High Grade Transitional Cell Carcinoma of the Renal Pelvis with Divergent Differentiation Mimicking a Renal Abscess

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Abstract: We describe an unusual case of high-grade transitional cell carcinoma of the renal pelvis with sarcomatoid and squamous differentiation that presented as a left renal abscess. The patient had originally been treated for minimally invasive transitional cell carcinoma of the urinary bladder and ureteral orifices five years prior. Computerized tomography scan findings were consistent with an abscess of the left kidney. Percutaneous nephrostomy with drainage afforded no clinical improvement. Nephrectomy was performed and tissue was removed piecemeal because of the diagnosis of an abscess. Macroscopically the tissue was fragmented and necrotic with patches of gray-tan abscess. Microscopic sections revealed a biphasic neoplasm with squamous and sarcomatous elements that were co-existent with evident morphologic transition. There was also evidence of residual papillary transitional cell carcinoma in the renal pelvis. The sarcomatoid component was immunoreactive for cytokeratin, and vimentin. A malignant process must always be considered as an underlying cause when patients present with an abscess especially when there is a prior history of malignancy.

CLINICAL FINDINGS

A 52-year-old man with a history of superficially invasive, low-grade papillary urothelial carcinoma and concomitant Gleason 6 prostatic adenocarcinoma was, status post radical cystoprostatectomy with an ileal conduit performed in 2001. All margins were clean. He presented to the emergency room of Saint Barnabas Medical Center (Livingston, NJ) in late 2005 with left flank pain, hematuria, nausea, vomiting and fever. Evaluation revealed an elevated white blood cell count (23,000), elevated creatinine (3.8) and a CT scan revealed findings consistent with an abscess of the left kidney (Fig. **1**). The kidney was nonfunctional based on renal scan. The etiology of this process was unclear; there was no sign of obstruction at the ureteroileal anastomosis. After percutaneous nephrostomy with drainage of this abscess, there was no clinical improvement observed. Surgical exploration and nephrectomy were performed.

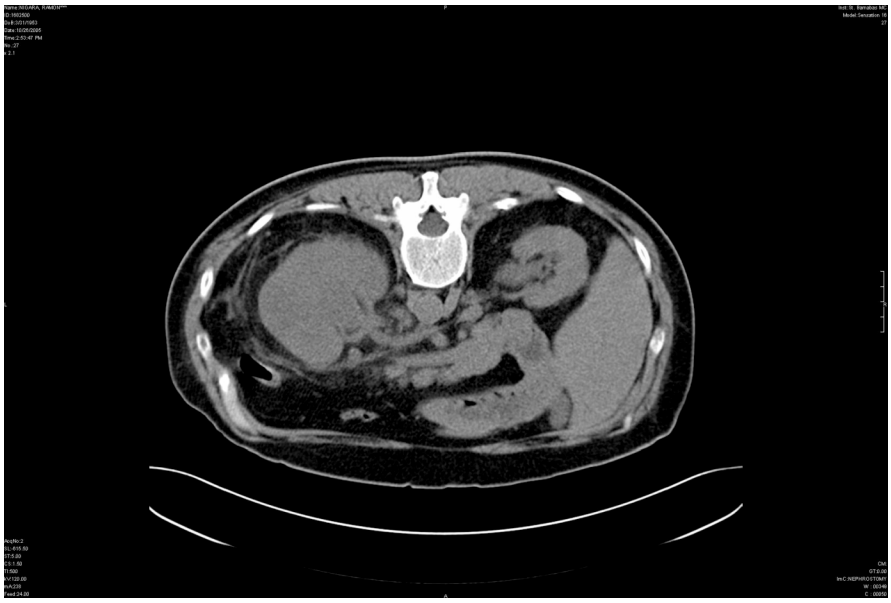

Fig. (1). CT scan of the abdomen (patient in prone position) showing an enlarged left kidney with hydroureter and irregular borders of the cortex. The primary consideration was an abscess. The right kidney also has mild hydroureter.

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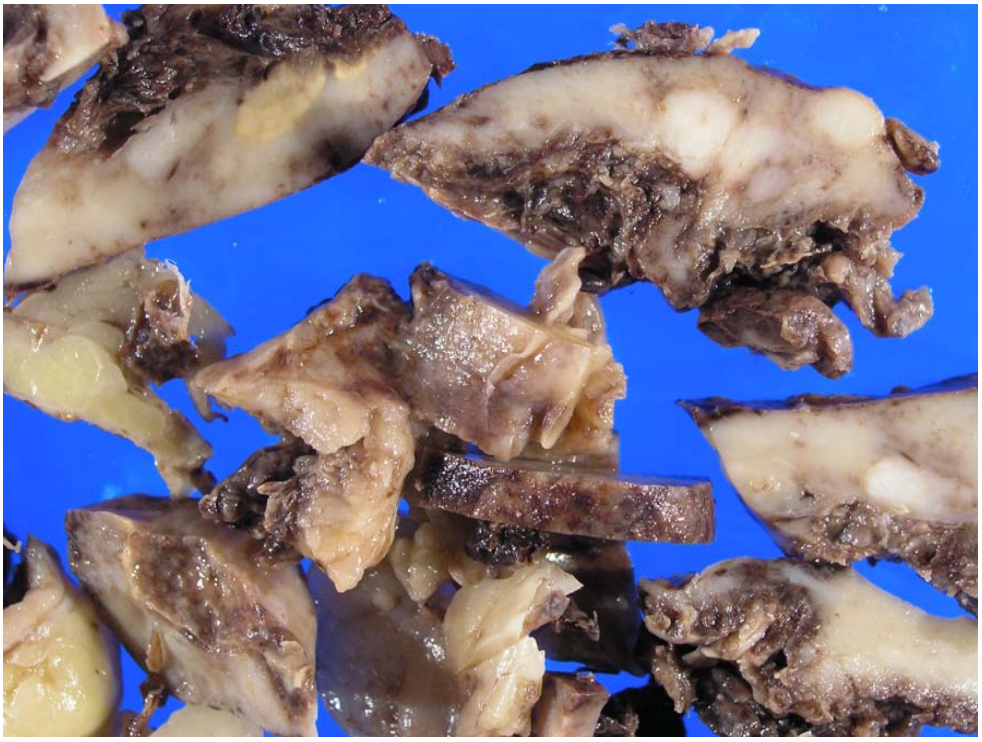

Fig. (2). Cut surface of the morcellated fragments of renal parenchyma, pelvis and calyces. Note the necrotic areas (20X).

PATHOLOGIC FINDINGS

The surgical specimen was received in the pathology department and consisted of multiple irregular fragments of pink-tan, focally hemorrhagic partially soft and partially firm tissue with areas consistent with necrotic renal cortex, medulla, pelvis, calyces and perinephric fat. There was also gray-white, friable and necrotic tissue present in the morcellated fragments (Fig. **2**).

PATHOLOGIC FINDINGS, HISTOLOGY

Histopathologic examination showed a biphasic malignant neoplasm with epithelial and sarcomatous elements. The sarcomatous portion of the tumor was composed of sheets of malignant spindle cells with large vesicular nuclei, prominent nucleoli and frequent mitotic figures (Fig. **3**).

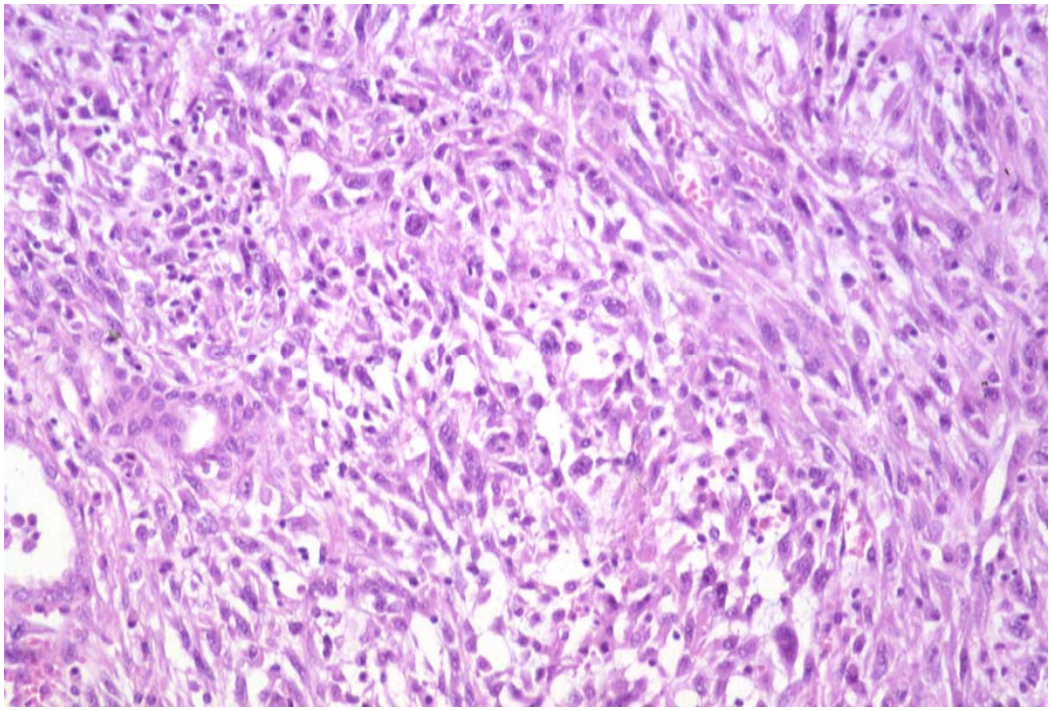

Fig. (3). Low power photomicrograph showing sarcomatous differentiation (10X).

The tumor also had areas of frankly invasive squamous carcinoma with origin from the renal pelvis (Fig. **4A**) as well as low-grade papillary urothelial carcinoma (Fig. **4B**).

The tumor contained myxoid areas and giant cells. The residual renal parenchyma was extensively necrotic with abscess formation and diffuse glomerular sclerosis. Immunohistochemical stains demonstrated biphasic expression of the sarcomatous component with strong positivity for vimentin (Fig. **5A**), and focal positivity for keratin AE1/3 (Fig. **5B**).

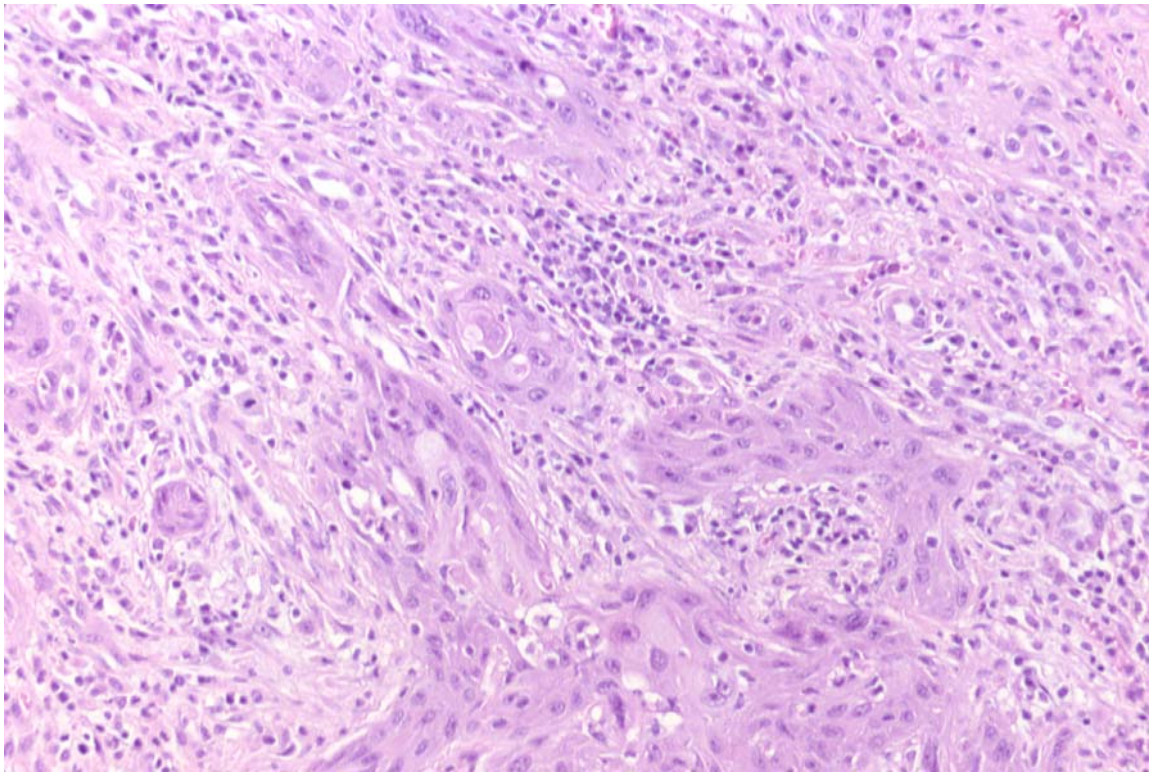

Fig. (4A). Low power photomicrograph showing squamous differentiation (10X).

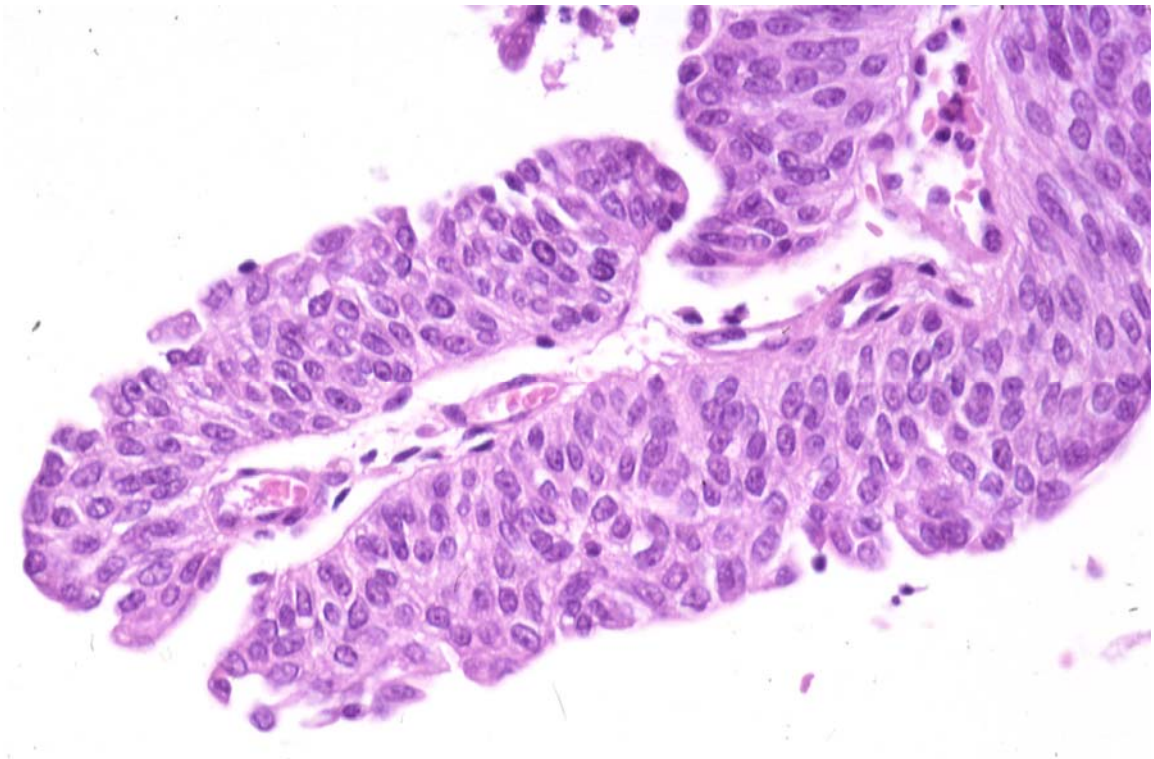

Fig. (4B). High power photomicrographs showing residual papillary urothelial carcinoma (20X).

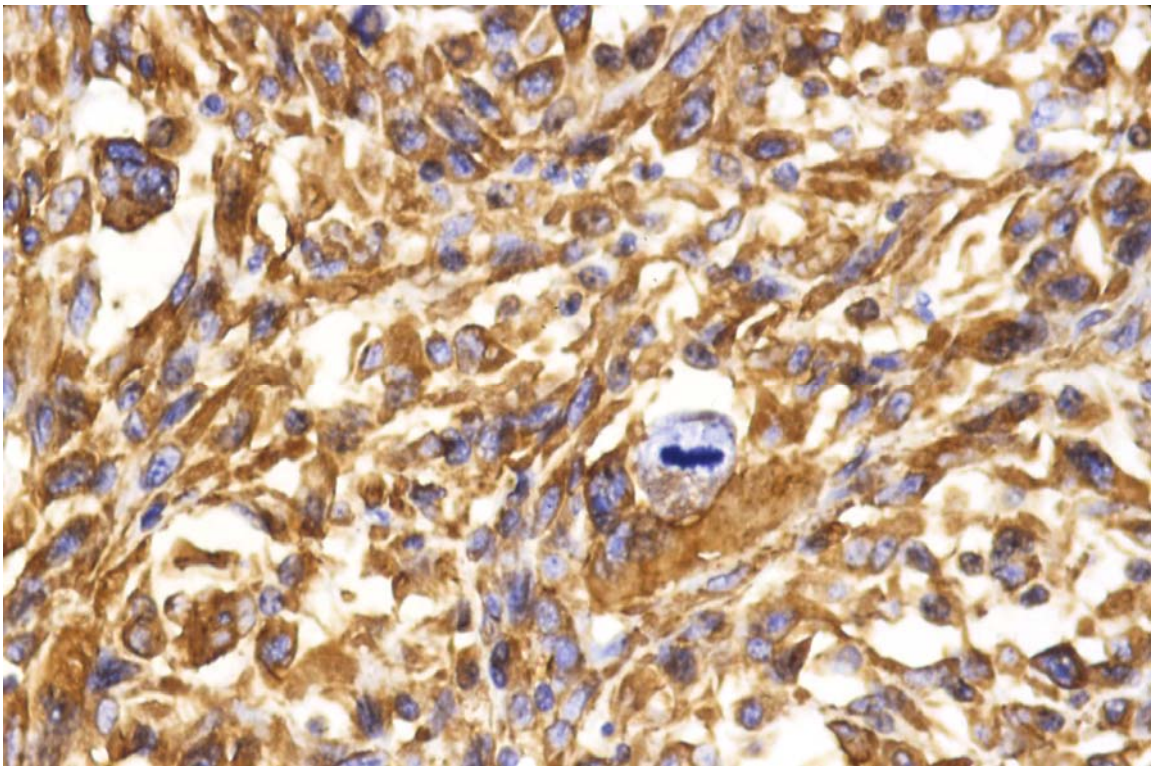

Fig. (5A). Immunostain positive for Vimentin (20X).

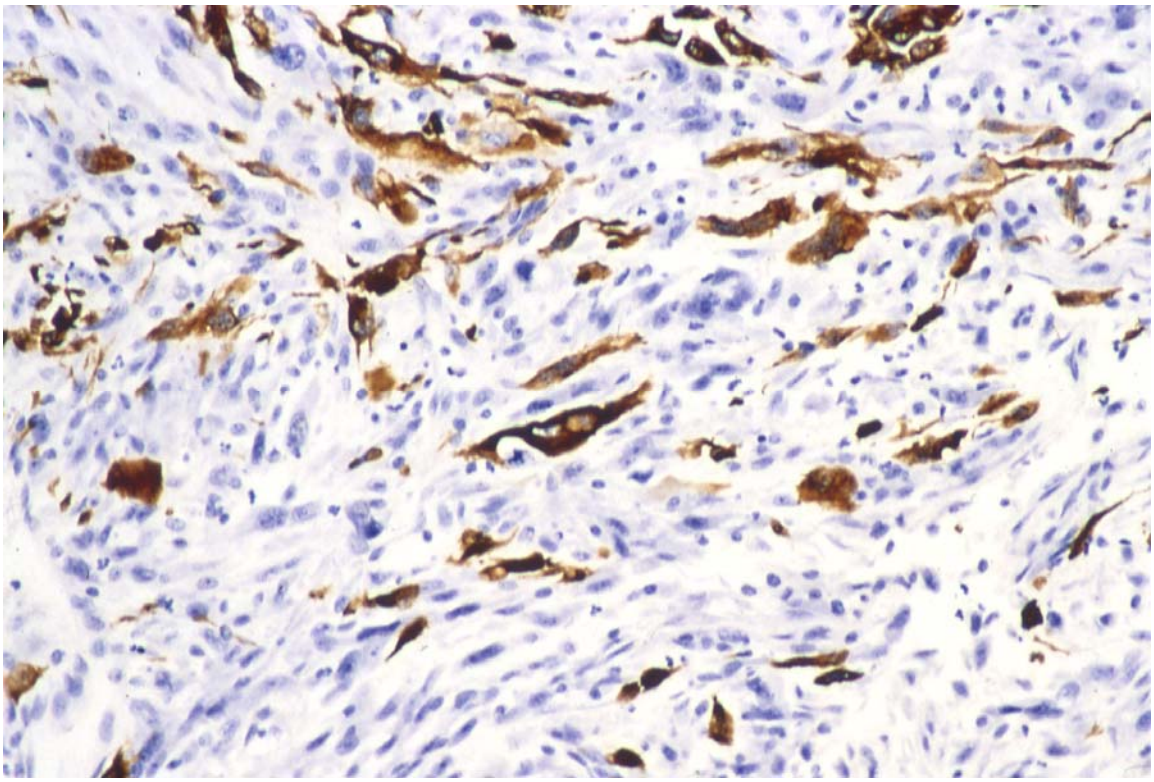

Fig. (5B). Immunostain positive for Cytokeratin AE1/AE3 (10X).

DISCUSSION

Malignant tumors arising from the urothelium of the renal pelvis account for only 5% of urinary tract neoplasms [1], with the most common of these being transitional cell carcinoma (TCC) and squamous cell carcinoma. Of the tumors that arise from the renal pelvic urothelium, approximately 90% are transitional cell carcinomas [2].

Sarcomatoid carcinoma is a rare entity. It is a high-grade epithelial neoplasm, microscopically characterized by a biphasic appearance caused by the presence of a focal, lim-

ited, but clearly epithelial component intermingled with extensive areas having a sarcoma-like appearance [3]. The latter is largely composed of spindle and/or pleomorphic tumor giant-cells. In both the sarcomatoid and carcinomatous components, nuclear overexpression of p53 oncoprotein is confirmed [3-7]. Immunohistochemical study demonstrated coexpression of keratin and vimentin [3], two intermediate filaments thought to be fairly specific for epithelial and nonepithelial cells, respectively. It is proposed that the spindle transformation of the epithelial cells in such cases may be explained on the basis of the development by the tumor cells of nonepithelial characteristics, such as the expression of vimentin intermediate filaments that may be responsible for the adoption of the morphological growth pattern characteristic of neoplasms following mesenchyme-derived lines of differentiation [6].

The first case of sarcomatoid carcinoma of the renal pelvis was reported in 1984 by Piscioli *et al.* [3]. They concluded that the tumor should be diagnosed as sarcomatoid carcinoma and be discriminated from "true" carcinosarcoma. In some instances, the term carcinosarcoma is used as a synonym for sarcomatoid carcinoma, but they are considered clearly separate entities [8]. In contrast to sarcomatoid carcinoma, carcinosarcomas exhibit, in addition to a malignant epithelial component, specific features of mesenchymal differentiation, such as chondrosarcoma, osteosarcoma, rhabdomyosarcoma, liposarcoma, or malignant fibrous histiocytoma. Histological distinction of sarcomatoid carcinomas from carcinosarcomas is often difficult and immunohistochemistry is a helpful diagnostic adjunct in the correct diagnosis [7-10].

Sarcomatoid carcinoma of the kidney is usually a variant of renal cell carcinoma (RCC); however, TCC of the renal pelvis might also assume a sarcomatoid appearance, although this occurs only rarely [3-7]. The sarcomatoid renal pelvic tumor should not be confused with sarcomatoid RCC, a high-grade malignant variant of renal parenchymal origin [11, 12]. Demonstration of a TCC component should be important in the differential diagnosis. The possibility of a high-grade urothelial carcinoma should always be considered in the evaluation of a tumor displaying unusual morphologic features in the renal pelvis, and attention to proper sampling as well as the use of immunohistochemical stains will be of importance to arrive at the correct diagnosis [13].

Renal abscesses are primarily caused by an ascending infection from the lower urinary tract with gram-negative bacilli and enteric bacteria, such as *Escherichia coli, Klebsiella* species, and *Proteus* species. Sonography and CT reveal a well-defined heterogeneous mass that at times may simulate a renal malignancy. Features such as irregular walls with increased through-transmission on sonography and a low-attenuation lesion with enhancing walls on CT, along with a history of fever and a positive urinalysis and culture, indicate a renal abscess [14]. Differentiation from a renal malignancy may be difficult if clinical information does not support the presence of infection [12]. Pathologically, renal abscess is identified by the presence of pus and debris with varying degrees of reactive inflammatory changes.

CONCLUSION

High-grade transitional cell carcinoma can imitate severe purulent kidney infection. This disease is characterized by an unfavorable course and poor prognosis. In spite of the clinical signs of inflammatory renal disease, an underlying neoplastic disorder should always be considered, especially in patients with prior history. In uncertain cases, a quick preoperative biopsy and histological examination of the kidney are recommended.

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