



BILATERAL ADRENAL MALIGNANT MASSES WITH EXTENSIVE *CAVO-PORTAL-MESENTERIC* TUMOR THROMBUS AND RAPID FATAL OUTCOME: AN IMAGING-BASED CASE REPORT

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Abstract

Background: Bilateral adrenal malignant masses are uncommon and may be diagnostically challenging, particularly when associated with hepatic invasion and extensive venous tumor thrombus. Cross-sectional imaging is pivotal for defining the site of origin, mapping vascular extension, and refining the differential diagnosis.

Case presentation: A 60-year-old man presented with epigastric pain and abdominal swelling. Initial abdominal ultrasound suggested chronic liver disease with a focal right hepatic lesion, splenomegaly, and moderate ascites. Subsequent contrast-enhanced CT abdomen demonstrated large bilateral adrenal masses with extensive local and vascular invasion. The right adrenal mass invaded the inferior vena cava (IVC), with tumor thrombus extending cranially into the chest and possible right atrial involvement, and directly invaded the right hepatic lobe. Tumor thrombus also involved the portal vein, superior mesenteric vein (SMV), and splenic vein, with associated altered hepatic enhancement. The left adrenal mass extended into the left renal vein and further into the IVC. Moderate ascites was present. The extent of vascular involvement suggested advanced-stage disease at presentation, limiting therapeutic options and precluding surgical intervention. The patient deteriorated rapidly and died within one week. Histopathologic confirmation was unavailable. This extremely short clinical course highlights the fulminant biological behavior of the underlying malignancy.

Conclusion: This case highlights an unusually aggressive imaging pattern of bilateral adrenal malignant masses with simultaneous systemic and portal venous tumor thrombus. It underscores the value of contrast-enhanced CT in correcting an initial sonographic impression favoring primary hepatic disease, establishing adrenal origin, and mapping the full extent of vascular invasion. In the absence of tissue diagnosis, the findings were most suggestive of adrenal cortical malignancy, with metastatic adrenal disease and malignant pheochromocytoma remaining differential considerations.

Keywords: bilateral adrenal masses; tumor thrombus; inferior vena cava; portal vein; adrenocortical carcinoma; computed tomography; case report

Introduction

Adrenal malignancies are rare, and bilateral adrenal malignant masses are even less common. When associated with extensive venous tumor thrombus, they represent a highly aggressive disease pattern with major diagnostic and prognostic implications. Tumor extension into the inferior vena cava is a recognized manifestation of advanced adrenal malignancy, but concurrent involvement of the portal vein, superior mesenteric vein, splenic vein, and renal vein is distinctly unusual. Such cases may mimic primary hepatic or hepatobiliary disease, particularly on initial sonographic evaluation. Simultaneous cavo-portal-mesenteric venous tumor thrombosis in the context of adrenal malignancy has been very rarely described in the literature, if at all in such a combined distribution.

Contrast-enhanced CT is central to defining the site of origin of retroperitoneal masses, assessing local organ invasion, identifying venous tumor thrombus, and narrowing the differential diagnosis. This report describes a rapidly fatal case of bilateral adrenal malignant masses with extensive cavo-portal-mesenteric venous tumor thrombus and hepatic invasion, initially suspected on ultrasound to represent chronic liver disease with a hepatic mass.

Case Presentation

A 60-year-old man presented with epigastric pain and abdominal swelling. Initial abdominal ultrasound reportedly demonstrated hepatomegaly with coarse hepatic echotexture suggestive of cirrhosis, a rounded heterogeneous right hepatic lobe lesion, splenomegaly, and moderate ascites. The preliminary impression favored liver cirrhosis with a possible hepatoma.

Subsequent contrast-enhanced CT of the abdomen demonstrated large bilateral lobulated adrenal masses. Image quality and multiphasic acquisition allowed detailed assessment of vascular invasion and tumor thrombus propagation. The right adrenal mass measured approximately $5.0 \times 5.6 \times 5.5$ cm and the left adrenal mass approximately $5.6 \times 4.4 \times 7.7$ cm. The right adrenal mass showed direct invasion into the IVC, with tumor thrombus extending cranially into the chest; right atrial involvement could not be excluded on the available images. There was also direct tumor invasion into the right hepatic lobe. Tumor thrombus involved the portal vein, which was markedly dilated at the porta hepatis, and extended into the superior mesenteric vein and splenic vein. Associated differential hepatic enhancement suggested altered portal venous perfusion secondary to tumor thrombosis. The left adrenal mass extended into the left renal vein and further into the IVC. Moderate abdominopelvic ascites was present. A small right inguinal hernia was also noted.

The constellation of bilateral adrenal masses, direct hepatic invasion, extensive IVC tumor thrombus with cranial extension, portal venous system involvement, and left renal vein extension indicated an aggressive malignant process. The leading radiologic consideration was adrenal cortical malignancy, particularly adrenocortical carcinoma, although metastatic adrenal malignancy and malignant pheochromocytoma remained important differential considerations.

Histopathologic confirmation and endocrine workup were not available because of rapid clinical deterioration. The patient died within one week of imaging evaluation.

Discussion

This case is notable for several reasons. First, it demonstrates bilateral adrenal malignant masses, an uncommon imaging finding with a relatively broad but clinically significant differential diagnosis. The presence of aggressive contiguous vascular invasion strongly favored malignant neoplasia.

Second, the pattern of venous extension was exceptional. Tumor thrombus involved the IVC, left renal vein, portal vein, SMV, and splenic vein, with cranial propagation into the chest and possible right atrial extension. Simultaneous involvement of both the systemic venous axis and the porto-mesenteric-splenic venous system is highly unusual. The right adrenal mass also directly invaded the right hepatic lobe, contributing to the initial diagnostic confusion and the altered hepatic enhancement pattern. The altered hepatic enhancement likely reflected a combination of direct tumor infiltration and hemodynamic changes secondary to extensive portal venous obstruction.

Third, the case illustrates a meaningful diagnostic pitfall on ultrasound. The sonographic interpretation emphasized chronic liver disease with a focal hepatic lesion, splenomegaly, and ascites,

raising suspicion for hepatoma in a cirrhotic liver. Cross-sectional imaging subsequently clarified that the dominant disease process arose from the adrenal glands, with secondary hepatic invasion and vascular compromise. This underscores the limitations of ultrasound in complex upper abdominal malignancy when lesions abut the liver and distort vascular anatomy.

From an imaging perspective, CT was crucial for identifying the bilateral adrenal origin, demonstrating contiguous vascular tumor thrombus, depicting direct hepatic invasion, and showing the full cranio-caudal extent of disease.

The principal differential diagnoses included: (1) adrenocortical carcinoma, favored because of the aggressive behavior, local invasion, and extensive venous tumor thrombus; (2) metastatic adrenal disease, which may be bilateral but is usually less likely to show this degree of contiguous venous extension; and (3) malignant pheochromocytoma, which can be large and invasive but could not be supported or excluded biochemically in this case.

The patient died within one week of imaging evaluation, emphasizing the fulminant nature of the disease. Even without tissue diagnosis, the imaging pattern alone indicated advanced, biologically aggressive malignancy with severe vascular burden and likely compromised hepatic perfusion.

Limitations

The major limitation of this report is the absence of histopathologic confirmation and endocrine workup. Additionally, absence of MRI or PET-CT limited further characterization of metabolic activity and potential extra-abdominal disease burden. Owing to rapid clinical deterioration and death, definitive tissue diagnosis was not obtained. The diagnosis should therefore be presented as radiologically favored rather than pathologically proven.

Conclusion

This case demonstrates an unusually aggressive pattern of bilateral adrenal malignant masses with extensive cavo-portal-mesenteric venous tumor thrombus, direct hepatic invasion, and rapid fatal outcome. It highlights the value of contrast-enhanced CT in establishing the adrenal origin of disease, mapping the full extent of vascular involvement, and correcting an initial sonographic impression favoring primary hepatic pathology. In the absence of histopathologic confirmation, the imaging findings were most suggestive of adrenal cortical malignancy, with metastatic adrenal disease and malignant pheochromocytoma remaining differential possibilities. Recognition of this imaging pattern is critical, as it indicates terminal-stage disease with extremely limited therapeutic options.

Learning Points

- Bilateral adrenal malignant masses with extensive venous tumor thrombus represent a rare and highly aggressive imaging pattern.
- Initial ultrasound may be misleading when adrenal masses invade the liver or distort regional vascular anatomy.
- Contrast-enhanced CT is essential for determining the site of origin and mapping contiguous venous tumor thrombus.
- Concurrent involvement of the IVC, renal vein, portal vein, SMV, and splenic vein should alert the radiologist to advanced malignant disease.
- In rapidly fatal cases without tissue diagnosis, careful wording is required and the diagnosis should remain radiologically favored rather than definitive.
- Extensive multi-territory venous tumor thrombus involving both systemic and portal venous systems may represent a radiologic marker of terminal-stage adrenal malignancy.

Prepared as an anonymized submission-ready draft

Patient	age	Case	type	Status
60 years		Imaging-based case report		Identifiers removed

Pathology	Outcome	Primary	modality
Not available	Death within one week	Contrast-enhanced abdomen	CT

Declarations

Consent	Written informed consent for publication should be obtained from the patient’s next of kin before submission. If not feasible, follow the target journal’s policy regarding publication of deceased-patient case material.
Funding	No funding was received.
Competing interests	The authors declare no competing interests.
Author contributions	[Insert author names/initials] contributed to image interpretation, manuscript drafting, literature review, and final approval.

Figure Panel and Legends

All figure screenshots were cropped to remove identifiers, including patient name, hospital name, dates, accession numbers, and study identifiers. Replace any low-resolution images with higher-quality exports if available before final submission.



Figure 1. Axial contrast-enhanced CT image showing large bilateral adrenal masses.

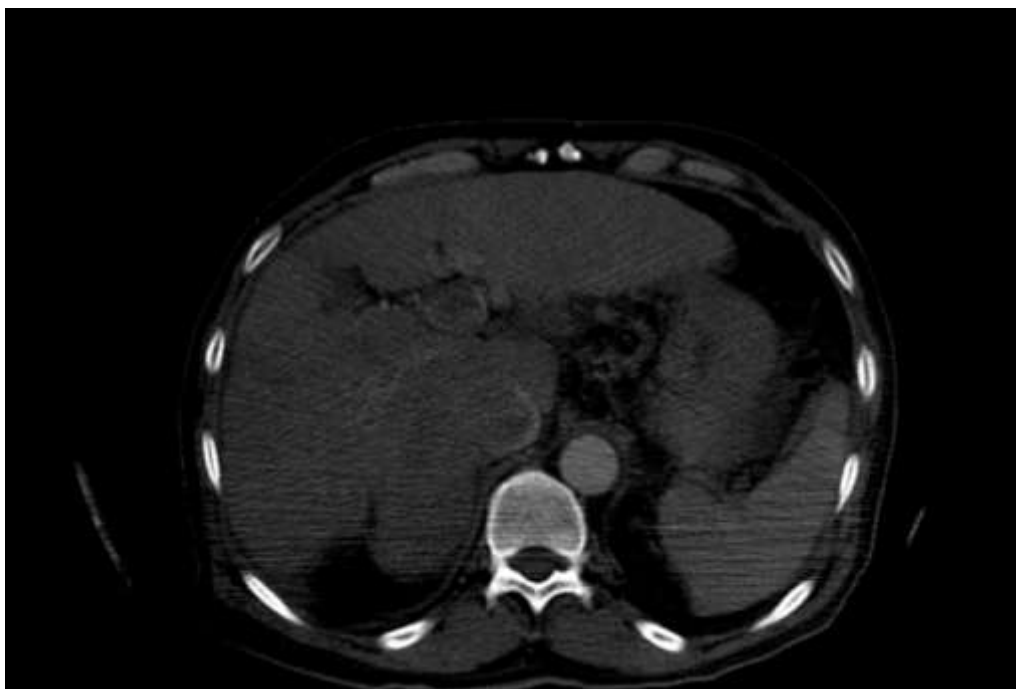


Figure 2. Axial contrast-enhanced CT image demonstrating tumor thrombus within the inferior vena cava.



Figure 3. Axial upper abdominal/lower thoracic CT image demonstrating cranial extension of the IVC tumor thrombus toward the right atrium; right atrial involvement could not be excluded on the available images.



Figure 4. Axial contrast-enhanced CT image showing tumor thrombus involving the porto-mesenteric confluence.

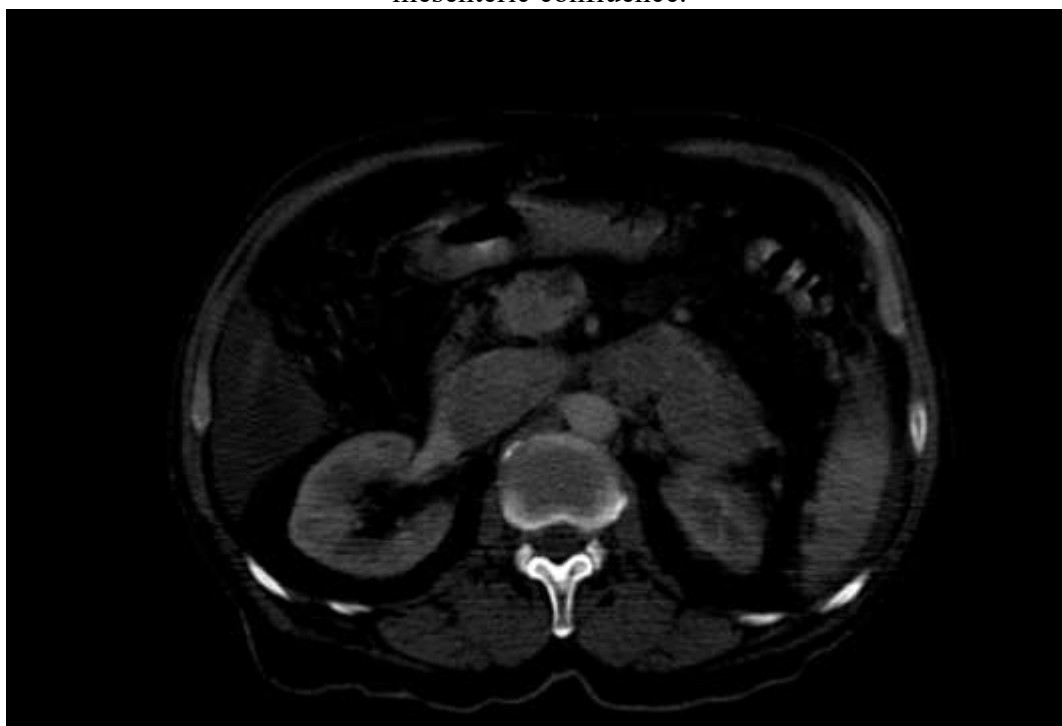


Figure 5. Axial contrast-enhanced CT image demonstrating extension of tumor thrombus into the superior mesenteric vein and splenic venous axis.



Figure 6. Axial contrast-enhanced CT image showing left renal vein involvement associated with the left adrenal mass.

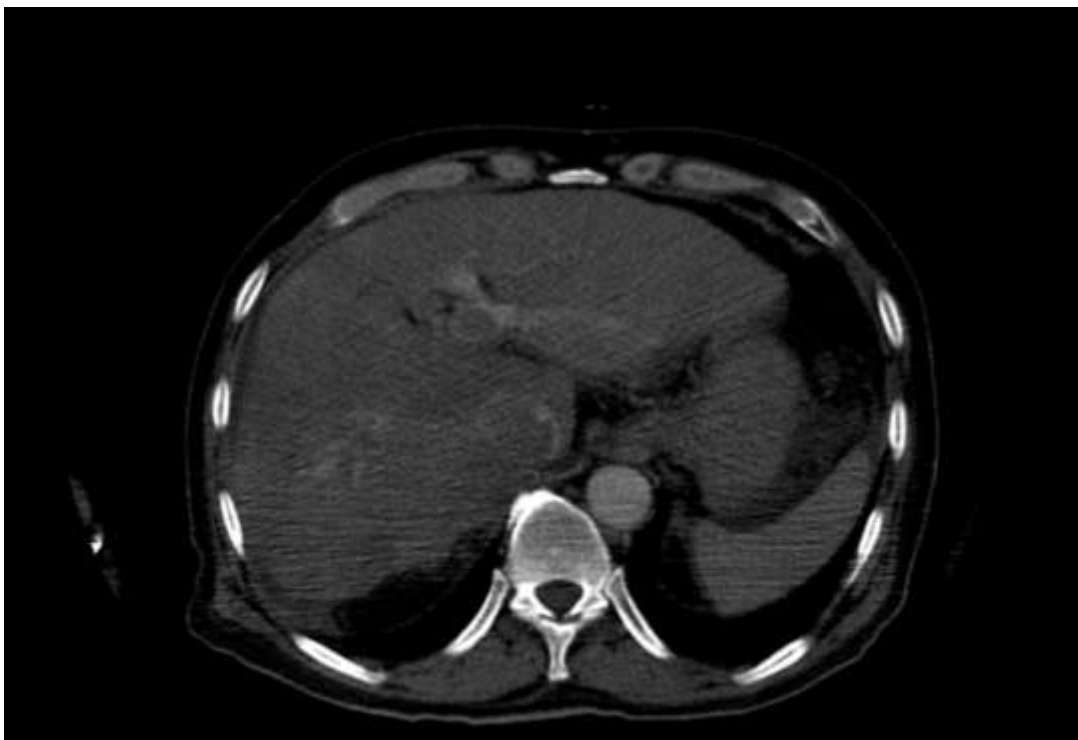


Figure 7. Axial contrast-enhanced CT image demonstrating altered hepatic enhancement and/or direct hepatic invasion related to the right adrenal mass and portal venous tumor thrombus.

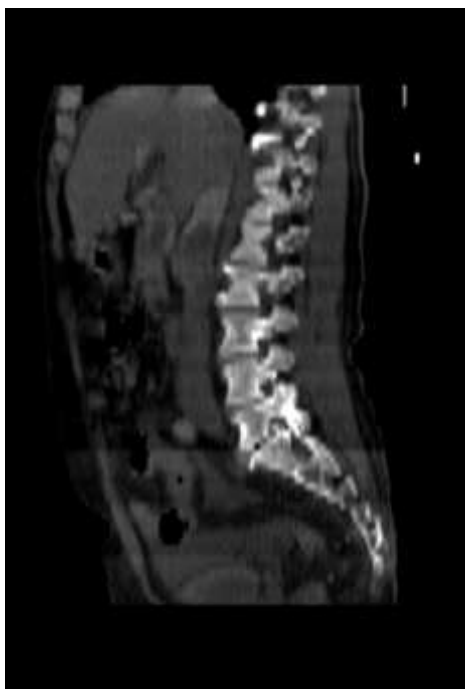


Figure 8. Sagittal contrast-enhanced CT reconstruction showing the longitudinal extent of IVC tumor thrombus.

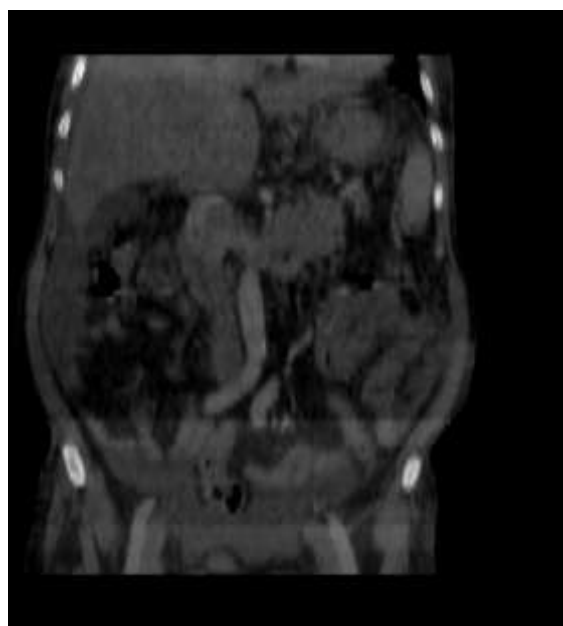


Figure 9. Coronal contrast-enhanced CT reconstruction demonstrating the left adrenal mass with contiguous extension of tumor thrombus into the left renal vein and inferior vena cava.

Submission Checklist

1. Confirm patient age is uniformly stated as 60 years across manuscript, cover letter, and figure metadata.
2. Confirm next-of-kin consent or journal-approved alternate pathway for publication of deceased-patient material.
3. Replace any low-resolution screenshots with direct PACS exports if possible.
4. Add authors, affiliations, corresponding author details, and target journal formatting requirements.
5. Perform final language edit after target journal selection.