Pathologic Quiz Case

A 56-Year-Old Man With Bilateral Renal Masses

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A 56-year-old man without significant past medical history was found to have an elevated serum creatinine of 1.8 mg/dL during a routine health care maintenance appointment. A computed tomographic scan demonstrated significant bilateral renal enlargement due to multiple masses, the largest an 8-cm mass with a central scar in the right kidney. The patient underwent needle biopsy and subsequent total right nephrectomy and nephron-sparing partial left nephrectomy.

Grossly, the perirenal fat was easily stripped off the enlarged right kidney, exposing a surface deformed by numerous nodules (Figure 1). The kidney weighed 1180 g and measured 21 × 12.5 × 8 cm. On cut section, the parenchyma was entirely replaced by mahogany-brown, firm nodules, ranging from 0.2 to 8.5 cm in diameter. Some of the nodules had poorly formed central fibrous scars (Figure 2). Microscopically, there was loss of the normal kidney architecture. Multiple distinct nodules were composed of cells organized in nested, solid, and tubulocystic formations. The cells had abundant granular eosinophilic cytoplasm and central small round nuclei with smooth nuclear membranes, finely dispersed chromatin, and a single small nucleolus (Figure 3, hematoxylin-eosin, original magnification ×100). Residual tubular epithelial cells between the nodules had similar cytologic features, with abundant cytoplasm and small round nuclei (Figure 4, hematoxylin-eosin, original magnification ×400). The mass from the lower pole of the left kidney measured 5 × 4 × 4 cm and had a similar gross and microscopic appearance.

What is your diagnosis?

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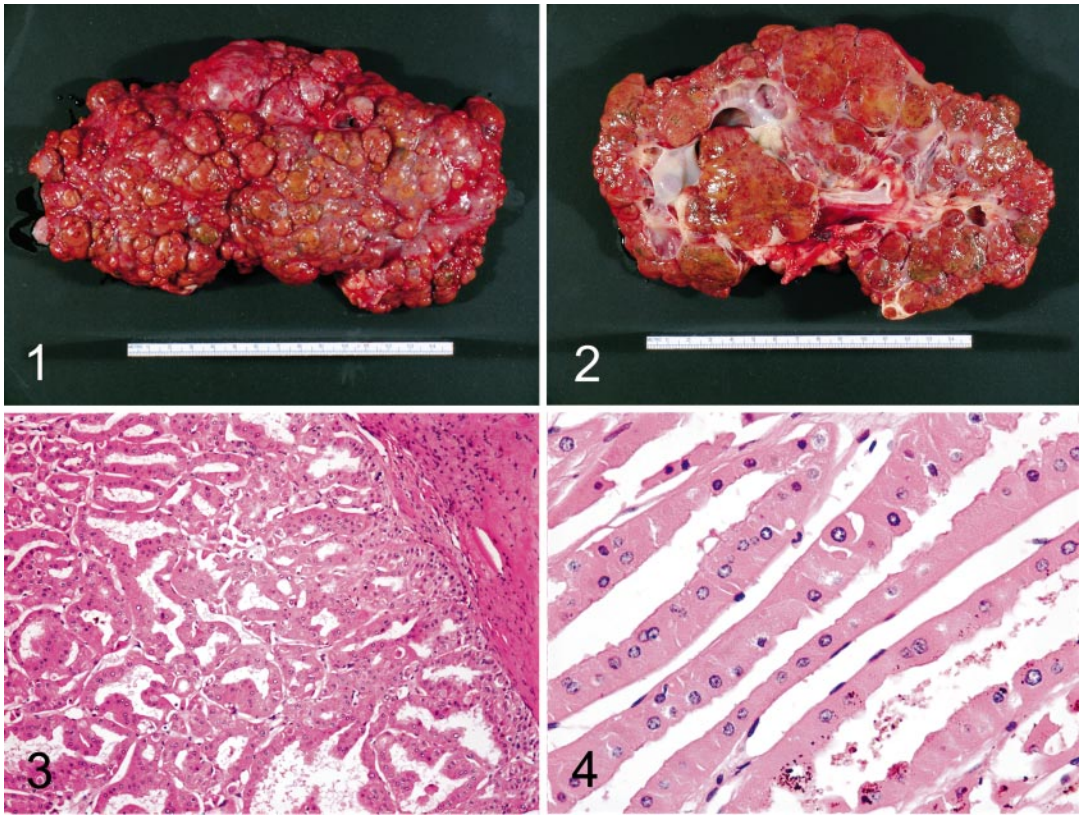

Pathologic Diagnosis: Bilateral Renal Oncocytosis

Renal oncocytomas are benign neoplasms constituting 5% to 7% of all primary renal cortical neoplasms.[1,2] Approximately 5% are bilateral, and around 6% are multifocal.[2] Warfel and Eble[3] first described a case of diffuse involvement of the kidney by more than 200 oncocytomas and proposed the term *oncocytomatosis* for this entity. However, Tickoo et al,[4] in a review of 14 cases of widespread oncocytic change in the renal parenchyma, suggested that the term *oncocytosis* encompasses both the numerous oncocytomas and the associated oncocytic changes that can be also present, which include cortical cysts lined by oncocytic cells, infiltrating single cells and clusters of oncocytic cells, and diffuse oncocytic changes in the nonneoplastic renal tubules. Renal oncocytosis is rare, with only a few cases reported in the literature.[3–6]

Thorough sampling of such cases is important to exclude the presence of a concurrent renal cell carcinoma (RCC), particularly the eosinophilic variant of chromophobe RCC, which can resemble oncocytoma grossly and microscopically. Renal cell carcinoma has been reported to coexist in 10% of oncocytomas.[2] Chromophobe RCC (CRCC) has been documented in several cases of oncocytosis.[4] The presence of a hybrid CRCC-oncocytoma also has been reported and thus should also be considered.[4] Interestingly, many studies have found overlapping features between oncocytomas and CRCC, and it has been suggested that oncocytomas, hybrid oncocytoma-CRCC, and CRCC constitute a spectrum of oncocytic tumors, arising from a common progenitor cell, the intercalated cell.[4] One case of oncocytosis has been associated with a papillary RCC.[5]

Morphology, Hale colloidal iron, and ultrastructure analysis can help differentiate CRCC from oncocytoma. Oncocytomas are composed of a uniform population of round to polygonal cells that can be arranged in a nested, alveolar, trabecular, tubular, or microcystic pattern. The cells have granular eosinophilic cytoplasm with a single round vesicular nucleus and a centrally placed nucleolus. Mitotic activity is rare to nil, and necrosis is absent. Chromophobe RCCs usually have a solid growth pattern and are composed of an intimate admixture of 2 cell types (clear and eosinophilic). The cells have distinct cell borders (resembling vegetable cells), with wrinkled and often binucleated nuclei, with a perinuclear halo. Hale colloidal iron shows a strong diffuse, finely granular staining with CRCC, whereas oncocytomas are negative for the stain, or may show a focal weak cytoplasmic staining.[7] Ultrastructurally, the cells in both CRCC and oncocytoma have abundant mitochondria. However, the tumor cells in CRCC, uniquely, also contain variable numbers of cytoplasmic microvesicles, 150 to 300 nm in diameter, that are presumed to be altered mitochondria or endoplasmic reticulum.[8]

Clinically, renal oncocytosis has been reported to be unilateral and bilateral,[4,6] with signs and symptoms that have included flank pain, hematuria, and renal failure.

Radiologic studies can sometimes be helpful in determining the presence of oncocytomas (homogeneous, well-defined smooth masses with central stellate scars and absence of hemorrhage and necrosis), but the absence of these findings does not exclude its diagnosis. In addition, it has been reported that computed tomographic scan criteria are poor predictors of the diagnosis of renal oncocytoma versus carcinoma.[9] Percutaneous needle biopsy can be used for diagnosis, but a large study indicated a nondiagnostic rate of 31% and an accuracy rate of 72%[10]; thus, renal exploration maybe necessary to rule out a malignancy.

Tickoo et al[4] recommended conservative management (such as tumorectomies or partial nephrectomy) in patients with oncocytosis in one resected kidney and radiologic evidence of multiple nodules in the contralateral kidney, since the significance of bilateral disease has not yet been determined.

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