



Inferior Vena Cava Thrombosis (IVCT) with extension into the right atrium in a patient with Renal Cell Carcinoma (RCC)

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Introduction

Inferior Vena Cava Thrombosis (IVCT)

- Incidence of IVCT is rare and is often correlated with significant morbidity and mortality.
- Etiology is broad, including nephrolithiasis, renal cell carcinoma, pulmonary embolism, and liver disease.¹
- Categorization as primary or secondary etiology is essential.
 - Primary IVCT results from metabolic syndrome or hypertension processes, while
 - Secondary IVCT results from malignancy, surgery or infectious causes.²

Renal Cell Carcinoma and IVCT

- Renal cell carcinoma (RCC) is uniquely associated with inferior vena cava thrombus (IVCT) formation
- RCC is associated with extension into the IVC in 4-10% of cases and extension to the right atrium in only 1-3% of cases.³
- prognosis of RCC with IVC involvement depends on the thrombus level of involvement.⁴

Case Report

- 79-year-old male with reduced ejection fraction heart failure, stage III chronic kidney disease, and diabetes mellitus was admitted for left foot cellulitis in the setting of worsening bilateral edema and acute renal failure (creatinine of 3.1 mg/dL with a baseline of 2.2 mg/dL).
- To evaluate the patient's renal failure, a computed tomography (CT) scan, magnetic resonance imaging (MRI) scan and transthoracic echocardiogram were performed which demonstrated an infiltrative renal mass and an extensive inferior vena cava thrombus (IVCT).
- Patient was started on low molecular weight heparin
- Transjugular renal biopsy resulted in pathology conclusive for stage III (T3b, NO, MO) clear cell renal carcinoma (CCRCC)
- Given patient's poor functional status, the patient elected hospice care.

Clinical Images

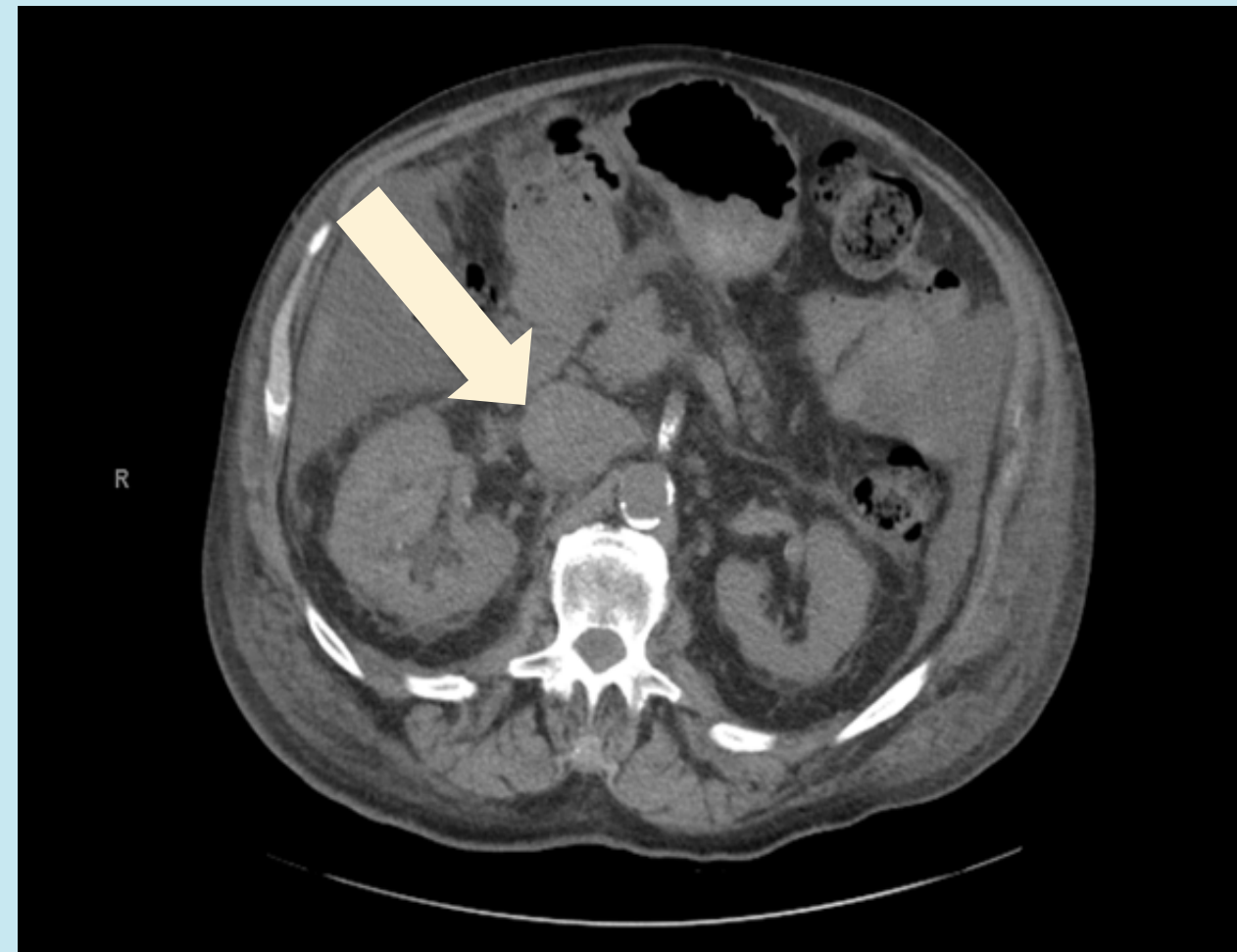


Fig. 1 A noncontrast CT scan of the abdomen revealed asymmetric fullness of the right kidney concerning for soft tissue neoplasm.

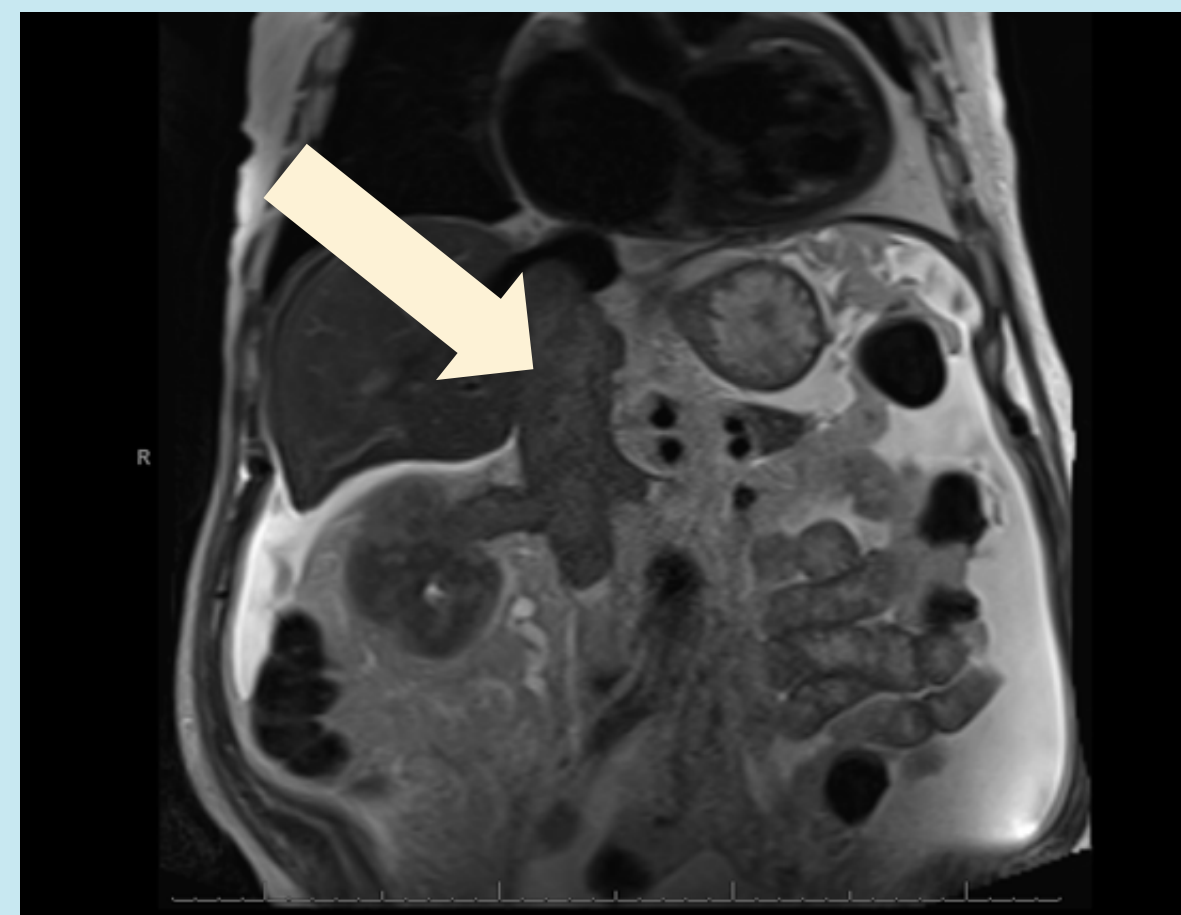


Fig. 2 MRI of the abdomen further revealed a thrombus (arrow) within the right renal vein and IVC that extended below the right atrium.

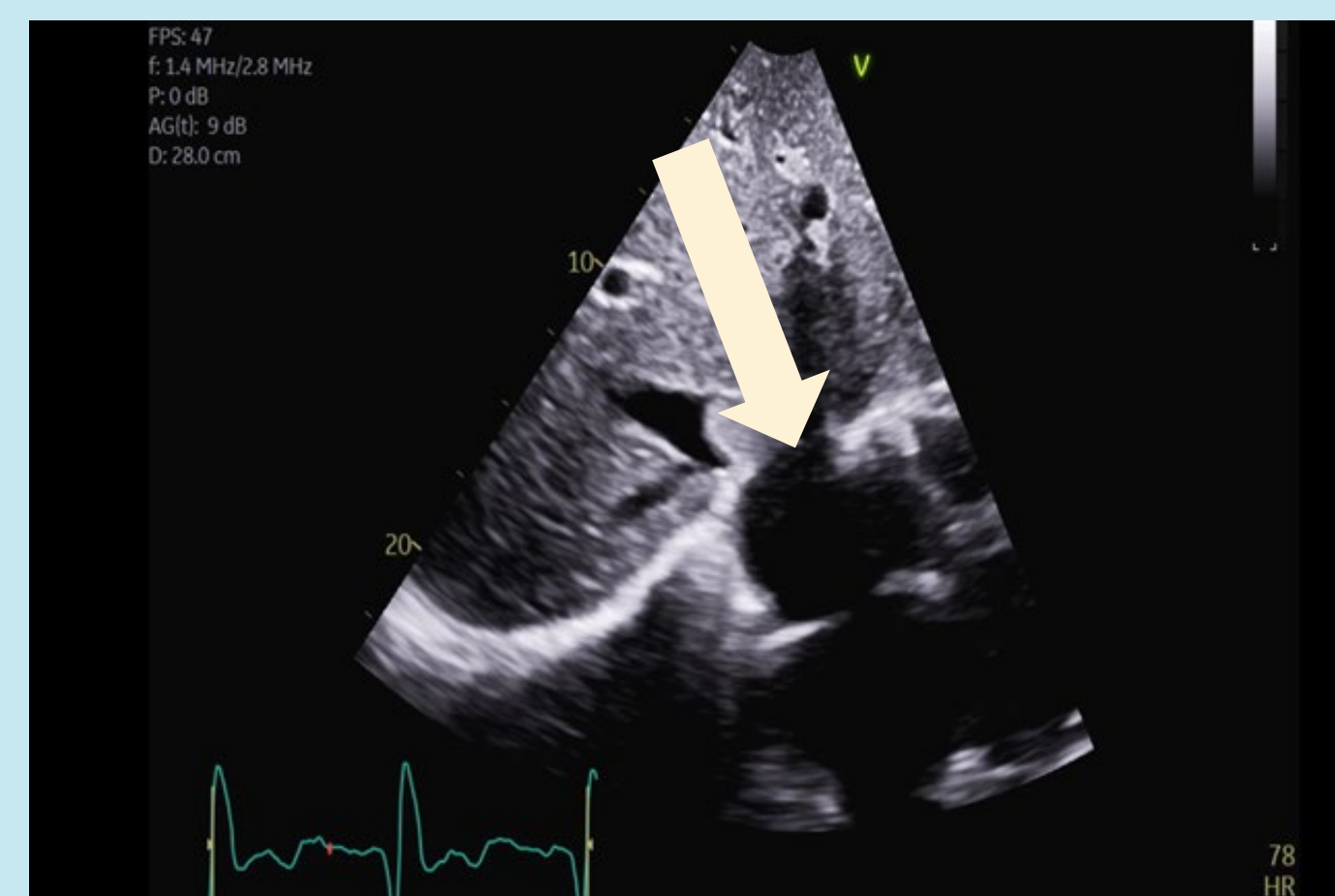


Fig. 3 Transthoracic echocardiogram subcostal view revealed mobile echodensity 1.7 cm x 2.4 cm (arrow) at the junction of the inferior vena cava and the right atrium.

Discussion

Inferior Vena Cava Thrombosis (IVCT)

- Characterization: pseudo, benign, or malignant
- Diagnostic Imaging:
 - CT: initial imaging modality to identify IVC filling defect
 - Pseudothrombosis: most frequent defect observed on CT due to parallel laminar blood flow from renal veins
 - MRI: further characterize unclear CT findings
 - Bland Thrombus: associated with hypercoagulable state (oral contraceptive use, IVC filters, and vascular coagulopathies)⁵
 - Malignant Tumor Thrombus: associated with expanded anterior-posterior (AP) diameter of renal vein in relation to renal vein ostium (RVo) and complete occlusion at the level of the IVC⁶ (used to determine IVC thrombus involvement)
 - Transthoracic Echocardiography: used in settings when right atrium is involved in IVC thrombus⁶
- Management: dependent on percent occlusion, acuity, and extent of proximal vascular involvement
 - Anticoagulation: initial treatment
 - Catheter Thrombolysis/Caval Thrombectomy: acute thrombus
 - Surgery: IVC filter placement, stapling, ligation of IVC, and segmental resection of the IVC⁷ (considerations dependent on level of IVC involvement)
- Prognosis:
 - Non-surgical: 5 months
 - Surgery: 40-60% 5-year survival⁸

Conclusion

- IVCT involvement extending into the right atrium is a rare presentation of RCC. The degree of IVC and right atrium involvement is critical in determining management and prognosis of patients.
- Management and prognosis of RCC complicated by IVCT is highly depended on the level of thrombus involvement. CT and MRI images can be utilized to determine the AP diameter of the renal vein at the RVo which can help determine the pre-operative level of involvement.
- This case features a unique presentation of IVCT in RCC with right atrial involvement demonstrating the importance of accurate inferior vena caval filling defect diagnosis and level of thrombus involvement as these greatly affect surgical management.

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