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Chyluria Associated With Radiofrequency Ablation of Renal Cell Carcinoma

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Abstract

Chyluria is a rare condition resulting from an abnormal connection between the lymphatic and urinary collecting system and is known to occur after partial nephrectomy. We report 2 cases of chyluria in patients after radiofrequency ablation of renal cell carcinoma diagnosed on surveillance computed tomography.

Keywords

chyluria; radiofrequency ablation; renal cell carcinoma; fat-fluid level

Percutaneous renal tumor ablation is increasingly used because of its high success rate, low morbidity, and excellent ablation follow-up imaging is critical to clinical management, and radiologists need to be aware of the expected appearance of defects caused by ablation and its complications. Although chyluria has previously been seen as a complication of partial nephrectomy, it has not been described after ablation therapy. We present 2 cases of chyluria diagnosed on computed tomography (CT) after a local renal cell carcinoma radiofrequency ablation and review of the literature.

CASE REPORTS

Case 1

A 62-year-old man was incidentally noted on abdominopelvic CT scan to have a 2.3 × 2.3-cm heterogeneously enhancing mass in the lower pole, right kidney, suspicious for renal cell carcinoma (Fig. 1A). Immediately inferior to the enhancing right renal mass, a hemorrhagic renal cyst was seen (Fig. 1B). The patient subsequently underwent percutaneous radiofrequency ablation of the enhancing renal mass, and concurrent aspiration cytologic examination result confirmed the diagnosis of clear cell renal cell carcinoma. Eight months later, a surveillance abdominopelvic CT study revealed expected postablation changes consistent with the treated renal cell carcinoma. However, new fat-fluid levels were seen within the now smaller right hemorrhagic cyst (Fig. 1C) and within the urinary bladder (Fig. 1D), consistent with chyluria. The patient had no urinary complaints and was treated conservatively.

Case 2

A 71-year-old man with a history of bilateral papillary renal cell carcinoma status after bilateral partial nephrectomies subsequently underwent radiofrequency ablation of a 1.5-cm exophytic mass of the upper pole, left kidney that was discovered on surveillance CT. Concurrent aspiration cytologic examination result confirmed the diagnosis of clear cell renal cell carcinoma. Computed tomography performed 11 months after the ablation revealed a treated renal cell carcinoma in the left kidney (Fig. 2A) and a new fat-fluid level in the bladder (Fig. 2B) indicating chyluria that was not present on preablation CT scans. The patient remained asymptomatic and was treated conservatively.

DISCUSSION

Chyle is a milky-colored lymphatic fluid that is rich in protein and fat in the form of chylomicrons.^{1,2} Chyluria is a rare condition that was first described in the 17th century and is most commonly due to filariasis-related lymphatic obstruction in areas endemic for *Wucheria bancrofti*, a parasite transmitted by a mosquito vector.³ In Western countries, chyluria is most often associated with renal trauma, tuberculosis, diabetes mellitus, neoplasm, abscess, and congenital disorders of the lymphatic system.³ Recently, chyluria has also been described as a complication of open and laparoscopic radical and partial nephrectomies^{4,5} but has not previously been described after radiofrequency ablation.

Radiofrequency ablation has become an accepted, minimally invasive treatment of renal cell carcinoma in patients who are unable to undergo surgery.⁶ Major complications associated with radiofrequency ablation of renal cell carcinoma are infrequent and are mostly related to unintended heat injury to organs including bowel and ureter and massive bleeding.⁶ Minor complications include hematoma and hematuria.⁶ Chyluria associated with radiofrequency ablation of renal cell carcinoma has not been previously reported. In our first case, the postablation CT scan showed fat-fluid levels in both the renal cyst and the urinary bladder. In the second case, the postablation CT scan showed fat-fluid level in the urinary bladder. The CT findings in both cases are consistent with chyluria. The presumed mechanism for the fat seen in our patients is lymphatic injury secondary to radiofrequency ablation and fistulous connection with the renal collecting system. In our first case, there was also presumed fistulous connection between the lymphatic system and the renal cyst that was near the renal cell carcinoma.

On CT, it is important not to mistake fat, which is generally between -20 and -180 HU, for gas in the renal collecting system. Air-fluid levels in the collecting system can result from instrumentation but, in the correct clinical setting, may indicate infection. Proper window and leveling techniques and CT attenuation measurement may be necessary to recognize the fat-fluid level associated with chyluria. As chyluria may not be associated with clinical symptoms, radiologists may be relied upon solely to make this diagnosis in patients who have had renal instrumentation or trauma.

Chyluria may range in severity from no symptoms to causing flank pain, dysuria, hematuria, hypoproteinemia, malnutrition, and cachexia.³ Symptomatic patients may complain of having milky-white urine, and directed urinalysis will reveal the presence of fat. Care must be taken, as the signs and symptoms of pyuria overlap with those of chyluria, leading patients to possibly undergo unnecessary antibiotic management.³ Although 50% of cases of chyluria resolve spontaneously, treatment may be required for persistent cases and symptomatic patients.³ Nutritional management includes a low fat, high protein diet, with the fat portion of the diet consisting of medium chain triglycerides that are largely absorbed in the portal system before entering the systemic circulation.^{2,3} If more aggressive treatment is warranted, renal sclerotherapy with silver nitrate or povidoneiodine⁷⁻⁹ or embolization

with *N*-butyl-2-cyanoacrylate can be performed.¹⁰ Alternatively, surgical ligation of the renal pedicle lymphatic vessels has a high rate of reported success.^{3,11}

In summary, chyluria may be diagnosed on CT in patients after radiofrequency ablation of a renal tumor. Identification of fat-fluid levels on CT may assist in the clinical management of these patients.

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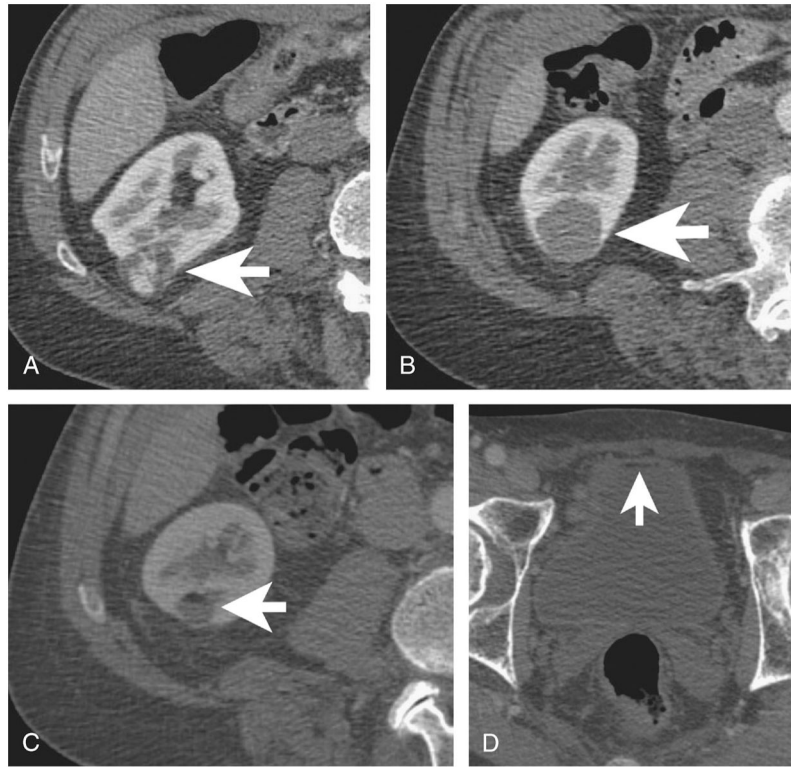
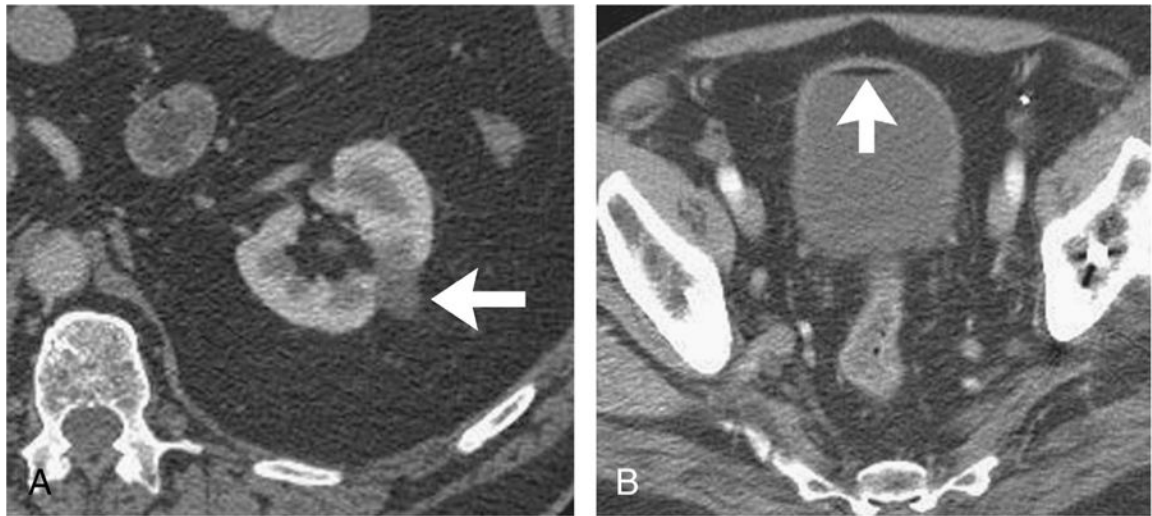


FIGURE 1.

A 62-year-old man with renal cell carcinoma. A, Preablation axial contrast-enhanced CT scan demonstrates a heterogeneously enhancing cortical mass (arrow) in the lower pole, right kidney, suspicious for renal cell carcinoma. B, Preablation axial contrast-enhanced CT scan demonstrates an adjacent nonenhancing cystic lesion (arrow), which has intrinsic high density on the concurrent non-contrast-enhanced CT scan (not shown), consistent with a hemorrhagic cyst. C, Postablation axial contrast-enhanced CT through the right kidney reveals a fat-fluid level (arrow) in the now smaller right hemorrhagic renal cyst, consistent with chyluria. D, Postablation axial contrast-enhanced CT through the urinary bladder reveals a small fat-fluid level (arrow), consistent with chyluria.

**FIGURE 2.**

A 71-year-old man with renal cell carcinoma status after radiofrequency ablation. A, Postablation axial contrast-enhanced CT through the abdomen reveals a radiofrequency ablation site (arrow) in the upper pole of the left kidney, without suspicious enhancement to suggest residual tumor. B, Postablation axial contrast-enhanced CT through the urinary bladder reveals a small fat-fluid level (arrow), consistent with chyluria.