Renal-cell carcinoma (RCC), a common urologic malignancy, carries a poor prognosis. Metastatic potential is high. 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.

**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 T4NxM1.

**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).
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.

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 presentation 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 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
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 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.

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-
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.

References
1. Lam J, Leppert J, Figlin R, Belldegrun AS. Surveillance following radical or partial nephrectomy for renal cell carcinoma. *Curr Urol Rep.* 2005 Feb;6(1):7-18. [PubMed]
2. Chin A, Lam J, Figlin A, Belldegrun A. Surveillance strategies for renal cell carcinoma patients following nephrectomy. *Rev Urol.* 2006 Winter;8(1):1–7. [PubMed]
3. Landis SH, Murray T, Bolden S, Wingo PA. Cancer statistics: 1999. *CA Cancer J Clin.* 1999 Jan-Feb;49(1):8-31. [PubMed]
4. Pantuck AJ, Zisman A, Belldegrun AS: The changing natural history of renal cell carcinoma. *J Urol.* 2001 Nov;166(5):1611-1623. [PubMed]
5. Itoh H, Nishijima K, Kurosaka Y, et. al. Asymptomatic metachronous solitary metastasis to the gallbladder from renal cell carcinoma: Report of a case. *Chir Gastroenterol.* 2004;20(2):153–156. DOI 10.1159/000072932.
6. Celebi I, Güzelsoy M, Yörükoglu K, Kirkali Z. Renal cell carcinoma with gallbladder metastasis. *Int J Urol.* 1998 May;5(3):288–290. [PubMed]
7. Hellenthal N, Stewart G, Cambio A, DeLair S. Renal cell carcinoma metastatic to gallbladder: A survival advantage to simultaneous nephrectomy and cholecystectomy. *Int Urol Nephrol.* 2007;39(2):377–379. [PubMed]
8. Nojima H, Cho A, Yamamoto H, et. al. Renal cell carcinoma with unusual metastasis to the gallbladder. *J Hepatobiliary Pancreat Surg* 2008 Apr;15(2):209-12. [PubMed]
9. McLadden M, Kremetz E, McKinnon W, Pararo LL, Ryan R. Metastatic melanoma of the gallbladder. *Cancer.* 1979 Nov;44(5):1802–1808. [PubMed]
10. Csendes A, Burgos A, Csendes P, Smok G, Rojas J. Late follow-up of polypoid lesions of the gallbladder smaller than 10 mm. *Ann Surg.* 2001 Nov;234(5):657-660. [PubMed]
11. Kassouf W, Morash C, Goldenberg L, Chetner M, Tanguay S. Follow-up guidelines after radical or partial nephrectomy for localized and locally advanced renal cell carcinoma. *Can Urol Assoc J.* 2009 Feb;3(1):73-6. [PubMed]
12. Tollefson M, Takahashi N, Leibovich BC, Contemporary imaging modalities for the surveillance of patients with renal cell carcinoma. *Curr Urol Rep.* 2007 Jan;8(1):38–43. [PubMed]
13. Vardaman C, Albores-Saavedra J, Clear cell carcinomas of the gallbladder and extrahepatic bile ducts. *Am J Surg Pathol.* 1995 Jan;19(1):91–99. [PubMed]