

Metastatic renal clear-cell carcinoma to the gallbladder: A radiologist's perspective

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Renal-cell carcinoma is the most lethal of all urologic malignancies, with a high metastatic potential. Approximately 25% of patients present with stage IV disease, and up to 40% of patients have disease recurrence after nephrectomy. Computed tomography (CT) is an important imaging modality for initial diagnosis and restaging of this patient population. Although extremely rare, clear-cell renal carcinoma has been reported to metastasize to the gallbladder. We present the case of a 50-year-old man who developed clear-cell renal carcinoma metastases to the contralateral adrenal gland and the gallbladder that were detected at initial restaging with CT scan.

Introduction

Renal-cell carcinoma (RCC), a common urologic malignancy, carries a poor prognosis. Metastatic potential is high. Approximately one fourth of patients have metastatic disease at initial presentation (1, 2, 3, 4). The most common sites of distant metastasis are lung, liver, contralateral kidney, bone, and adrenal glands (1, 2). In contrast, metastatic RCC to the gallbladder is exceedingly rare (5, 6, 7, 8). We present the case of a 50-year-old man with clear-cell renal carcinoma metastases to the contralateral adrenal gland and the gallbladder that were detected at initial restaging with contrast-enhanced computed tomography (CT).

Case report

A 50-year-old man presented with gross hematuria. Past medical history was significant for untreated hypertension, chronic obstructive pulmonary disease (COPD), alcohol use, and a long history of smoking. Contrast-enhanced CT

scan revealed a 7.2 cm x 5.7 cm x 6.3 cm mass in the right kidney, with right renal vein involvement and questionable bilateral adrenal gland involvement (Fig. 1). The patient underwent right radical nephrectomy and right adrenalectomy. He was found to have a clear-cell renal carcinoma with a metastatic focus in the right adrenal gland, but not by direct extension. Postoperative staging was T4 Nx M1.

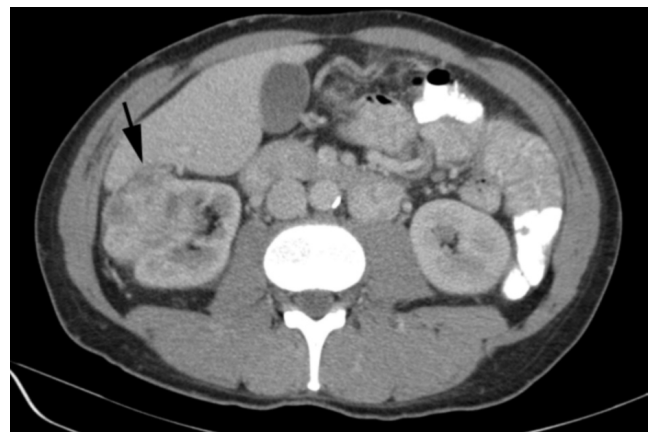


Figure 1. 50-year-old man with renal-cell carcinoma. Post-contrast axial CT image of enhancing primary renal-cell carcinoma of the right kidney (arrow).

Followup CT imaging obtained three months after the patient initially presented demonstrated increased number and size of multiple arterially enhancing left adrenal gland lesions, which were indeterminate on the initial CT (Fig. 2).

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In addition, within the gallbladder there was an 8 mm x 11 mm nodule of soft-tissue density with an enhancing component. The left adrenal lesion was biopsied and proven to be metastatic RCC. It was decided to address the left adrenal metastasis and gallbladder lesion at separate surgeries. A left adrenalectomy was performed two months later after pretreatment with steroids.

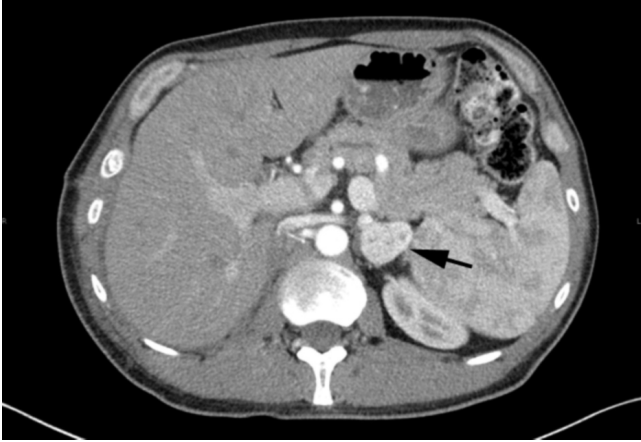


Figure 2. 50-year-old man with renal-cell carcinoma. Post-contrast axial CT image demonstrates enhancing left adrenal lesion (arrow).

A CT scan performed eight months after initial presentation now revealed a 13 mm x 21 mm arterially enhancing polypoid soft-tissue mass within the gallbladder, with a blood supply from a sizeable cystic artery (Figs. 3, 4).

The patient subsequently underwent open cholecystectomy with partial liver resection. Despite the gallbladder mass, he remained asymptomatic from his initial presenta-

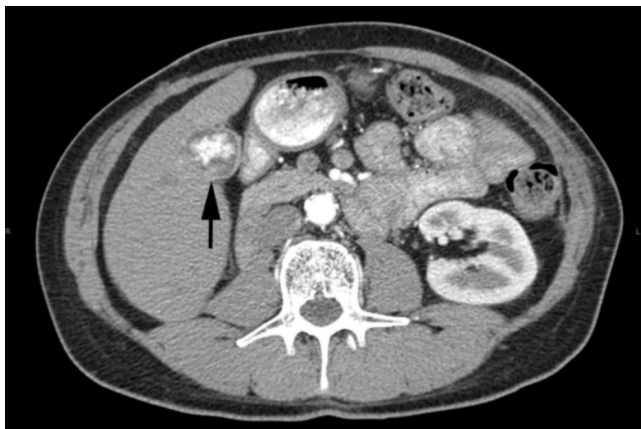


Figure 3. 50-year-old man with renal-cell carcinoma. Post-contrast axial CT image demonstrates avidly contrast-enhancing polypoid gallbladder lesion (arrow).

tion until surgery, denying any complaints of nausea, vomiting, weight loss, jaundice, change in bowel habits, or abdominal pain.

Intraoperative ultrasound revealed a hyperechoic polypoid soft-tissue mass within the gallbladder, and no liver lesions (Fig. 5). The gallbladder, along with a circumferential area of liver, was removed en bloc. The pathologic

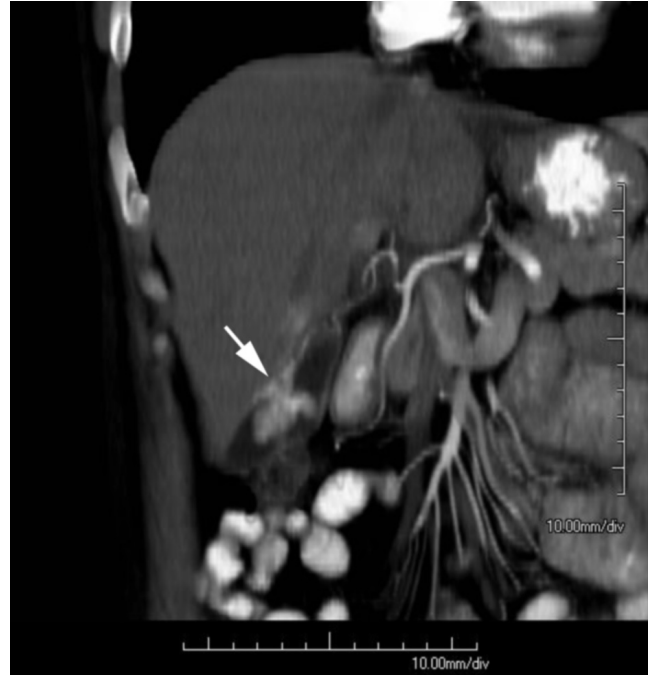


Figure 4. 50-year-old man with renal-cell carcinoma. 3D CT reconstruction of gallbladder lesion with anomalous vascular supply derived from intrahepatic hepatic arterial branches (arrow).

specimen measured 3 cm x 1.5 cm x 1.5 cm in greatest dimensions. Additionally, there were two smaller polyps within the acalculous gallbladder.

Histology revealed metastatic renal clear-cell carcinoma to the gallbladder (Figs. 6, 7). The removed portion of the liver and three lymph nodes were free of tumor.

The patient did well immediately postoperatively. However, approximately 12 months after his initial diagnosis of RCC, he presented to the emergency department with gross hematuria and abdominal pain. He was found to have bladder metastasis on repeat imaging that was subsequently confirmed by bladder biopsy. The patient is currently undergoing chemotherapy with Sunitinib as well as hormone-replacement therapy for iatrogenic adrenal insufficiency.

Discussion

Renal-cell carcinoma has a high propensity to metastasize, with up to one fourth of patients presenting with stage IV disease at the time of initial diagnosis. Up to 40% of patients have disease recurrence after nephrectomy, and

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Figure 5. 50-year-old man with renal-cell carcinoma. Intraoperative ultrasound image of polypoid gallbladder lesion.

more than 40% of patients have died from their RCC (1, 2, 3, 4). Radiologists and referring clinicians should be aware of some of the less common sites for metastatic disease when following these patients.

Metastatic disease of the gallbladder is rare and most commonly due to melanoma (9). Metastasis should certainly be considered in patients with a personal history of RCC when a hypervascular gallbladder mass is detected on imaging. Polypoid gallbladder lesions less than 10 mm are

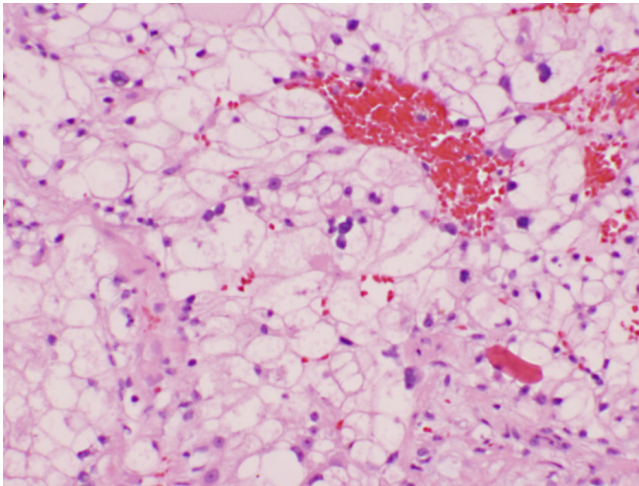


Figure 6. 50-year-old man with renal-cell carcinoma. Photomicrograph of metastatic renal clear-cell carcinoma to gallbladder in this patient.

most likely benign cholesterol polyps and are typically followed with ultrasound. Lesions greater than 10 mm are suspicious for malignancy and should be surgically removed (5, 10). The gallbladder lesion in our patient measured 13 mm x 21 mm on CT at the time of cholecystectomy.

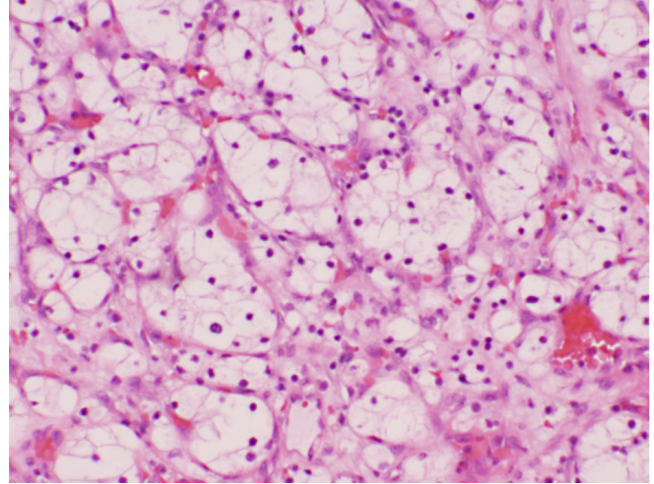


Figure 7. 50-year-old man with renal-cell carcinoma. Photomicrograph of primary renal clear-cell carcinoma in this patient.

Early detection of metastatic foci has implications with regards to staging and patient management. CT scan is currently the modality of choice for restaging renal-cell-cancer patients (11, 12). Unfortunately, differentiating a primary gallbladder carcinoma from gallbladder metastasis of RCC on CT scan alone can be challenging. Although nonspecific, attenuation measurements over time on dynamic imaging may provide clues to the underlying etiology (Fig. 8).

All measurements are derived from the initial restaging dynamic CT scan before and after contrast during arterial, portal venous, and delayed phases. Contrast-enhancement characteristics of the two lesions were quite similar to each other, yet distinctly different from those of the adjacent normal renal and liver parenchyma. Such similar enhancement dynamics of synchronous lesions, as shown in this case, may suggest the same underlying pathology (8). Direct comparison of time-attenuation curves of the metastasis to the initial CT scan that diagnosed the primary RCC was not possible because that scan had not been performed as a multiphasic examination.

Histologically, it can be difficult to differentiate primary clear-cell carcinoma of the gallbladder from renal metastasis. The incidence of primary clear-cell carcinoma of the gallbladder is also rare. In a series of seven cases of primary clear-cell carcinomas of the gallbladder, reported by Vardaman and Albores-Saavedra, all of the patients were females with pre-existing cholelithiasis (13). In the presence of a known renal clear-cell tumor and in the absence of gallstones, a polypoid gallbladder lesion is most likely meta-

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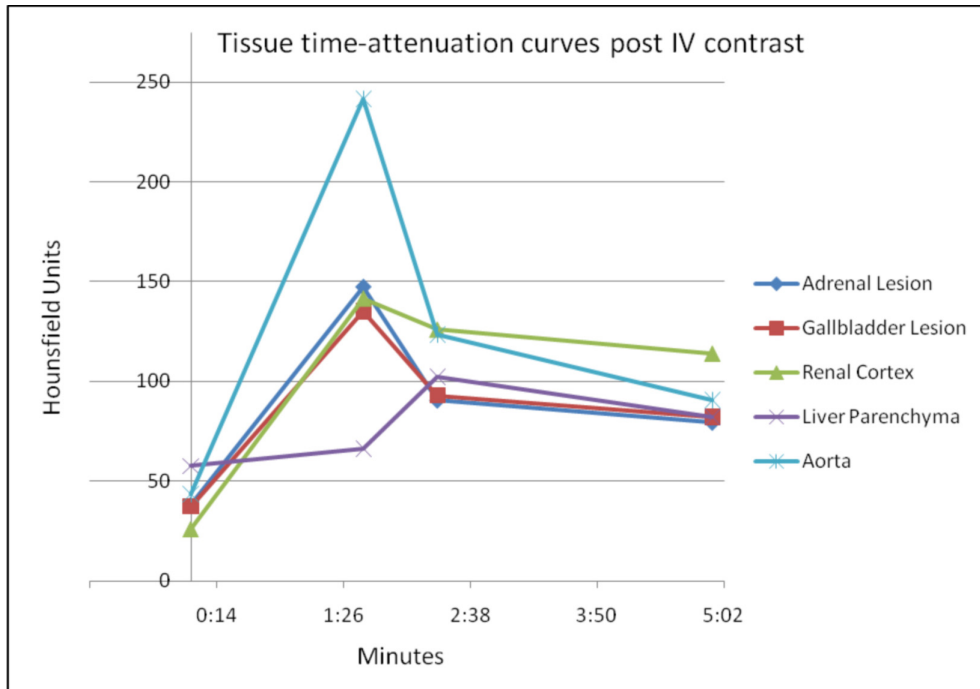


Figure 8. 50-year-old man with renal-cell carcinoma. Time-attenuation curves of the left adrenal and gallbladder masses, as well as of the renal cortex, liver parenchyma, and aorta.

static disease (6), and less likely primary gallbladder carcinoma.

In summary, although metastatic disease of the gallbladder is rare, it should be included in the differential diagnosis when gallbladder lesions are detected during initial staging and restaging of renal-cell carcinoma patients.

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