Renal Artery Thrombosis with Renal Infarction Secondary to COVID-19 Infection: A Rare Presentation

Renal artery thrombosis is a serious condition that is underdiagnosed especially in elderly people leading to renal infarction and acute kidney injury (AKI). Isolated renal artery thrombosis in the largest case series of the emergency department gives a prevalence of about 0.02 per 1,000, describing the rarity of this disease.[1] There are a few case reports of thromboembolic involvement of renal arteries due to infective endocarditis,[2] hypercoagulable states such as inherited thrombophilia, renal transplantation, and oral contraceptives in females.[3] *In situ* thromboembolism is certainly a rare entity, but blunt abdominal trauma is the most common cause of *in situ* thrombosis.[4] We report a rare case of renal artery thrombosis with renal infarction due to COVID-19 (coronavirus disease 2019).

A 62-year-old male presented in the emergency department with complaints of fever for 4 days, which was associated with shortness of breath. There was also a history of loss of taste and smell sensation. The patient had no prior history of diabetes mellitus, hypertension, or any other chronic medical illness. His oxygen saturation was 94% on high-flow oxygen. Other systemic examination was within normal limits. Chest X-ray and high-resolution computed tomography (CT) of lung were diagnostic of COVID-19 infection [shown in Figure 1a], and a nasal swab for SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) reverse transcriptase–polymerase chain reaction tested positive. The patient developed acute hypoxic respiratory failure requiring high-flow oxygen supplementation. On Day 4 of admission, the patient complained of acute flank pain on the left side, which was sudden and nonspecific in nature. Abdominal examination revealed mild tenderness in the left lower quadrant with no underlying guarding and rigidity. There was no abdominal distension or organomegaly. All the relevant laboratory investigations are summarized in Table 1. Based on the symptoms of left flank pain in the absence of a history suggestive of abdominal trauma, common differentials considered were nephrolithiasis, urinary tract infection, and diverticulitis, whereas mesenteric ischemia, renal artery thrombosis, and renal artery dissection were also kept as rare ones. The urine sample was sterile. CT angiogram of abdomen was done, which showed atherosclerotic changes in the descending abdominal aorta in the form of circumferential mixed density plaque in the distal abdominal aorta, just before bifurcation causing approximately 20% to 30% of luminal narrowing, also involving bilateral common iliac arteries. A hypodense filling defect measuring 1.5 × 1.3 cm was seen in the descending thoracic aorta, causing 50% to 60% luminal obliteration. The left renal artery and its branches were not opacified with contrast [shown in Figure 1b] with the thrombus bulging into the aortic lumen at the level of renal ostium. Moreover, a single right renal artery could be seen without evidence of thrombosis [shown in Figure 1c and 1d]. No mesenteric ischemia was noted. His two-dimensional echocardiography was normal. Diagnosis of left renal artery thrombosis with left renal infarction secondary to COVID-19 was made. His thrombophilia profile was suggested of raised D-dimers and elevated fibrin degradation products, which supported the diagnosis of COVID-19 infection. The patient was started on low molecular weight heparin 80 mg twice daily along with intravenous (IV) steroids and IV antibiotics. The patient's vitals stabilized, and his oxygen requirements declined gradually. Renal function test and coagulation profile were regularly monitored every 24 to 48 hours, and all were in improving trend till the date of discharge [Table 1]. The patient was discharged on oral dabigatran 150 mg BD and followed up after 2 weeks.

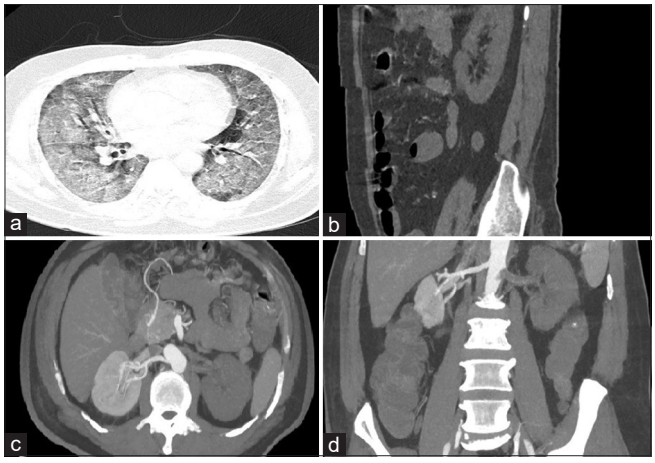

Figure 1: (a) CT Lung showing Bilateral ground glass opacities. (b) Saggital view showing non-enhancing left kidney. (c) Axial view showing enhanced right renal artery and non-enhanced left kidney and renal artery. (d) Coronal view showing enhanced right renal artery and non-enhanced left renal artery and left kidney

As knowledge regarding COVID-19 is enhancing, studies indicate that patients of COVID-19 are at increased risk of AKI. This case is rather unique as there is no direct evidence of the underlying disease process or the usual risk factors, triggering the formation of thrombus in the renal artery. This temporal relationship between renal artery thrombosis and COVID-19 would suggest that COVID-19 induced the renal artery thrombosis. His thrombophilia profile also favored the diagnosis. Thromboembolic events in patients with COVID-19 occur in both the arterial and venous systems. Although the exact pathogenesis behind the formation of renal artery thrombosis in a patient

Table 1: Laboratory investigations

Investigations	Admission	Day 5	Discharge
White Cell Count:			
Total leukocyte count (10^3/UL)	9.7	26.0	14.3
Differential count (per mm^3):	74.3%	95.5	89.8
Total neutrophils	15.1%	2.0	6.3
Total lymphocytes	8.7%	2.0	3.6
Total monocytes			
Platelet count (10^3/UL)	284	229	464
Hemoglobin (g/dL)	13.9	15.4	14.0
Serum lactate dehydrogenase (U/L)	751	1260	939
C-reactive protein (mg/dL)	331.53	19.46	0.87
Fibrin degradation product dimer (ng/mL)	>1,000	>1,000	780
Coagulation Test			
Prothrombin time (seconds)	14.2	14.5	18.2
International normalized ratio	1.30	1.33	1.71
Urea (mg/dL)	88.0	85.0	63
Creatinine (mg/dL)	0.94	1.57	1.21
eGFR (mL/minute/1.73 m^2)	87	47	64

eGFR=Estimated glomerular filtration rate

with COVID-19 is unknown, various mechanisms have been proposed that include direct cytopathic effects of SARS-CoV-2 on endothelial cells leading to endothelial dysfunction, proinflammatory cytokines leading to stimulation of tissue factor expression, or the presence of antiphospholipid antibodies leading to thrombotic events. Most of the patients usually present with sudden, unexplained flank pain, abdominal pain, or pain in the lower back region. It may or may not be associated with fever, nausea, vomiting, raised white blood cell count, and raised serum lactate dehydrogenase levels. Hematuria and proteinuria can be the presenting manifestation. The diagnosis was confirmed only after CT angiogram of the abdomen. Surgical interventions such as nephrectomy can be avoided as in this case, with early diagnosis and initiation of thrombolytics along with anticoagulants. The main purpose of this case report is to sensitize physicians to keep the differential diagnosis of renal artery thrombosis secondary to COVID-19, in patients with unexplained flank pain, who may or may not be critically ill with the coronavirus disease.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understand that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

Aayush Jain, Gaurav Bector[1], Dinesh Jain[1], Vikas Makkar[2], Sudhir Mehta[3]

Department of Medicine, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, Departments of [1]Medicine and [2]Nephrology, Dayanand Medical College and Hospital, Ludhiana, Punjab, [3]Department of Nephrology, Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala, Haryana, India

Address for correspondence:
Dr. Sudhir Mehta,
Assistant Professor, Department of Nephrology, Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala - 133 207, Haryana, India.
E-mail: samsudhir123@yahoo.co.in

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