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Renal vein thrombosis in a recent COVID-19 patient; a case report

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ABSTRACT

We report a 74-year-old male with a recent history of COVID-19 pneumonia who was admitted with acute periumbilical and left lower quadrant pain and respiratory distress. Laboratory data showed pre-renal azotemia and microscopic hematuria. An abdominopelvic computerized tomography (CT) scan with intravenous contrast was conducted, showing signs of right renal vein thrombosis (RVT) with extension to inferior vena cava (IVC), without any evidence of renal ischemia. The patient did not have any risk factors for thrombosis except for probable hypercoagulopathy due to COVID-19 and diabetes mellitus. He was not an appropriate candidate for surgical or radiologic thrombectomy, thus received heparin infusion accordingly. Unfortunately, he died after the cardiopulmonary arrest on the second day of admission. Considering his respiratory distress, we suspect pulmonary embolism as the most probable cause of death.

Implication for health policy/practice/research/medical education:

A case of acute abdominal pain in a recent COVID-19 patient is discussed. A thrombosis was diagnosed in his right renal vein, extending to the inferior vena cava (IVC). Unfortunately, the patient expired in the intensive care unit (ICU) following cardiopulmonary arrest.

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Introduction

Renal vein thrombosis (RVT) is a relatively rare condition with variable clinical presentation and course. For the first time, Rayer in 1840, described this disease (1). RVT affects males more than females and has been reported in children and embryos (2-4). Given the scarce data on this subject, the exact age distribution is not clear; nevertheless, most studies report a peak in the fourth to sixth decade of life (2,5). Due to the large renal venous system, the left vein is more commonly involved in RVT; despite that, up to two-thirds of the patients have bilateral involvement. The presentation can range from an acute onset of abdominal pain, costovertebral angle tenderness and gross hematuria to unspecific symptoms. It can be asymptomatic in many instances, especially in chronic cases (3,6,7).

Major RVT predisposing factors include trauma,

malignancy, infection, hypercoagulopathy and nephrotic syndrome. Factor V Leiden mutation has been particularly associated with RVT (3,6,8). Membranous glomerulonephritis (MN) is the most common disease that leads to RVT; however, other nephrotic syndromes such as membranoproliferative glomerulonephritis, focal glomerulosclerosis and systemic diseases such as lupus erythematosus are also among the causes. Given the MN's male predominance, it might explain why RVT affects the male population more (3,9).

Although RVT can resolve without any intervention in some cases, oral or intravenous anticoagulation therapy, thrombectomy and thrombolysis are commonly used as treatment options. Furthermore, treatment of underlying predisposing disorders should also be considered. The clinical course and prognosis depend on several factors

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such as baseline renal function, acute or chronic quality of disease, and the severity of original underlying factors (3). Overall, a mortality rate of approximately 40% has been reported for RVT (5,10). Here, we present a case of RVT diagnosed in a 74-year-old man presenting with acute abdominal pain.

Case Presentation

A 74-year-old male with a history of type two diabetes mellitus, ischemic heart disease and recent COVID-19 infection came to the emergency department with abdominal pain. The pain was in the periumbilical and left lower quadrant area and started six hours before the admission with a visual analog scale of 10. He reported anorexia, nausea, and one episode of vomiting that contained food particles. He did not have any other gastrointestinal or urinary symptoms. One week prior, he was admitted to our hospital due to COVID-19 pneumonia and received remdesivir and corticosteroid (Figure 1). Then the patient was discharged after six days of admission with a blood O₂ saturation of 96%. During the new admission, he had respiratory distress with supraclavicular and intercostal retraction and blood O₂ saturation of 74%. The abdomen was tender, especially in the periumbilical and left lower quadrant area. The rebound tenderness and guarding were negative. Oxygen therapy was administered along with reservoir and bag mask to reduce the patient's hypoxia.

Laboratory data showed leukocytosis with a left shift and elevated levels of blood glucose, amylase, and troponin. Serum creatinine and blood urea nitrogen revealed a pattern of pre-renal azotemia. Urine analysis showed microscopic hematuria and glycosuria. Moreover, venous blood gas results revealed metabolic acidosis. The elevated blood glucose was treated with insulin injection, and he received four mg dexamethasone twice a day. Chest X-ray exhibited opacities compatible with COVID-19 pneumonia, but abdominal X-ray did not show any pathologic sign. The electrocardiogram showed left axis deviation with no other abnormal changes, and the echocardiography study was also normal. Abdominopelvic ultrasonography did not show any aberrant findings. The right kidney diameter was reported 110 mm with a parenchymal diameter of 18 mm; for the left kidney, these measurements were 112 mm and 19 mm, respectively. No intra-abdominal free fluid was reported. In surgery consultation, an abdominopelvic CT scan with intravenous contrast was suggested. A filling defect in the right renal vein with extension to inferior vena cava (IVC) without any signs of renal ischemia was seen in the CT scan (Figures 2 and 3). The latter finding put the RVT at the top of our differential diagnoses, and therefore, we started heparin infusion and consulted with vascular surgery and interventional radiology services. Due to normal enhancement of the kidney, no need for surgical or radiologic intervention was detected, thus



Figure 1. Bilateral ground glass opacifications in patients chest CT-scan, one week before new admission.

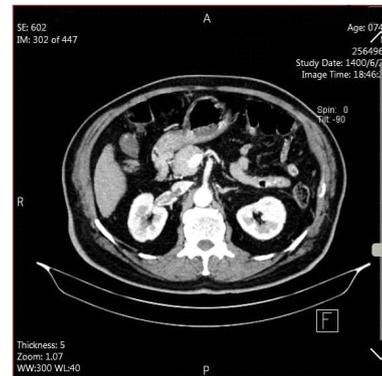


Figure 2. Abdominopelvic CT-scan demonstrating a filling defect suggestive of thrombosis in right renal vein.

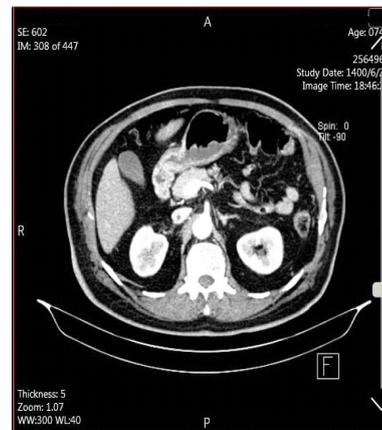


Figure 3. Abdominopelvic CT-scan demonstrating right renal vein filling defect extending to inferior vena cava.

the heparin infusion was continued. One day after the treatment, patient's respiratory distress worsened and therefore the patient was moved to the intensive care unit and was intubated. The medication did not improve his condition and cardiopulmonary arrest occurred the day after. Unfortunately, the patient did not respond to the cardiopulmonary resuscitation and expired.

Discussion

Flank pain is the most common presentation of RVT; therefore, this disease should always be considered as a rare differential diagnosis of patients with abdominal pain (2). In this case presentation, we explained an elderly man with RVT without any known risk factors such as previous nephrotic syndrome, malignancy, or hypercoagulopathy. We first considered a baseline hypercoagulability state for our patient regarding the history of type 2 diabetes. Nevertheless, the association is improbable given the unusual site of thrombosis and his daily aspirin treatment (11). Coagulation dysfunction and its correlation with COVID-19 has been well-reviewed and accordingly, the patient's recent COVID-19 infection could have propagated the thrombosis formation (12-14). Despite all of this information, cases of idiopathic and spontaneous RVT have also been reported in the literature (2,15).

Since there is no specific laboratory study diagnosis of RVT, imaging remains the main diagnostic tool. In ultrasonography, the involved kidney might become enlarged or atrophic depending on the acute or chronic manifestation of the disease. Color Doppler ultrasound can also be utilized to detect flow. However, as in our case, sonographic methods are not highly sensitive. While angiography remains the gold standard diagnostic procedure, CT-angiography and MR-angiography are the most commonly used due to their accessibility and non-invasive nature (3).

Immediate initiation of anticoagulant therapy with parenteral heparin is essential for the management of RVT and the prevention of further renal damage (3,16). Mechanical or chemical thrombectomy is not indicated in all cases of RVT. It is implemented in situations such as medical treatment failure, bilateral RVTs, thrombosis extension to IVC, transplanted kidneys, or complications such as pulmonary embolism. In rare cases such as renal carcinoma or complete renal necrosis, nephrectomy might be indicated (3). Considering the severe respiratory distress in our case, we can assume pulmonary embolism as a probable cause of death, which unfortunately did not respond to heparin therapy. However, given the unstable clinical condition and azotemia in our patient, it was not possible to perform pulmonary CT angiography to rule out or confirm it.

Conclusion

RVT is a rare cause of abdominal and flank pain if left untreated may lead to renal damage. Current literature emphasizes CT-angiography as the diagnostic modality of choice. Extension to IVC and pulmonary embolism are possible complications of this phenomenon. Anticoagulant therapy should not be hesitated in order to reduce the risks. For the best outcomes, all physicians, especially emergency medicine practitioners should be familiar with this problem.

Authors' contribution

HM, ZZ and MN were the principal investigators of the study. All authors were included in preparing the concept and design. SSL, AdT, ALT, and FO revisited the manuscript and critically evaluated the intellectual contents. All authors participated in preparing the final draft of the manuscript, revised the manuscript and critically evaluated the intellectual contents. All authors have read and approved the content of the manuscript and confirmed the accuracy or integrity of any part of the work.

Conflicts of interest

The authors declare that they have no competing interests.

Ethical issues

This case report was conducted in accord with the World Medical Association Declaration of Helsinki. Written informed consent was obtained from the patient for the publication of this report. Additionally, ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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