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CASE REPORT

Sarcomatoid Renal Cell Carcinoma with Foci of Chromophobe Carcinoma

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Both chromophobe carcinoma and sarcomatoid carcinoma of the kidney are rare. The former is characterized by a relatively good prognosis, while the latter is a highly aggressive tumor. Coexistence of the two components in one renal tumor, which has been reported only rarely, is therefore paradoxical. Both sarcomatoid and chromophobe renal carcinoma were diagnosed in a 52-year-old woman following nephrectomy and resection of metastases in the right lobe of the liver. She died of the disease two months after the first operation; only the sarcomatoid component of her tumor was seen in the liver metastasis and the recurrent carcinoma. Differences in phenotype, immunophenotype and DNA-ploidy patterns of the two components are reported. The intensive p53 staining observed only in the sarcomatoid area supports the role of the TP53 gene in the transformation of chromophobe renal carcinoma to sarcomatoid carcinoma. (Pathology Oncology Research Vol 8, No 2, 142–144, 2002)

Keywords: chromophobe renal cell carcinoma, sarcomatoid renal carcinoma, DNA-ploidy, p53

Introduction

Both sarcomatoid and chromophobe renal cell carcinoma (RCC) are rare. The former is a highly aggressive type of RCC, whereas the latter has a relatively good outcome.[1,4,5,13] Simultaneous occurrence of the two histological types in one tumor is rare and paradoxical. We report such a case and review the related literature.

Material and Methods

A 52-year-old woman was referred to our institution because of a palpable mass and pain in the right hypochondrium. A tumor was identified on ultrasound and CT scans, and the patient underwent surgery on August 25, 2000. The maximum dimension of the tumor was 14.5 cm; it had perforated the renal capsule and encroached on the mesocolon of the ascendent colon, the psoas muscle and the lower segment of the right lobe of the liver, where several foci of the tumor were identified. A radical right nephrectomy was performed with resection of the involved liver segment, and the patient was judged to be tumor-free macroscopically. She gave no evidence of further metastases on chest radiography and abdominal ultrasonography. The first cycle of combined chemotherapy (cyclophosphamide, vinblastine, adriamycin and dimethyltetrazenoimidazole carboxamine) was initiated in September. She reported abdominal complaints, meteorism and vomiting, and was readmitted in October, when a barium swallow demonstrated slow emptying of the stomach, and suggested perforation of the stomach or duodenum. She was explored from a median laparotomy: diffuse tumoral involvement of the small and large intestinal and ventricular serosal surfaces was noted, without any evidence of perforation. Five liters of blood-stained ascites was evacuated, and approximately 0.5 kilogram of necrotic fleshy tumor tissue was also removed. The patients died 4 days postoperatively. No autopsy was performed.

The removed tissues were fixed in 7% buffered formalin, and embedded in paraffin. Standard hematoxylin and eosin stained sections were assessed first. Immunohistochemistry was performed with the following antibodies: cytokeratin (MNF116, DAKO, Glostrup, Denmark), vimentin (DAKO, Glostrup, Denmark) and p53 (DO7, Dako, Glostrup, Denmark),

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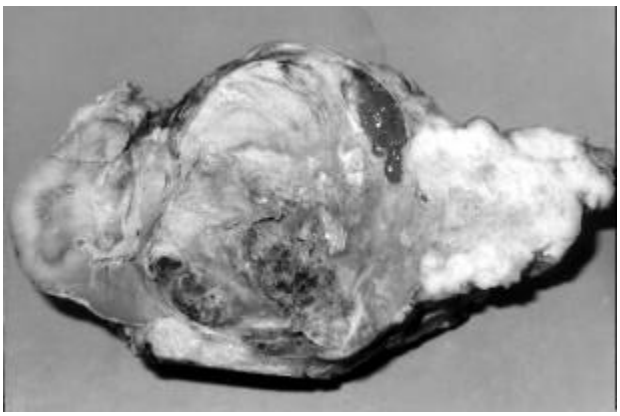

Figure 1. Macroscopic appearance of the tumor, which has a circumscribed border toward the renal parenchyma, and a firm, gray-white component that penetrates through the renal capsule on the opposite pole. This area adhered to the surrounding tissues.

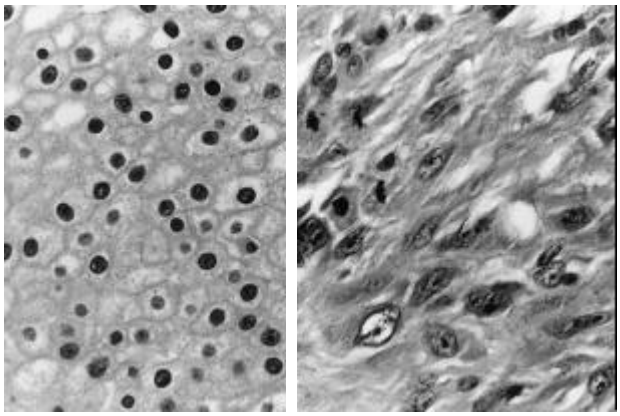

Figure 2. The two distinct histological components of the tumor. The chromophobe carcinoma cells (left) have a definite cytoplasmic membrane, a granular cytoplasm and rather uniform nuclei. The sarcomatoid carcinoma cells (right) are spindle-shaped and pleomorphic. Note the mitotic figures in the sarcomatoid component. (Hematoxylin and eosin, x 400)

DNA-ploidy was studied by image analysis. Sections were stained with Feulgen stain, and tumor cells were isolated from both tumor components. Normal tubular epithelial cells were used for calibration.

Results

Macroscopically the tumor showed a fleshy appearance, with foci of necrosis and hemorrhage; it was circumscribed toward the renal parenchyma, but had an extrarenal component which was firm and gray-white in appearance (*Figure 1*), similarly to that of the recurrence. Blocks for histological assessment were taken from different areas of the tumor, fixed in 7% buffered formalin and embedded in paraffin. Some of the blocks exhibited typical RCC with chromophobe cells (*Figure 2*). These were characterized by a cytoplasm that was either pale or granular, with no specific staining. The nuclei were rather monotonous, but a small area of nuclear pleomorphism was also noted. A majority of the blocks revealed sarcomatoid carcinoma with pleomorphic and spindle cells (*Figure 2*). The two components were also seen within one block, the sarcomatoid component growing around small foci of the chromophobe component. The liver metastasis and the recurrent tumor displayed only sarcomatoid tumor features.

On immunohistochemistry, the neoplastic cells of the epithelial component were positive for cytokeratin and negative for vimentin and p53, whereas the sarcomatoid component exhibited positivity for both cytokeratin and vimentin, and also demonstrated p53 positivity in approximately 80% of the cells (*Figure 3*).

DNA analysis of the two components indicated different ploidy patterns. The chromophobe carcinoma was typically hypodiploid, with a DNA index of 0.77, whereas the sarcomatoid component was aneuploid, showed features of polyploidization, and had a DNA index of 2.2. No common peaks were observed.

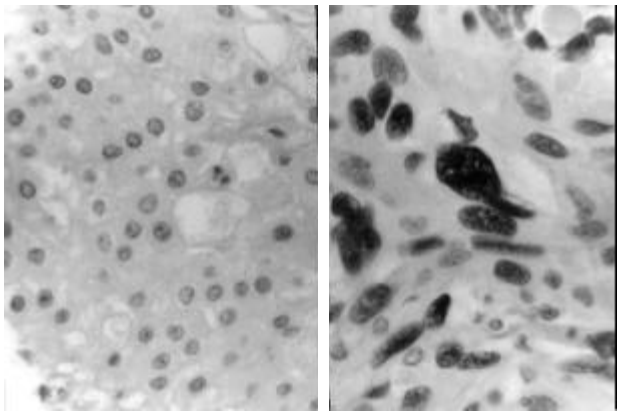

Figure 3. P53 immunostaining was negative in the chromophobe carcinomatous area (left) and strongly positive in the sarcomatoid area (right) of the tumor. (p53 immunostaining with slight hematoxylin nuclear counterstaining, x 400)

Discussion

Chromophobe RCCs are rare. They have a characteristic histomorphology[1,5,11] and immunophenotype, as seen in the present case. They are also characterized by hypodiploidy,[1,3,8] though in one study a hypodiploid pattern was found in 1 of the 10 cases investigated.[12]

Chromophobe RCC has a relatively good prognosis,[1,5] in marked contrast with the poor prognostic of sarcomatoid RCCs,[4,13] The two histological types of RCC occur together only rarely; very few cases have been reported in the

English-language literature.[3,6,7,9,10,14] Their coexistence may be due either to dedifferentiation of the more differentiated chromophobe cell tumor or to the collision of two synchronous tumors. Our investigations did not allow a differentiation of these two possibilities. The collision theory seems unlikely because of the rarity of each of the entities and the close intermixing of the two patterns in some tumors, including the present one. On the other hand, the fact that no common ploidy peaks were found in the two components might favor the collision of two independent tumors, but does not exclude the possibility of transformation into a more aggressive neoplasm. Loss of heterozygosity is often seen for several chromosomes in chromophobe RCCs[8] and may predispose to polyploidization, resulting in the hyperdiploid and aneuploid pattern seen in the sarcomatoid compartment. A further point in favor of a transformation is the fact that the karyotypic identity of the two components was confirmed in one sarcomatoid chromophobe RCC.[2]

From the aspects of microscopic morphology, immunophenotype and ploidy, our findings fit in fully with those on the 6 cases of sarcomatoid and chromophobe RCCs reported by Akhtar et al.[3] The significant p53 immunostaining observed in the sarcomatoid, but not the epithelial component lends support to the role of the TP53 gene in the genesis or transformation between the two prognostically different histological types. Whatever the genesis of a sarcomatoid component in RCCs, chromophobe tumors should be adequately sampled in order to exclude a sarcomatoid component, and use of the name chromophobe carcinoma should be restricted to pure carcinomas of this type.

References

1. *Akhtar M, Kardar M, Linjawi T, et al:* Chromophobe cell carcinoma of the kidney: a clinicopathologic study of 21 cases. Am J Surg Pathol 19:1245-1256, 1995.
2. *Akhtar M, Kfoury H, Kardar A, et al:* Sarcomatoid chromophobe cell carcinoma of the kidney. J Urol Pathol 4:155-166, 1996.
3. *Akhtar M, Tulbah A, Kardar AH, Ali MA:* Sarcomatoid renal carcinoma: the chromophobe connection. Am J Surg Pathol 21:1188-1195, 1997.
4. *Bertoni F, Ferri C, Benati A, et al:* Sarcomatoid carcinoma of the kidney. J Urol 137:25-28, 1987.
5. *Crotty TB, Farrow GM, Liber MM:* Chromophobe cell renal carcinoma, clinicopathological features of 50 cases. J Urol 154:964-967, 1995.
6. *Gomez-Roman JJ, Mayorga-Fernandez M, Mayorga-Fernendez F, Val-Bernal JF:* Sarcomatoid chromophobe cell renal carcinoma: immunohistochemical and lectin study in one case. Gen Diagn Pathol 143:63-69, 1997.
7. *Hirokawa M, Shimizu M, Sakurai T, et al:* Sarcomatoid renal carcinoma with chromophobe cell foci. Report of a case. APMIS 106:993-996, 1998.
8. *Kovacs G:* Molecular differential pathology of renal cell tumors Histopathology 22:1-8, 1993.
9. *Kuroda N, Hayashi Y, Itoh H:* A case of chromophobe renal cell carcinoma with sarcomatoid foci and a small daughter lesion. Pathol Int 48:812-817, 1998.
10. *Mai KT, Veinot JP, Collins JP:* Sarcomatous transformation of chromophobe cell renal carcinoma. Histopathology 34:557-559, 1999.
11. *Murphy WM, Beckwith JB, Farrow GM:* Atlas of tumor pathology. Tumors of the kidney, bladder, and related structures. Third series. Armed Forces Institute of Pathology, Washington, 1994.
12. *Renshaw AA, Henske EP, Loughlin KR, et al:* Aggressive variants of chromophobe renal cell carcinoma. Cancer 78:1756-1761, 1996.
13. *Ro JY, Ayala AG, Sella A, et al:* Sarcomatoid renal cell carcinoma: clinicopathologic study of 42 cases. Cancer 59:516-526, 1987.
14. *Tardio JC:* Chromophobe cell renal carcinomas with sarcomatoid areas: Histopathology 35:184-185, 2000.