombozu, COVID-19 hastalığının trombotik komplikasyonları arasında bile daha nadir bir arteriyel tromboembolizm tipini temsil eder. Bu tür komplikasyonlar özellikle enfeksiyonun aktif fazı sırasında ortaya çıkmaktadır. Bu yazıda, COVID-19 pnömoni tedavisi sonrası taburcu edilen bir hastada profilaktik antitrombotik tedaviye rağmen renal arter trombüsü gelişen nadir bir olguyu sunuyoruz.

**Anahtar Kelimeler:** Covid, renal arter trombüs, renal enfarkt, CT

## Semih SAĞLIK

Siirt Üniversitesi Tıp Fakültesi Radyoloji  
Anabilim Dalı, Türkiye

E-posta: drsmhsglk@gmail.com

<https://orcid.org/0000-0002-4224-9272>

COVID-19 (coronavirus disease-2019) is a serious and fatal illness that can present with high fever and shortness of breath caused by a type of coronavirus, namely severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Although respiratory symptoms are predominant, extrapulmonary involvement poses a significant problem in COVID-19 patients. Hypercoagulability and vascular

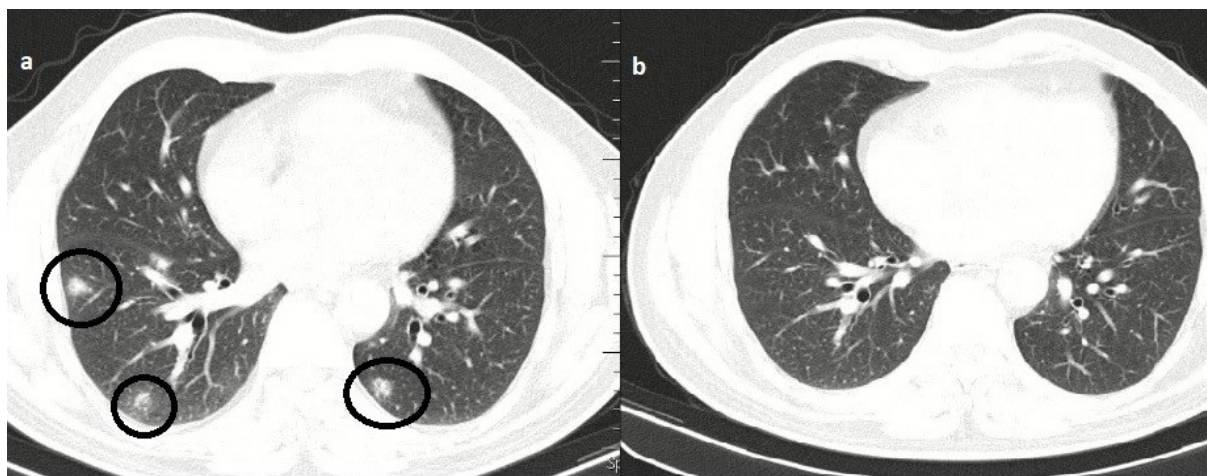
thromboembolism that may be caused by COVID-19 infection are described as potential complications (1). Such complications are identified especially during the active phase of infection. Patients with positive COVID-19 diagnosis may have hypercoagulability, including elevated D-dimer, troponin, ferritin levels and leukocytosis, and it is not possible to predict which patients will experience

thromboembolic events (2). However, arterial thromboembolic conditions have rarely been reported in unusual sites such as extremities and visceral arterial ischemia (3). Acute renal artery thrombus is a rare complication in COVID-19 patients (4,5). Acute renal artery thrombus can lead to serious problems such as morbidity and organ damage. The most common cause is an embolism of extrarenal origin (6). In this article, we present a rare case of a patient with severe abdominal pain who was discharged with complete remission after treatment for COVID-19 pneumonia and who concomitantly developed

renal artery thrombus despite prophylactic antithrombotic therapy.

### CASE REPORT

A 49-year-old man with no known chronic diseases had a positive SARS-CoV-2 RNA polymerase chain reaction (PCR) test result as well as chest X-ray and computed tomography (CT) that were diagnostic for COVID-19 infection (Figure 1).



**Figure 1:** Computed tomography (CT) of the chest taken at the time of initial admission demonstrated bilateral ground-glass densities with a tendency to consolidation(a). Control CT taken at the time of discharge from hospital revealed that the lesions had disappeared(b).

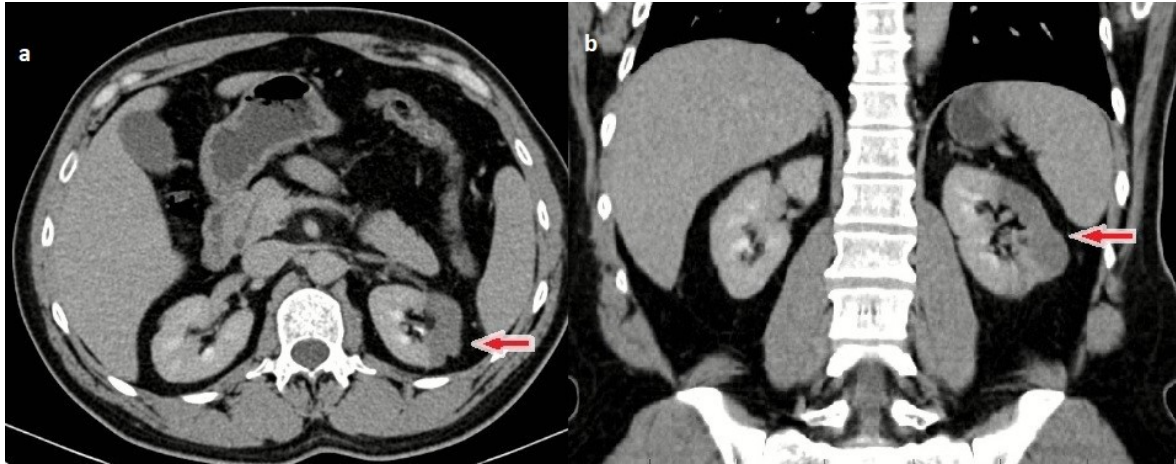
The patient was followed up in the clinic because of bilateral lung involvement and oxygen requirement. The patient who experienced a cytokine storm during hospitalization was discharged after clinical stabilization was achieved with treatment and Enoxaparin 6000 iu once daily was started. The patient, whose complaints did not regress with the symptomatic treatment administered in the outpatient center to which he applied for severe side pain 2 weeks after his discharge, was admitted to the emergency department of our hospital approximately 8 hours after the onset of his first complaint. In the initial evaluation in the emergency department, the patient was in

a moderate general condition, conscious, oriented and cooperative.

On physical examination, blood pressure was 140/90 mmHg, respiratory rate was 24/minute and temperature was 37 °C. There was no defense and rebound on abdominal examination. He only had pain under the left rib that was radiating to the left side. ECG revealed normal sinus rhythm with a heart rate of approximately 98 beats/min. Leucocytosis was present in the hemogram (WBC: 21.55 K/uL). Complete urinalysis was normal. In the initial blood biochemistry evaluation LDH was 941U/L (135-225), ALT; 198 IU/L, AST; IU/L, CRP; 48.6,

procalcitonin: 0.154 ng/ml (0.5-2), urea; 16 mg/dl, creatinine 1.25 mg/dl, Na 132 while 10-15 erythrocytes, 8-10 leukocytes, 3-5 epithelial cells were detected in the urinalysis microscopy. Hb was 14.1 g/dl, Hct 44.1%, and platelets 310000/mm<sup>3</sup>. Since the patient had a history of

covid, it was decided to perform contrast-enhanced abdominal computed tomography (CT) for the differential diagnosis of a possible thromboembolic event. CT scan revealed parenchymal non-contrast enhancing areas compatible with infarction in the left kidney (Figure 2).



**Figure 2:** Contrast-enhanced abdominal CT shows non-contrast enhanced areas (arrows) consistent with infarction in the left kidney on axial (a) and coronal reformat (b) sections.

The presence of a wall-related thrombus in the middle part of the left main renal artery allowing partial flow was detected in CT angiography (Figure 3).



**Figure 3:** Abdominal CT angiography revealed the presence of hypodense thrombus in the middle part of the left main renal artery in axial (a), coronal reformat (b) and sagittal reformat (c) sections (arrows). The thrombus is apparent in the 3D-VR (volume rendering) images obtained after CT angiography examination..

## DISCUSSION

COVID-19 (coronavirus disease-2019) is an infectious viral disease that primarily targets the lungs (7). The virus is transmitted by inhaling viral particles that are then settled in the respiratory tract. COVID-19 infection can cause mild respiratory symptoms, acute respiratory failure and even viral pneumonia leading to death. Common laboratory abnormalities include lymphopenia, thrombocytopenia, and inflammatory markers including elevated lactate dehydrogenase (LDH), C-reactive protein, D-dimer, ferritin and interleukin-6 (8). In patients infected with COVID-19, both arterial and venous thrombotic complications, including events such as deep vein thrombosis, pulmonary embolism, acute coronary syndromes and infarction, have been reported due to hypercoagulability and systemic inflammation, especially during the first week of the disease (9-11).

Although the exact cause of renal artery thrombus in patients with COVID-19 is unknown, it has been associated with the direct cytopathic effects of SARS-CoV-2 on endothelial cells (12). As renal artery thrombus is rare and presents with non-specific clinical findings, the diagnosis is often delayed or missed (5). Early diagnosis plays an important role in preserving kidney function. The preferred methods of non-invasive examination are contrast-enhanced abdominal CT in the diagnosis of acute renal infarction and CT angiography in the diagnosis of renal artery thrombus (13,14). Early intervention with anticoagulants and thrombolytics and even endovascular interventional applications in eligible patients may minimize renal damage (11,15).

We present this case because of the rare occurrence of renal artery thrombus in a patient who is followed up after treatment for COVID-19 pneumonia. Since our patient received symptomatic treatment in a different center before being admitted to our center, the diagnosis was initially missed. Because the complaint of left flank pain present in our patient can be easily confused with more common pathologies such as pyelonephritis and especially nephrolithiasis. Therefore, renal artery thrombus should be considered in the differential diagnosis in case of unexplained abdominal pain even if renal function is not

impaired (5). In the literature, it has been reported that renal artery thrombus developed during periods when the infection was active in COVID-19 patients who had this condition (4,5,16-18). It was reported in a single-center study conducted by Fournier et al. that among 531 patients with COVID-19 who were followed up in hospital, 30 patients experienced thromboembolic events, out of which 7 were renal artery thrombi. (19) In contrast, renal artery thrombus and renal infarction developed in our case on the 14th day of discharge after treatment for COVID-19 pneumonia was completed and despite receiving prophylactic anticoagulant treatment. The etiology of renal artery thrombosis features risk factors such as trauma, valvular heart disease, vasculitis, renal vein occlusion, hypertension, neoplasm and aortic dissection (6). We did not establish any identified risk factors for renal artery thrombosis in our case.

## Conclusion

Acute thrombotic complications associated with COVID-19 have been reported in the literature, with the majority cases occurring during hospitalization. This case report highlights the ongoing risk of arterial thrombosis in patients hospitalized with COVID-19 pneumonia even after discharge, and the importance of ongoing surveillance by clinicians for these complications.

## REFERENCES

1. Dane B, Smereka P, Wain R, Kim D, Katz D S. Hypercoagulability in COVID-19: identification of arterial and venous thromboembolism in the abdomen, pelvis, and lower extremities. *AJR Am J Roentgenol.* 2020; 29.
2. Shah A, Donovan K, McHugh A, et al. Thrombotic and haemorrhagic complications in critically ill patients with COVID-19: a multicentre observational study. *Critical care.* 2020; 24.1: 1-10.
3. Tan B. K, Mainbourg S, Friggeri A, Bertolotti L, Douplat M, Dargaud, Y, Lega, J. C. Arterial and venous thromboembolism in COVID-19: a study-level meta-analysis. *Thorax.* 2021; 76(10), 970-979
4. El Shamy O, Munoz-Casablanca N, Coca S, Sharma S, Lookstein R, Uribarri J. Bilateral renal artery

- thrombosis in a patient with COVID-19. *Kidney Med.* 2021; 3:116-9.
5. Ergün R, Ergün D, Shalabi H S, Shalabi M Y, Kanat F, Tulek B, Yormaz B, Nayman A. COVID-19 and Renal Artery Thrombosis: A case report. *Respiratory Case Reports.* 2022; 11.1.
  6. RK Lessman, SF Johnson, JW Coburn, JJ Kaufman. Renal artery embolism: clinical features and long term follow up of 17 cases. *Ann Intern Med.* 1978; 477-482
  7. MN Lango. How did we get here? Short history of COVID-19 and other coronavirus-related epidemics. *Head & neck.* 2020; 42.7: 1535-1538.
  8. Gentili G, Pérez P L, Laplumé-Elizalde E, España S. Kidney infarction in patient with covid-19: clinical case. *Revista Mexicana de Urología.* 2022; 82(1), 1-8.
  9. Lodigiani C, Iapichin G, Carenzo L, Cecconi M, Ferrazzi P, Sebastian T. Kucher, N Studt, JD, Sacco C, Bertuzzi A et al. Humanitas COVID-19 Task Force. Venous and arterial thromboembolic complications in COVID-19 patients admitted to an academic hospital in Milan, Italy. *Thrombosis research.* 2020; 191: 9-14.
  10. Avila J, Long B, Holladay D, Gottlieb M. Thrombotic complications of COVID-19. *Am. J. Emerg. Med.* 2021; 39, 213–218
  11. Klok FA, Kruip MJHA, Van der Meer NJM, Arbous MS, Gommers DAMPJ, Kant KM, et al. Incidence of thrombotic complications in critically ill ICU patients with COVID19. *Thrombosis research.* 2020; 191: 145-147.
  12. Jain A, Bector G, Jain D, Makkar V & Mehta S. Renal artery thrombosis with renal infarction secondary to COVID-19 infection: A rare presentation. *Indian Journal of Nephrology.* 2022; 32(2), 191.
  13. Y Yamanouchi, K Yamamoto, K Noda, K Tomori, T Kinoshita. Renal infarction in a patient with spontaneous dissection of segmental arteries: diffusion-weighted magnetic resonance imaging *Am J Kidney Dis.* 2008; pp. 788-791
  14. LA Miller, SE Mirvis, K Shanmuganathan, AS Ohson. CT diagnosis of splenic infarction in blunt trauma: imaging features, clinical significance and complications. *Clinical radiology.* 2004; 59.4: 342-348.
  15. K Ouriel, CH Andrus, JJ Ricotta, JA DeWeese, RM Green. Acute renal artery occlusion: when is revascularization justified? *Journal of vascular surgery.* 1987; 5.2: 348-355.
  16. Deshmukh SB, Upadhyay KM, Kulkarni A, Deshpande S, Purohit R, Kulkarni M. Renal Artery Thrombosis: A Post COVID-19 Sequel. *J Adv Res Med.* 2020; 7(2): 22-24.
  17. Acharya S, Anwar S, Siddiqui FS, Shabih S, Manchandani U & Dalezman S. Renal artery thrombosis in COVID-19. *ID Cases.* 2020; 22, e00968.
  18. Singh T, Chaudhari R, Gupta A. Renal artery thrombosis and mucormycosis in a COVID-19 patient. *Indian Journal of Urology: IJU. Journal of the Urological Society of India.* 2021; 37(3), 267.
  19. Fournier M, Faille D, Dossier A, Mageau A, Roland PN, Ajzenberg N, Sacré K. Arterial thrombotic events in adult inpatients with COVID-19. In *Mayo Clinic Proceedings.* Elsevier. 2021; Vol. 96, No. 2, 295-303.