



DEPARTMENT OF PATHOLOGY

Case of the Week

Genitourinary Pathology: Papillary Renal Cell Carcinoma with Reversed Polarity

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History

80-year-old patient with a 2 cm renal mass.

Gross image:

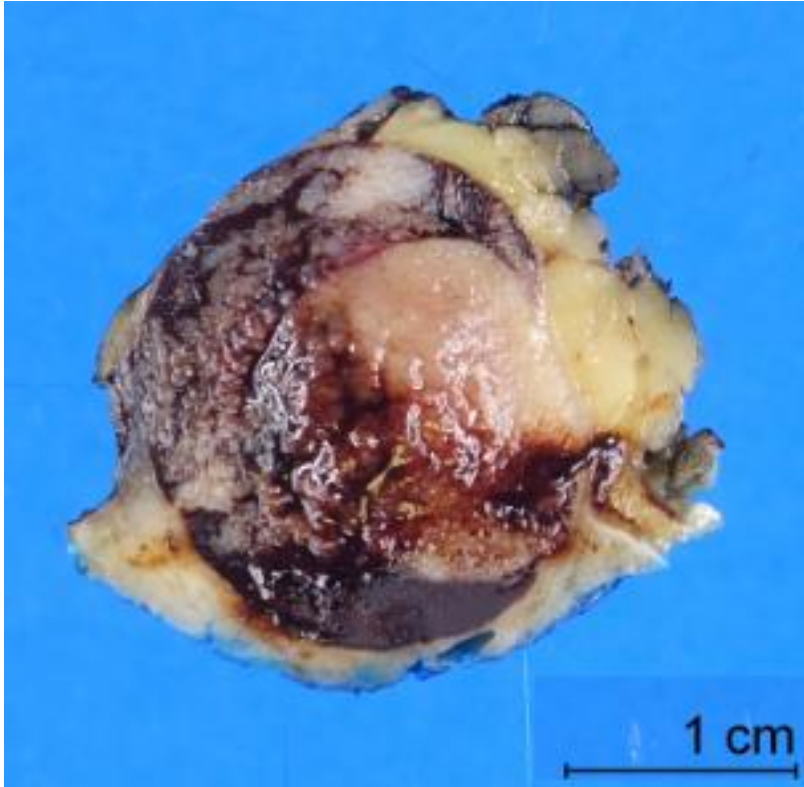


Figure 1: Circumscribed, soft, tan and hemorrhagic mass

Microscopic images:

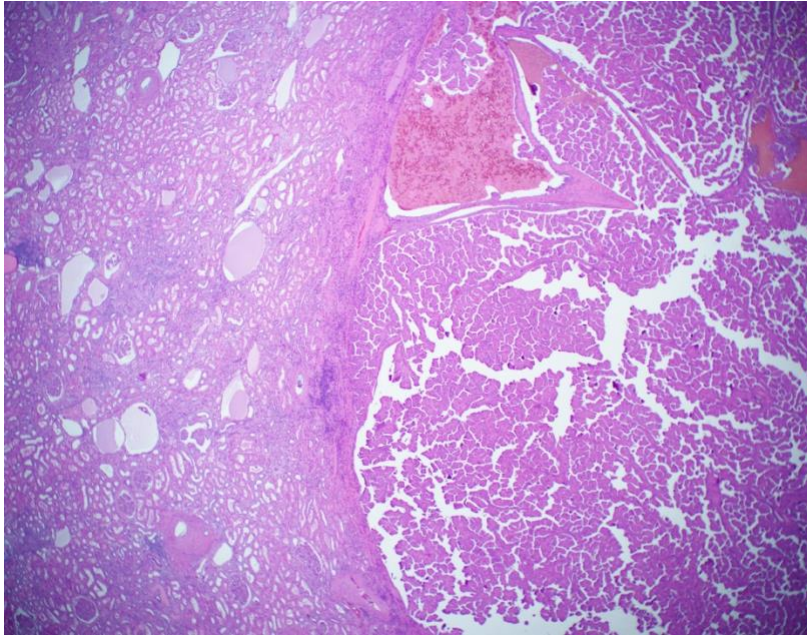


Figure 2: Well-circumscribed, encapsulated papillary lesion (H&E, 20x magnification)

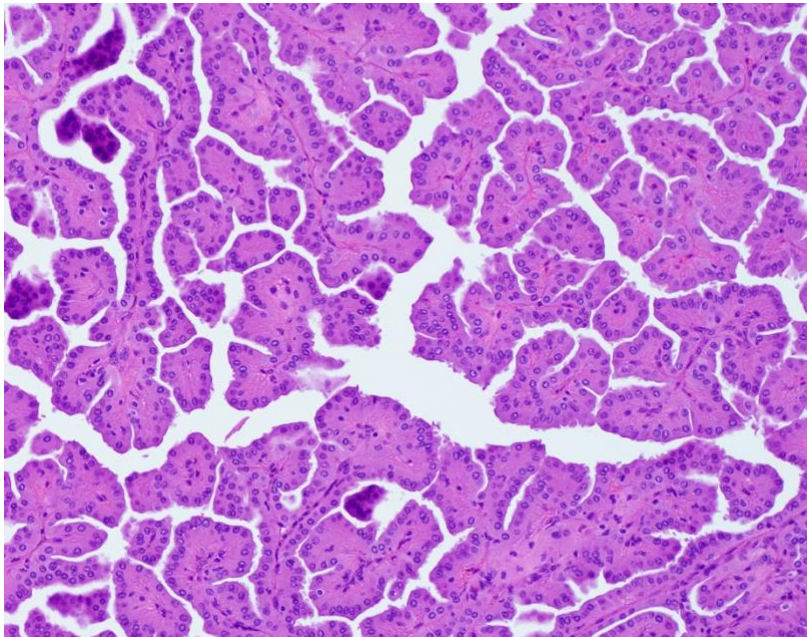


Figure 3: Fibrovascular cores lined by single-layer of cells with oncocytic cytoplasm (H&E, 200x magnification)

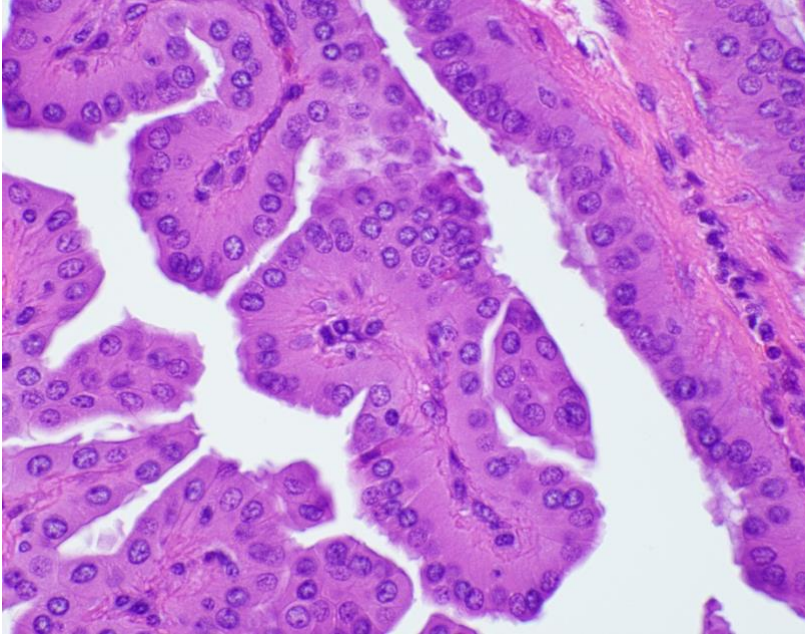


Figure 4: Oncocytic cells are cuboidal to columnar with apically located nuclei (reverse polarity) and low nuclear grade (H&E, 600x magnification)

Immunohistochemical stains:

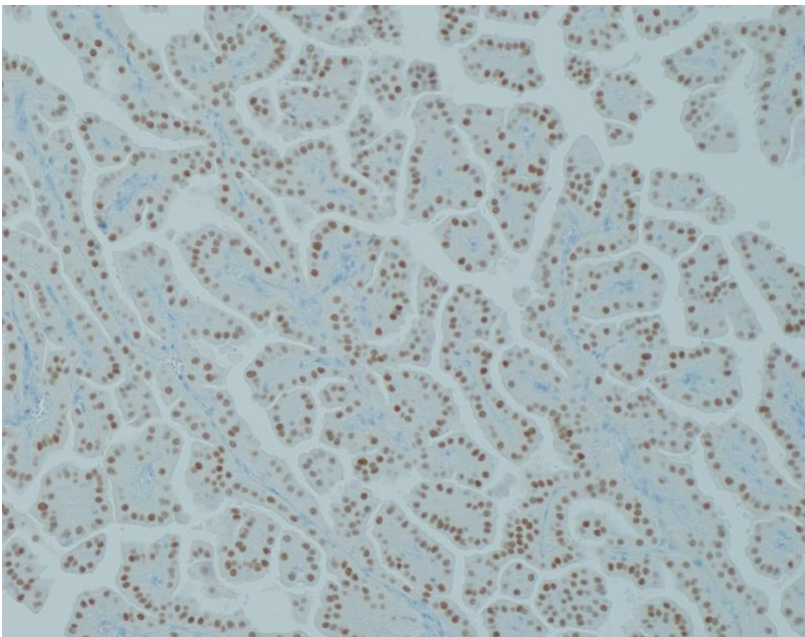


Figure 5: GATA-3 nuclear reactivity (H&E, 200x magnification)

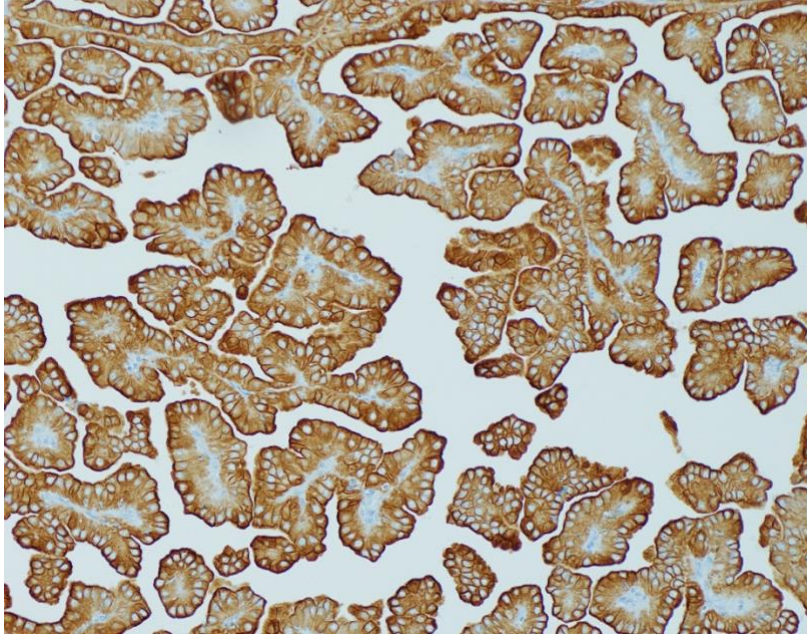


Figure 6: CK7 membranous and cytoplasmic reactivity, highlights the apical location of nuclei (H&E, 200x magnification)

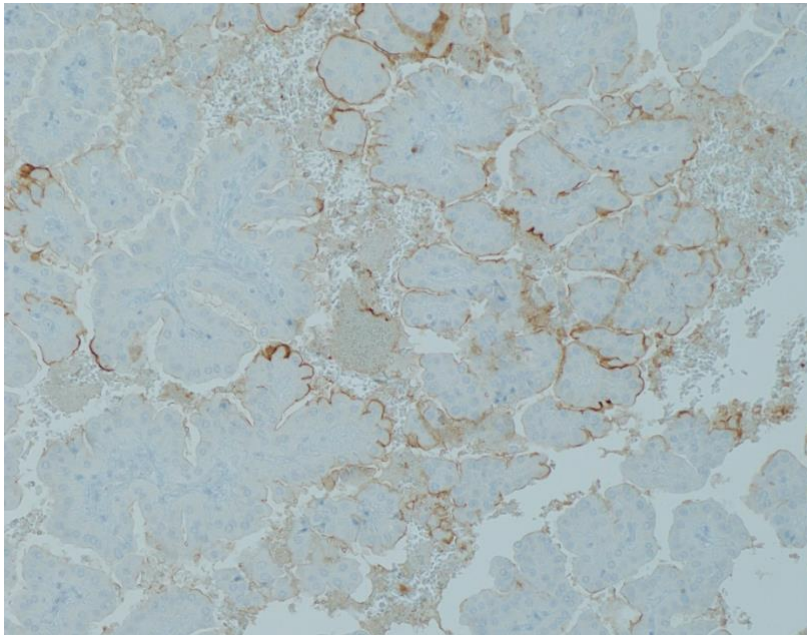


Figure 7: CD10 focal reactivity on the apical membrane. (H&E, 200x magnification)

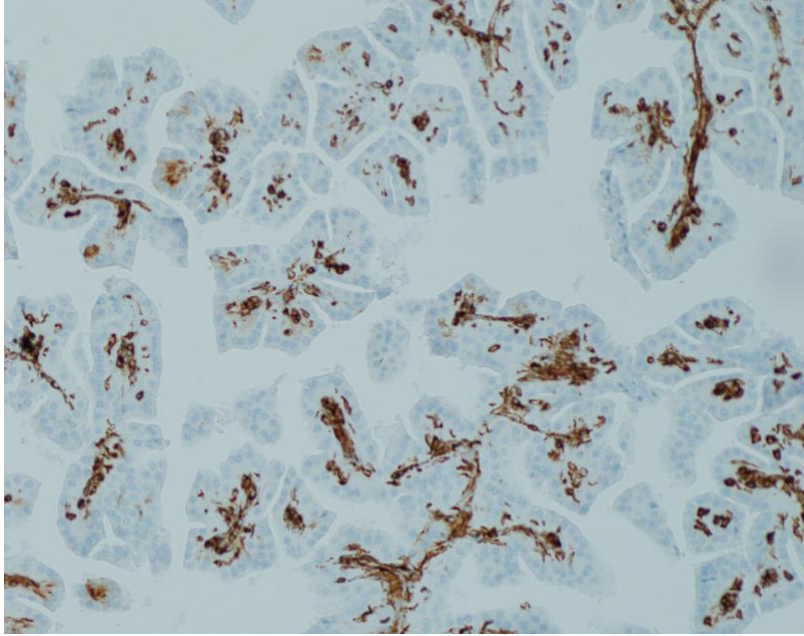


Figure 8: Vimentin non-reactivity on the tumor cells. Vimentin highlights the stroma of the papillae. (H&E, 200x magnification)

Additional stains:

Reactive: EMA, 34BE12

Non-reactive: CA-IX, AMACR

Diagnosis

Papillary renal cell carcinoma with reversed polarity

Discussion

Papillary renal cell carcinoma with reversed polarity is a rare entity that was recently described as a subset of oncocytic papillary renal cell carcinoma.

Morphologically, it is defined by an encapsulated tumor with papillary architecture composed of fibrovascular cores lined by single layer of tumor cells with eosinophilic cytoplasm and low-grade nucleus.

The immunoprofile is characterized by:

- Reactivity: GATA-3, CK7, 34βE12, CD10 (focal), AMACR (~30% cases)
- Non-reactivity: CA-IX, vimentin, CD117

Differential diagnosis include other subtypes of papillary renal cell carcinoma. Therefore, the reactivity of GATA-3 and 34βE12 is a useful feature to differentiate these tumors.

This tumor is characterized by frequent KRAS mutations.

Most reported cases show indolent behavior with good prognosis.

References

Al-Obaidy KI, Eble JN, Cheng L, Williamson SR, Sakr WA, Gupta N, Idrees MT, Grignon DJ. Papillary Renal Neoplasm With Reverse Polarity: A Morphologic, Immunohistochemical, and Molecular Study. *Am J Surg Pathol*. 2019 Aug;43(8):1099-1111.

Kim SS, Cho YM, Kim GH, Kee KH, Kim HS, Kim KM, Kim JH, Choi C. Recurrent KRAS mutations identified in papillary renal neoplasm with reverse polarity-a comparative study with papillary renal cell carcinoma *Mod Pathol*. 2020 Apr;33(4):690-699.

Zhou L, Xu J, Wang S, Yang X, Li C, Zhou J, Zhang P, Xu H, Wang C. Papillary Renal Neoplasm With Reverse Polarity: A Clinicopathologic Study of 7 Cases. *Int J Surg Pathol*. 2020 Oct;28(7):728-734.