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Papillary renal cell carcinoma with diffuse clear cells and thyroid-like macrofollicular areas☆

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Abstract Papillary renal cell carcinoma may display some unusual morphologic variations, including diffuse oncocytic change not otherwise specified, oncocytic change associated with an inverted nuclear pattern or nonoverlapping low-grade nuclei, low-grade spindle cells, and diffuse clear cells. Tumors comprised predominantly of thyroid-like follicles and inspissated eosoinophilic, colloid-like secretions (thyroid-like follicular carcinoma of the kidney) have been recently recognized. We report herein an unusual renal carcinoma that displayed diffuse clear cells, papillary architecture, foamy histiocytes, psammomatous calcifications, and large areas (approximately 20% of tumor volume) with thyroid macrofollicular-like structures and eosinophilic, colloid-like secretions. The tumor was diffusely positive for alpha-methylacyl-CoA racemase, cytokeratin 7 and CD10, and was entirely negative for CD15, thyroglobulin, thyroid-transcription factor-1, TFE3, and renal cell carcinoma antigen. Fluorescence in situ hybridization using centromeric DNA probes for chromosomes 7, 17, 3, and 3p25 showed gains only in chromosome 7 and no other aberrations. The tumor was accordingly classified as an unusual morphologic variation of papillary renal cell carcinoma. This case affirms the potential for papillary renal cell carcinoma to display a diffuse complement of clear cells, and documents the heretofore unreported finding of large areas of thyroid macrofollicular structures and eosinophilic, colloid-like secretions in this histotype.
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Keywords: Kidney; Renal cell carcinoma; Clear cell; Papillary; Thyroid follicular

1. Introduction

The American Cancer Society estimated that approximately 54 390 new cases of kidney/renal pelvis cancers were diagnosed in the United States in the year 2008, with 13 010 associated deaths [1]. The binary pathologic classification of renal epithelial neoplasms that was the norm less than 40 years ago [2], has given way to a more complex contemporary diagnostic approach that recognizes the existence of a wide array of entities. This has to a large extent been facilitated both by the morphologic recognition of new histotypes and the increased appreciation of the morphologic spectra of previously defined entities, as facilitated by the use of ancillary diagnostic techniques such as gene expression profiling, fluorescence in-situ hybridization, and immunohistochemistry. It is now recognized that renal epithelial neoplasms encompass a wide array of entities whose pathologic distinctions have prognostic significance [3,4]. Two aspects of renal epithelial neoplasia

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have been discussed with increasing frequency in recent years. First is the spectrum of renal neoplasms seen in end-stage renal disease (ESRD) and the related issue of the degree of cytoplasmic clarity that is allowable in papillary renal cell carcinoma [5-9]. Second is the renal carcinoma whose morphologic features are reminiscent of follicular carcinoma of the thyroid gland [10-13], designated "thyroid-like follicular carcinoma of the kidney" by Amin et al [10]. We describe herein an unusual renal tumor whose unique morphologic features are germaine to both of these issues.

2. Case presentations

2.1. Clinical history

A 55-year-old white woman with a past medical history significant for hypertension, hypothyroidism, gastroesophageal reflux disease, major depressive disorder, morbid obesity, and a past surgical history of gastric bypass surgery, cholecystectomy, appendectomy, and ventral incisional hernia repair, presented to her primary care provider with complaints of lower back pain with radiculopathy to her right knee. Subsequent neurosurgical work-up for the back pain had an incidental finding of a well-circumscribed enhancing left lower pole renal mass measuring 1.6 × 1.3 cm on magnetic resonance imaging and a 3-phase renal computed tomographic scan, with features concerning for renal cell carcinoma. She denied hematuria and weight loss and had unremarkable urinalysis and renal function work-up (blood urea nitrogen = 11; creatinine = 0.8). She had no personal history of thyroid or any other neoplasia, and her family history was significant only for breast cancer. She elected to undergo an open left partial nephrectomy procedure through a flank incision that was performed shortly thereafter. Postsurgical care included outpatient follow-up and surveillance renal computed tomographic scans to monitor for tumor recurrence. At last follow-up (4 months postoperation), there had been no evidence of tumor recurrence.

2.2. Gross features

The partial nephrectomy specimen measured 1.8 × 1.7 × 1.5 cm. Protruding above the capsular surface was a well-circumscribed spherical mass with a beige to dark-brown cut surface which measured 1.6 × 1.2 × 1.1 cm. An intraoperative evaluation of the margins showed that it was free of tumor. Neither tumor cells nor lymph nodes were identified in the perinephric adipose tissue. The mass was entirely processed.

2.3. Microscopic features

The tumor was unencapsulated, although a variably-thick pseudocapsular rim was present around approximately 60% of its circumference. The majority (approximately 80%) of the tumor was comprised of a papillary to tubulopapillary proliferation with fibrovascular cores that were clearly

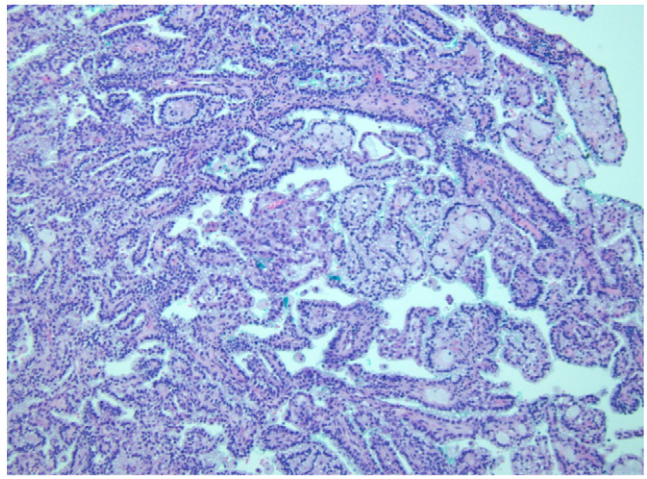

Fig. 1. Eighty percent of the tumor displayed this appearance of a papillary proliferation with variable amounts of stromal foamy histiocytes (hematoxylin and eosin; original magnification ×100).

decipherable at low to intermediate level magnification (Fig. 1). Solid-appearing areas that represented compressed papillae were also present, especially at the peripheral regions of the mass. Aggregates of foamy histiocytes were present within the papillary stromal cores as well as in the interpapillary spaces (Fig. 1). The papillae were lined by 2 types of cells (Figs. 2-4). Most (approximately 70%) had abundant, variably clear, occasionally vacuolated cytoplasm (Fig. 2) that showed a positive Periodic acid–Schiff stain reaction (Fig. 4) that disappeared after diastase predigestion. The second cell type, which was in the minority (approximately 25%), displayed eosinophilic cytoplasm (Fig. 3). Other cells displaying a cytoplasmic tinctural quality that was intermediate between the aforementioned cell types were also present. The nuclei of all cell types were hyperchromatic and were linearly arranged very close to the

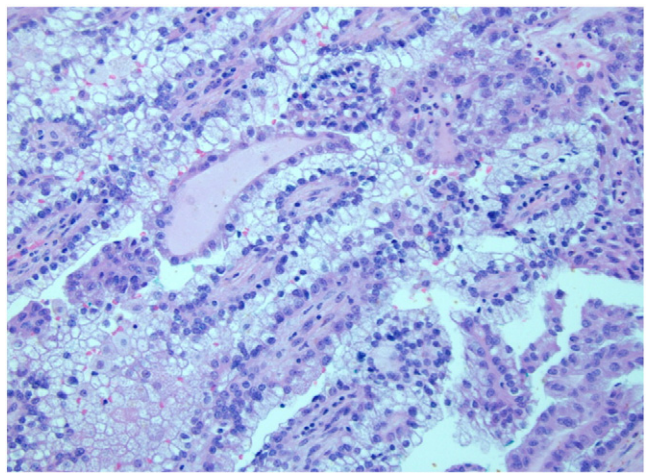

Fig. 2. Most papillae were lined by cells with clear cytoplasm. Note that nuclei are polarized towards the basal part of each cell (hematoxylin and eosin; original magnification ×160).

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