Cystic Renal Oncocytoma: A Case Report with Review of the Literature

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Abstract

Renal oncocytomas are benign, predominantly asymptomatic tumors that are usually found incidentally. These tumors are typically solid, well-circumscribed, homogenous tan-brown lesions, often with a central fibrous scar. Histologically, the tumor cells are arranged in solid compact nests, acini and tubules of variable size, all within a hypocellular hyalinized stroma. In the literature, there are only five cases of cystic renal oncocytoma reported. Herein we present a case of cystic renal oncocytoma with the unusual gross appearance of multiloculation. It was found incidentally on imaging studies in the upper pole of the right kidney. Grossly, it was a well-circumscribed 1.5 cm mass with a multiloculated cystic cut surface. Microscopically, the oncocytic cells were arranged along the septae that divided the mass into multiloculated cysts. Immunohistochemical staining of the tumor showed expression of kidney-specific cadherin in all the neoplastic cells, CK7 expression in 45% and PAX-2 expression in 60% of these cells. RCC and vimentin showed no reactivity within the tumor. The morphological features and immunohistochemical studies confirmed the diagnosis of a cystic renal oncocytoma.

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Case report

A 46-year-old female presented with a few months history of postprandial abdominal pain in her right upper quadrant. An abdominal ultrasound revealed an echogenic round mass in the upper pole of her right kidney, with the initial radiological impression being that of an angiolipoma. A subsequent CT scan confirmed the presence of a 1.4 cm mass with findings suspicious for a renal cell carcinoma. The patient was thereafter advised to have the mass removed.

Pathological findings

Examination of the resected kidney revealed a well-circumscribed tan-brown multiloculated cystic mass in the upper pole, measuring 1.5 cm in greatest dimension.

Microscopically, cuboidal to polygonal cells with abundant pink granular cytoplasm were arranged along septae that divided the mass into a multiloculated cyst. The nuclei were round with uniform nuclear contours and evenly dispersed chromatin. Many cells showed prominent nucleoli, with a few cells demonstrating binucleation. Atypia, mitotic activity and necrosis were all absent. No clear cells or reticulated cells were noted. These histopathological features were consistent with a renal oncocytoma.

To confirm the diagnosis, immunohistochemical staining was performed using the following antibodies: Kidney-specific cadherin (Ksp-cadherin), CK7, PAX-2, RCC and vimentin. The tumor showed the following staining pattern: Ksp-cadherin showed strong membrane staining in all the neoplastic cells; CK7 was expressed in approximately 45% of the tumor cells and demonstrated a cytoplasmic and membranous distribution; and PAX-2 showed nuclear staining in approximately 60% of the tumor cells. The neoplastic cells were negative for both RCC and vimentin, ruling out renal cell carcinoma of the conventional type. Taken together, the histomorphology and immunohistochemical staining results were diagnostic for a cystic renal oncocytoma.

Discussion

Renal oncocytoma is a benign renal epithelial neoplasm that constitutes 3 to 7% of all primary renal neoplasms. Typically, oncocytoma is a solid tumor that develops in the renal parenchyma with a central scarred area. Foci of cystic changes and hemorrhage are uncommon features, even though not rare (20% in one study).[1] Most of the tumors often have a uniform mahagony brown color,[2] and the average size is between 4 to 5 cm (range of 1.5 to 14 cm).[1] The tumors are multifocal in approximately 7 to 13% of cases and may be bilateral in a small percentage of cases (3-5%).[3]

Histologically, the tumor cells frequently show three different architectural arrangements. The classic pattern

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consists of solid nests or an organoid arrangement of cells, each surrounded by a distinct reticular framework. The less frequent tubulocystic pattern has numerous closely packed cystically dilated tubular structures. A mixed pattern that has both organoid and tubulocystic pattern accounts for less than half of the cases (~36%) of renal oncocytoma.[2] Renal oncocytomas with purely cystic pattern are extremely rare. A single case of the cystic variant of renal oncocytoma was described by Ogden et al in 1987. Four more cases of multilocular cystic renal oncocytoma have since been reported in the literature .[4-7]

In terms of cytological features the classic oncocytic cells are polygonal to round with a moderate to abundant amount of granular eosinophilic cytoplasm and small, round, uniform nuclei with evenly dispersed chromatin. Most of the tumor cells show small centrally placed basophilic nucleoli.[1] Binucleation of tumor cells was reported in more than half of renal oncocytomas in one study.[3]

The differential diagnosis of renal oncocyotoma includes chromophobe renal cell carcinoma and the eosinophilic variant of clear cell renal cell carcinoma. Due to some overlapping morphologic characteristics, it is sometimes difficult to distinguish among these three entities by light microscopy. To render a more accurate diagnosis, immunohistochemical stains are often required. Ksp-cadherin, a member of the cadherin family of Calcium-dependent cell-adhesion molecules, appears to be a highly sensitive and specific marker for renal neoplasms of distal nephron derivation such as chromophobe renal cell carcinoma and oncocytoma. In one study, Ksp-cadherin was positive in 100% of chromophobe renal cell carcinoma and 95% of oncocytomas.[8] Another study showed Ksp-cadherin expression in 89% of chromophobe renal cell carcinoma and 64% of renal oncocytomas, further supporting the contention that Ksp-cadherin immunohistochemical analysis can be used as a marker for chromophobe renal cell carcinoma and renal oncocytoma, albeit not entirely useful in differentiation between these two tumors.[10]

The diagnostic value of CK7 in distinguishing chromophobe renal cell carcinoma and oncocytoma is controversial. One study showed CK7 positivity in 86% of chromophobe renal cell carcinomas whereas all oncocytomas were negative with only scattered staining in less than 5% of tumor cells.[9] In another study, 73% of chromophobe renal cell carcinoma showed diffuse CK7 positivity and 9% stained focally positive. CK7 staining of oncocytomas revealed diffuse positive staining in 19% of cases and focal positivity in 33% of cases.[13]

PAX-2, a nuclear transcription factor in renal development has been shown to be expressed in the majority of clear cell renal cell carcinomas of lower grades as well as in a few papillary renal cell carcinomas, chromophobe renal cell carcinomas and oncocytomas.[11] Vimentin is expressed in most clear cell RCC and fail to demonstrate any reactivity in most oncocytomas.

A study on the use of RCC in the differential diagnosis of renal neoplasms, demonstrated that 85% of clear cell renal cell carcinoma showed surface membrane staining with RCC. Papillary renal cell carcinoma also stained strongly for RCC. Chromophobe renal cell carcinoma and renal oncocytomas were completely negative for surface membrane staining with RCC.[12]

In our case, the expression of Ksp-cadherin, focal positivity with CK7 and PAX-2 and negative staining with RCC and vimentin confirmed the morphologic impression of a renal oncocytoma.

All types of renal oncocytoma have an excellent prognosis.[7] Although the majority of cases of renal oncocytomas are benign, in rare instances they have been reported to metastasize.[1] The clinical course of cystic renal oncocytoma is very similar to that of the usual type of oncocytomas. These tumors may be managed by partial nephrectomy.[7]

References

1. Perez-Ordonez B, Hamed G, Campbell S, et al. Renal oncocytoma: a clinicopathologic study of 70 cases. *Am J Surg Pathol*. 1997;21(8):871-883.
2. Amin MB, Crotty TB, Tickoo SK, et al. Renal oncocytoma: a reappraisal of morphologic features with clinicopathologic findings in 80 cases. *Am J Surg Pathol*. 1997;21(1):1-12.
3. Abrahams NA. Tamboli P. Oncocytic renal neoplasms: diagnostic considerations. Clinics in Laboratory Medicine. 2005:25(2):317-339.
4. Ogden BW, Beckman EN, Rodriguez FH. Multicystic renal oncocytoma. *Arch Pathol Lab Med*. 1987;111(5):485-486.
5. Schmidt PR, Bock D, Gasser G, et al. Multicystic renal oncocytoma. *Urologe A.* 1991;30(4):253–255.
6. Shimoda J, Matsukawa H, Shimizu S, Kigure T, Harada T. A case of renal oncocytoma with multilocular cyst. *Hinyokika Kiyo - Acta Urologica Japonica.* 1991:37(8):899-902.
7. Leroy X, Aubert S, Lemaitre L, Haffner J, Biserte J, Gosselin B. Multilocular cystic renal oncocytoma. *J Clin Pathol.* 2006:59(2):223-224.
8. Shen SS, Krishna B, Chirala R, Amato RJ, Truong LD. Kidney-specific cadherin, a specific marker for the distal portion of the nephron and related renal neoplasms. *Mod Pathol.* 2005:18(7);933-940.
9. Liu L, Qian J, Singh H, Meiers I, Zhou X, Bostwick DG. Immunohistochemical analysis of chromophobe renal cell carcinoma, renal oncocytoma, and clear cell carcinoma: an optimal and practical panel for differential diagnosis. *Arch Pathol Lab Med.* 2007;131(8):1290-1297.
10. Adley BP, Gupta A, Lin F, Luan C, Teh BT, Yang XJ. Expression of kidney-specific cadherin in chromophobe renal cell carcinoma and renal oncocytoma. Am J Clin Pathol. 2006;126(1):79-85.
11. Mazal PR, Stichenwirth M, Koller A, Blach S, Haitel A, Susani M. Expression of aquaporins and PAX-2 compared to CD10 and cytokeratin 7 in renal neoplasms: a tissue microarray study. *Mod Pathol*. 2005;18(4):535-540.
12. Avery AK, Beckstead J, Renshaw AA, Corless CL. Use of antibodies to RCC and CD10 in the differential diagnosis of renal neoplasms. *Am J Surg Path.* 2000;24(2):203-210.
13. Wu SL, Kothari P, Wheeler TM, Reese T, Connelly JH. Cytokeratins 7 and 20 immunoreactivity in chromophobe renal cell carcinomas and renal oncocytomas. *Mod Pathol.* 2002;15(7):712-717.

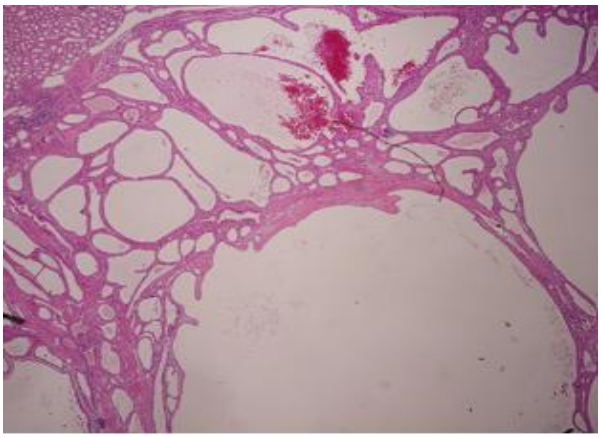

Figure 1. Histologic section of tumor demonstrating the multiloculated cystic pattern.

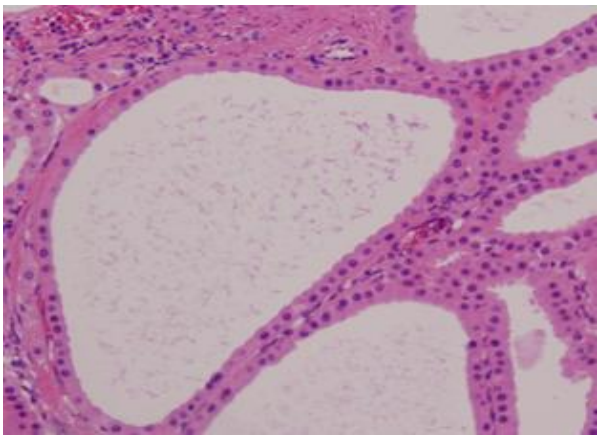

Figure 2. Oncocytic cells with uniform round nuclei are arranged along the septae.

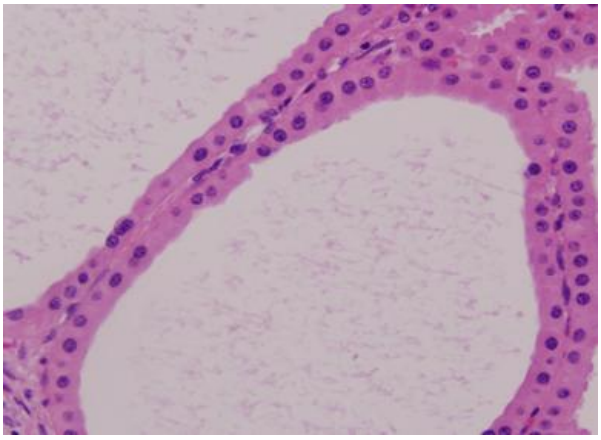

Figure 3. Few oncocytic cells demonstrating binucleation.

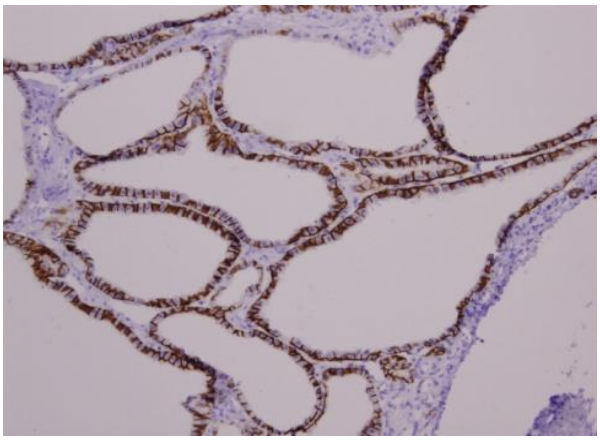

Figure 4. Ksp-cadherin showing strong membrane staining.

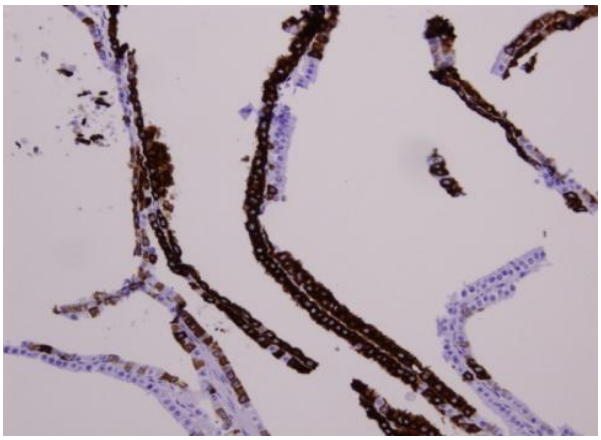

Figure 5. CK7 demonstrating cytoplasmic and membrane staining.

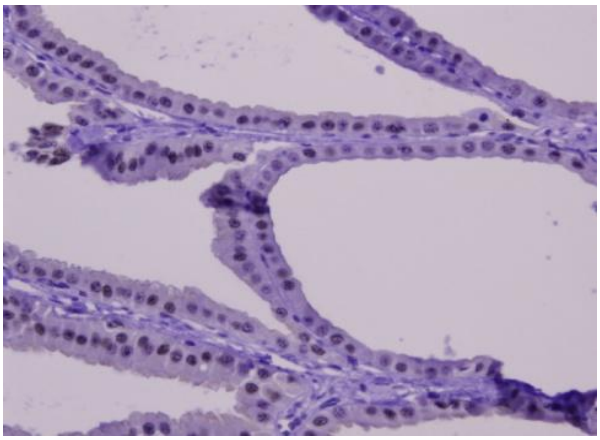

Figure 6. PAX-2 showing nuclear staining.