CASE REPORT

Inadvertent cryoablation of exophytic upper tract urothelial carcinoma without pelvicalyceal involvement

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Ablative therapy has recently emerged as an option for the treatment of small renal masses (SRMs). Benign tumors and indolent renal cell carcinoma (RCC) represent a majority of these masses, although an additional but often unappreciated consideration is upper tract urothelial carcinoma (UC). We report the case of a 74-year-old man with upper tract UC presenting as a SRM without any apparent involvement of the pelvicalyceal system, leading to its inadvertent cryoablation. We also discuss the role of renal biopsy in the management of SRMs undergoing an ablative procedure.

Key Words: cryosurgery, needle biopsy, renal cell carcinoma, transitional cell carcinoma

Introduction

With the routine use of cross-sectional imaging, the incidental detection of small renal masses (SRMs) has been increasing and is now a commonly encountered senario.[1] Approximately 20% of renal masses less than 7 cm and an even greater portion less than 3 cm represent a benign pathology.[2,3] Those proving to be malignant are almost always RCC, which demonstrates an indolent behavior in 70% to 80% of cases and is rarely aggressive until reaching a diameter of 3 cm.[2-5]

Nephron-sparing surgery has emerged in an effort to reduce the overly aggressive treatment of SRMs and its associated loss of renal function. Most recently, the use of minimally invasive ablative techniques like cryoablation and radiofrequency ablation has been explored to improve the morbidity and risk of complications associated with partial nephrectomy. Their safety and intermediate-term efficacy have been promising.[6] However, the proper application of ablative therapy is not fully defined, particularly concerning the decision to perform a preoperative biopsy.

We report the case of a 74-year-old man with upper tract UC presenting as a SRM without any apparent involvement of the pelvicalyceal system, leading to its inadvertent cryoablation.

Case report

A 74-year-old, Caucasian man was referred for a 3.0 cm mass in his left kidney, which was incidentally discovered on computed tomography (CT) performed for a complaint of abdominal pain. He had a history of heart failure, atrial fibrillation, hypertension, hyperlipidemia, and hypothyroidism. He had also quit smoking about 25 years ago. A complete blood count, comprehensive metabolic panel, and urinalysis were unremarkable. Magnetic resonance imaging (MRI) confirmed a 3.0 cm mass in the inferior pole of his left kidney without any apparent extrarenal involvement, Figure 1. Due to its proximity to the pelvicalyceal system, cystoscopy and left ureteropyeloscopy were performed to exclude a diagnosis of upper tract UC. No abnormal lesions were visualized within the bladder or left renal collecting system. Retrograde ureteropyelography (RP) failed to show any filling defects or signs of obstruction, while a renal pelvic

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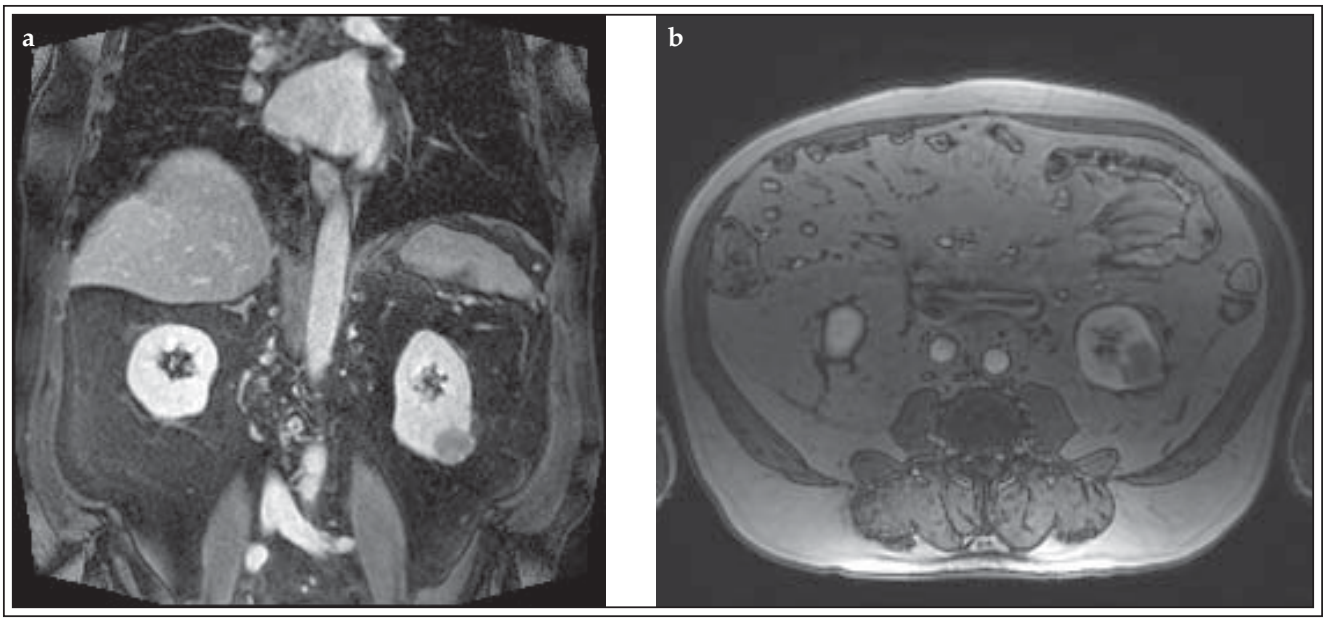

Figure 1. Contrast enhanced MRI of abdomen showing a heterogeneously enhancing, exophytic mass in the inferior pole of his left kidney: (a) coronal image; (b) cross-sectional image.

washing only revealed the presence of mildly atypical urothelial cells. Based on these findings, RCC was considered the likely diagnosis. Several options were discussed with our patient, but laparoscopic cryoablation was favored due to his comorbidities. Core biopsies were performed at the beginning of the procedure.

Pathologic examination of the biopsies showed a high grade, invasive carcinoma suggestive of either UC or collecting duct carcinoma when reported a few days later. It was therefore decided to proceed with left laparoscopic radical nephrectomy. Total ureterectomy and regional lymphadenetomy were subsequently performed once a diagnosis of upper tract UC was confirmed by frozen-section analysis. Consistent with the prior cryoablation, the surgical specimen consisted of extensive areas of necrosis with a residual tumor at its periphery. A final pathologic diagnosis of highgrade UC with glandular differentiation was assigned based on the presence of unequivocal urothelial elements, Figure 2. Immunohistochemistry demonstrated a pattern of reactivity consistent with but not absolutely characteristic of UC, Table 1. The tumor invaded the renal parenchyma as well as the perinephric and hilar adipose tissue with an involvement of one hilar lymph node. No unequivocal origin within the urothelium of the renal collecting system was identified despite an extensive pathologic examination.

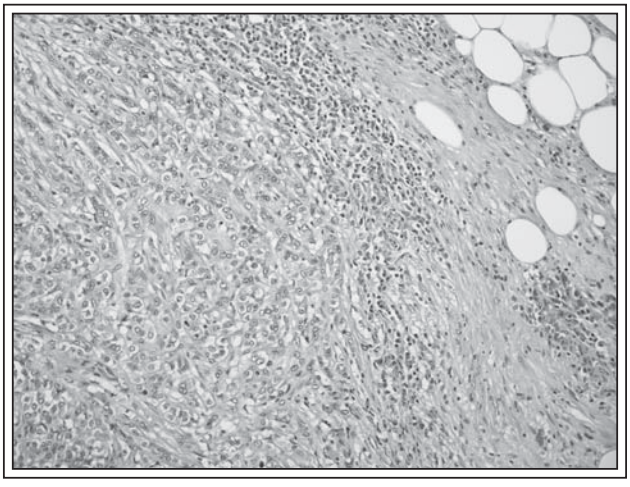

Figure 2. Photomicrograph showing high-grade, invasive UC within the perinephric adipose tissue of his left kidney.

TABLE 1. **Immunohistochemistry of tumors involving the kidney**

	High molecular weight keratin	CK7	CD10	p63
Our patient's tumor	+	+	+	–
Upper tract UC	+	+	–/+	+
CDC	+	–	+/–	–
Papillary RCC	–	+/–	+	–

Discussion

Upper tract UC is quite uncommon, accounting for only 5% of all tumors arising from the urothelium. It is most likely to originate from the pelvicalyceal system, where it represents 5% to 7% of primary tumors involving the kidney.[7]

Intravenous or CT urography is the standard imaging modality for the evaluation of upper tract UC. RP is also used for obtaining a detailed anatomy of the renal collecting system, particularly in the setting of ureteropyeloscopy. Upper tract UC typically manifests as a filling defect within the pelvicalyceal system associated with a dilated or amputated calyx. It cannot be reliably differentiated from RCC, though, once it invades the renal parenchyma. Several finding may be helpful under these circumstances. Upper tract UC characteristically preserves the renal contour, as opposed to the exophytic appearance of RCC. It also enhances to a lesser extent than RCC and demonstrates an infiltrative pattern that distorts the renal parenchyma.[8] On the MRI of our patient, the finding of a well-circumscribed, exophytic mass was more consistent with a diagnosis of RCC. There were also no findings on RP suggestive of upper tract UC.

Along with the use of upper tract imaging, the standard assessment for suspected UC consists of urinalysis, voided urinary cytology, and cystoscopy. A more comprehensive evaluation is usually required with selective upper tract urinary cytology and ureteropyeloscopy with an endoscopic biopsy.[9] In our patient, a similar approach was pursued but failed due to an apparent lack of involvement of the pelvicalyceal system. This phenomenon is occasionally seen in the pathologic examination of high grade tumors extensively invading the renal parenchyma and those with any aberrant differentiation.[10] To our knowledge, the incidence of this phenomenon has never been reported, nor has it been cited as a cause of failure to diagnose upper tract UC.

One of the limitations of ablative therapy is its reliance on the use of preoperative imaging in the management of SRMs. Some authors have argued that, without a definitive pathologic diagnosis, a considerable number of benign tumors are being unnecessarily treated. Ablative therapy has therefore been suggested as an emerging indication for a preoperative biopsy.[11] In our patient, the biopsies were performed at the beginning of cryoablation with the pathologic diagnosis not being available until a few days later. It is not routine to perform a preoperative biopsy at our institution, as its role in the management of SRMs has not been fully defined in the literature. An intraoperative biopsy, though, is always performed and examined in the postoperative period. Frozen-section analysis is also avoided due to its unreliability when compared to other cytologic and histologic techniques.[12,13] The biopsy is primarily obtained to differentiate between RCC and benign tumors like angiomyolipoma and oncocytoma. This distinction may obviate the need for a long term radiographic surveillance following an ablative procedure.

While a renal biopsy is considered a relatively safe procedure, it is not without any potential complications. One of the more feared complications is seeding of the needle track with a tumor. Few cases have been reported in the literature, primarily involving RCC and upper tract UC. Some authors consider UC to have a particularly great predilection for seeding and have therefore recommended not performing a biopsy when such a diagnosis is suspected.[14,15] Others have argued that the rarity of needle-track seeding should not deter a biopsy if indicated. They maintain that a biopsy may be performed if any suspicion of upper tract UC remains after a comprehensive assessment has been pursued.[11]

Conclusions

This case demonstrates the importance of considering upper tract UC in the management of SRMs. It can mimic the radiographic appearance of RCC and, if suspected, must be evaluated prior to initiating any treatment. A similar approach to the one pursued in our patient will be successful in a vast majority of cases. However, an unequivocal origin within the pelvicalyceal system may not always be identified, complicating the differentiation of RCC and upper tract UC. This possibility underscores the importance of performing a biopsy in all patients undergoing cryoablation to guide the proper treatment and subsequent surveillance of SRMs. Preoperative diagnosis, though, is probably not warranted due to the assumed rarity of this phenomenon and unlikelihood of impacting the initial management of SRMs. □

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