Pol J Pathol 2004, 55, 1, 43-46 PL ISSN 1233-9687

Case Report

Krzysztof Okoń[1], Sergiusz Demczuk[1], Barbara Dobrowolska[2], Zygmunt Dobrowolski[2]

Three in One Kidney. Report of a Case

[1]Department of Pathomorphology,
[2]Department of Urology, Collegium Medicum, Jagiellonian University, Kraków

The case of a 70-year old male in whom imaging studies revealed two separate tumors in the left kidney is presented. In the surgical nephrectomy material two tumors were seen, 4.5 and 4cm in diameter; one of them was a clear cell carcinoma, and the other - a papillary carcinoma, respectively. In addition, a small, subcapsular nodule was detected, which was classified as an adrenal rest. According to current opinions, the above lesions have different pathogenesis and their coexistence may be regarded as accidental.

Introduction

Recently, new classifications for renal cell carcinomas (RCC) have been proposed based not only on cell morphology, but also on the knowledge of their genetic background [12]. And thus the main diagnostic categories are: clear cell/conventional RCC (CRCC), papillary RCC (PRCC), chromophobe RCC (ChRCC), collecting duct RCC (CDRCC) and unclassified RCC. The most common form is CRCC (60 - 75% of cases) and PRCC (10 - 15%) [12, 13]. This classification has been found to be of prognostic significance [1].

Multiple tumors of the kidney are a well-known and not uncommon phenomenon. A strong tendency towards forming multiple foci is characteristic of PRCC. On the other hand, the concomitant occurrence of PRCC and CRCC is not a situation one might expect. Below the authors present a case where three tumors were found within the kidney, each of them with a distinct histological structure.

A Case Description

A 70-year old male reported to his GP due to an episode of hematuria. Ultrasonography revealed the presence of solid lesions within his left kidney. The patient was referred for further diagnostic and therapeutic management to Department of Urology, Collegium Medicum, Jagiellonian University.

Abdominal CT showed presence of two distinct tumors in the inferior half of the left kidney. One of them measured 4.7x3.7cm and was situated medially, partially involving the renal hilus; it closely adhered to the psoas muscle, but showed no explicit signs of infiltration. The other lesion involved the lateral part of the renal cortex and penetrated the cortex through, extending to, but not infiltrating the muscles of the dorso-lateral part of the abdominal wall; the tumor was also in close vicinity of the descending colon. In CT the tumors were demonstrated to have smooth outlines and somewhat heterogeneous structure. The patient presented with no urine retention, enlarged lymph nodes or adrenal glands, as well as no thrombosis in the left renal vein and the inferior vena cava. The skeletal system showed no lesions other than of degenerative origin, and specifically no metastatic deposits. In addition, the patient had a nodular goiter, a cardiac defect (mitral and aortic valve insufficiency) and duodenal ulcer.

The patient was subjected to surgical procedure on planned, elective basis. The peri- and postoperative periods were uneventful. On day 13 postoperatively, he was administered a single dose of Intron A, which was well tolerated. After discharge the patient failed to report for further treatment and follow-up examinations.

The surgical material was fixed in 10% buffered formalin; the samples were routinely processed and embedded in paraffin. Four-μm thick sections were stained with hematoxylin-eosin and immunostained using routine techniques and a Dako Immunostainer (DAKO, Denmark). Antigen unmasking was performed in a microwave oven (3x5 minutes, 750W) in a citrate buffer (pH 6.0). The following primary antibodies were used: CK7 (DAKO OV-TL12/30) diluted 1:50, CK (DAKO MNF116) diluted 1:100, CD10 (Novocastra 56C) diluted 1:50, vimentin (DAKO V9) diluted 1:50, Ki-67 (DAKO MIB-1) diluted to 1:50. The ENVISION+ detection system with 3-amino-9-ethylcarbazole as chromogen manufactured by DAKO, Denmark was used.

Grossly, the material submitted was a 11x6cm kidney. Within the lower pole a 4.5cm tumor was present. On cross-section, the mass was yellowish in color and revealed blue-red hemorrhage foci and whitish scars situated in the central part. Histologically, the neoplasm was composed of

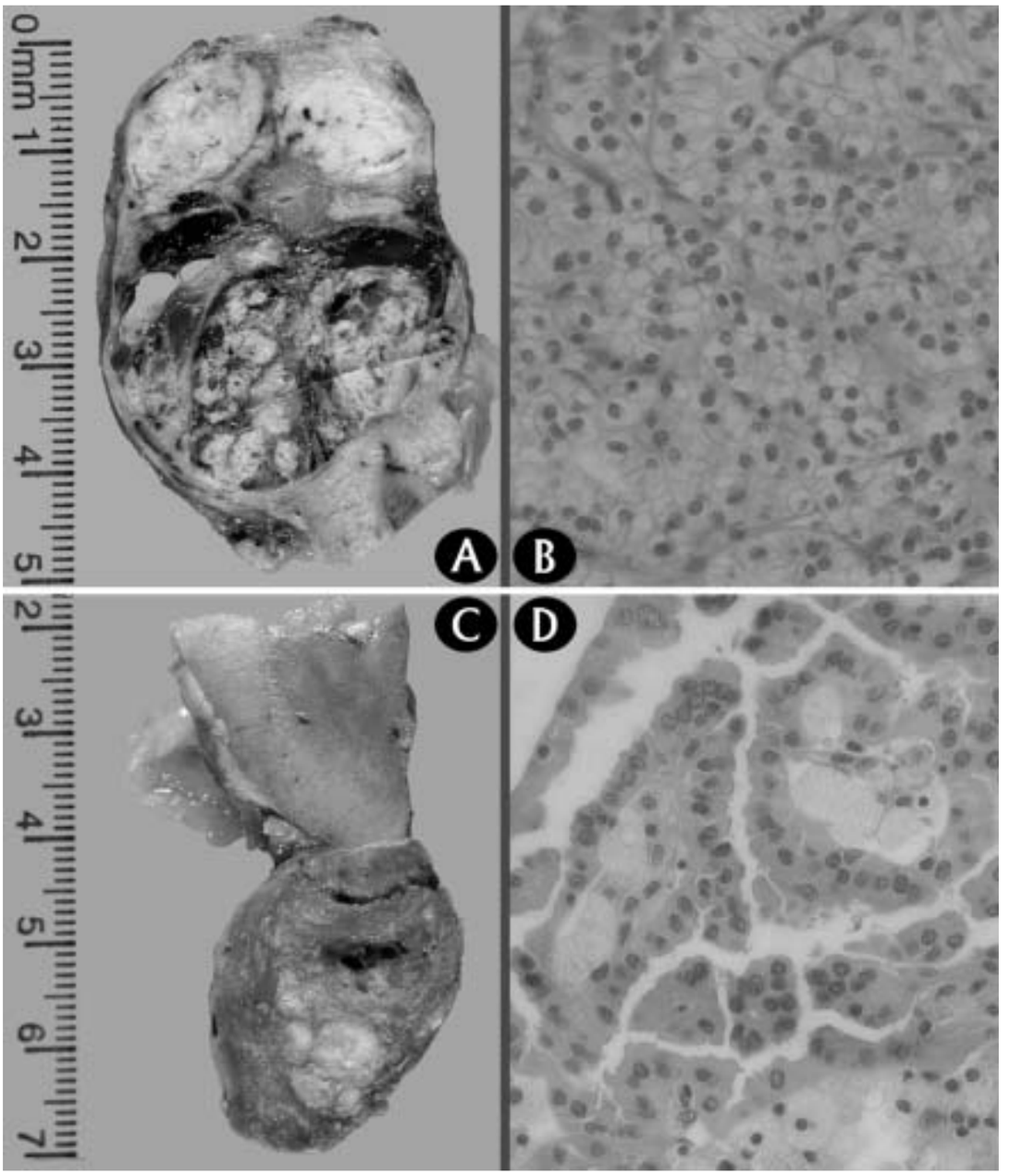

Fig. 1. The first tumor is yellowish, with hemorrhage and a central scar (A). Histology reveals a solid carcinoma composed of cells with clear cytoplasm, distinct cell borders and round to oval, rather monomorphic nuclei. HE. Lens magnification 60x (B). The second tumor is brownish, homogenous (C). Histologically, the papillary formations are seen. The fibrovascular cores contain foam cells, and the epithelial cell cytoplasm is pinkish, while the nuclei are moderately pleomorphic HE. Lens magnification 60x (D).

clear cells with moderate nuclear pleomorphism. The tumor infiltrated the renal hilus region and penetrated a medium-size vein, forming a short plug, 5mm in diameter. It also infiltrated the renal capsule, without extending beyond its boundaries. Immunohistochemistry showed that the tumor cells were positive for CD10 and negative for CK7. A clear cell carcinoma was diagnosed.

Another tumor was situated somewhat more laterally and was 4cm in diameter. On cross-section the mass was solid, brownish in color, with whitish and yellowish foci. Histology demonstrated the structure composed of papillae covered with fairly large cells with eosinophilic cytoplasm and clearly visible nuclear pleomorphism. In the center of numerous papillae, foamy histiocytes were seen. The mass infiltrated the renal capsule without extending beyond its

boundary; it did not penetrate the renal hilus either. Immunohistochemistry demonstrated the tumor cells to be CK7-positive and CD10-negative. A papillary carcinoma was diagnosed.

In the median part of the kidney, in the subcapsular region, a yellowish nodule, 3mm in diameter, was noted. In histology, its structure was composed of monomorphic cells with clear cytoplasm and monomorphic, round nuclei. On immunohistochemistry the cells were CK(-), VIM(-) and MIB-1(-). An adrenal rest was diagnosed.

Outside the tumors, the renal parenchyma showed focal, subcapsular infiltration of mononuclear cells combined with fibrosis. The adrenal gland, ureter and renal hilar lymph nodes showed no pathological lesions.

Discussion

The contemporary (Haidelberg/Rochester) classification of renal cell carcinoma is based on histology, but morphology is strongly associated with molecular changes occurring in particular types of tumors. Thus, pathogenesis of different RCC types is supposed to be different. CRCC is characterized by 3p deletions. The key element appear to be the *von Hippel-Lindau* (*VHL*) gene inactivation. In the case of PRCC, genetic changes mostly include 7, 16 and 17 trisomies. The main event triggering the development of this type of carcinoma would be the *c-met* gene activation [12, 13].

A subdivision of PRCC into two separate types associated with different prognosis has been proposed. Type I would be composed of papillae covered by a single layer of small cells with relatively regular, small nuclei. The rarer type II would be characterized by pseudostratification of cells with more abundant cytoplasm and clearly polymorphic nuclei. Type II PRCC is associated with higher grade, stage and poorer prognosis. The heterogeneity of PRCC may be responsible for unequivocal prognostic implications of this diagnosis in older literature [5]. Jiang et al. observed the presence of more numerous chromosomal changes in type II as compared to type I PRCC [9]. Similar results were achieved by Sanders et al. [14].

Multifocality is especially characteristic for familial renal cell carcinomas (FRCC). The best known, genetically transmitted syndromes with FRCC include the von Hippel-Lindau disease, tuberous sclerosis, hereditary papillary renal cell carcinoma, hereditary leiomyoma-renal cell carcinoma and the Birt-Hogg-Dube syndrome [4, 16, 17].

Multifocality or the appearance of foci of tubular epithelial dysplasia are a typical feature in PRCC and may be present in more than 1/3 of cases [2]. In CRCC, Hirsch et al. found the same karyotype in bilateral carcinoma. However, the cytogenetic method they employed is characterized by a low resolution and does not allow for formulating conclusions on the common origin of both tumors [8]. Kerstin et al. performed a thorough examination of surgical specimens and described multifocal carcinomas occurring in 16% of their patients. Their results suggest that in such cases various carcinoma foci may be of clonal origin, thus constituting the effect of intrarenal dissemination [10]. Commenting on the above observations, Kovacs [11] stated that it might indicate a different molecular genesis of this group of carcinomas as compared to more common CRCC presenting as a single tumor.

Concomitant occurrence of various renal cell carcinomas is very rare. The majority of authors describe coexisting CRCC and TCC, although such situations are also infrequent [3, 7]. The phenomenon has also been shown to occur in patients on chronic dialysis [15].

Adrenal rests (AR) constitute tumors composed of ectopic adrenal cortex tissue. The lesion is common and detected in various sites. In the kidney, its incidence is estimated to 6%. The features differentiating RCC from AR include the presence of hyperchromasia and nuclear polymorphism. In doubtful cases, immunohistochemistry can be helpful [6, 18].

In the presented case coexistence of tumors with different histology and presumably pathogenesis was reported. Patient's medical history did not provide any evidence for the familial background of the disease. No extrarenal signs were detected that would be observed in the described FRCC syndromes. One may surmise that this is an accidental phenomenon.

References

1. *Amin MB, Amin MB, Tamboli P, Javidan J, Stricker H, De-Paralta Venturina M, Deshpande A, Menon M:* Prognostic impact of histologic subtyping of adult renal epithelial neoplasms. Am J Surg Pathol 2002, 26, 281-191.
2. *Amin MB, Corless CL, Renshaw AA, Tickoo SK, Kubus J, Schultz DS:* Papillary (chromophil) renal cell carcinoma: histomorphological characteristics and evaluation of conventional pathologic prognostic parameters in 62 cases. Am J Surg Pathol 1997, 21, 621-635.
3. *Auguet T, Molina JC, Lorenzo A, Vila J, Sirvent JJ, Richard C:* Synchronous renal cell carcinoma and Bellini duct carcinoma: a case report on a rare coincidence. World J Urol 2000, 18, 449-451.
4. *Choyke PL, Glenn GM, Walther MM, Zbar B, Linehan WM:* Hereditary renal cancers. Radiology 2003, 226, 33-46.
5. *Delahunt B, Eble JN:* Papillary renal cell carcinoma: a clinicopathologic and immunohistochemical study of 105 tumors. Mod Pathol 1997, 10, 537-544.
6. *Gaffey MJ, Traweek ST, Mills SE, Travis WD, Lack EE, Medeiros LJ, Weiss LM:* Cytokeratin expression in adrenocortical neoplasia: an immunohistochemical and biochemical study with implications for the differential diagnosis of adrenocortical, hepatocellular, and renal cell carcinoma. Hum Pathol 1992, 23, 144-153.
7. *Hart AP, Brown R, Lechago J, Truong LD:* Collision of transitional cell carcinoma and renal cell carcinoma. Cancer 1994, 73, 154-159.
8. *Hirsch MS, Weinstein MH, Thomas A, Cin PD:* Identical karyotypes in synchronous bilateral clear cell renal cell carcinoma. Cancer Gen Cytogen 2002, 139, 86-87.

9. *Jiang F, Richter J, Schraml P, Bubendorf L, Gasser T, Sauter G, Mihatsch MJ, Moch H:* Chromosomal imbalances in papillary renal cell carcinoma. Am J Pathol 1998, 153, 1467-1473.
10. *Kerstin J, Thrum K, Schlichter A, Muller G, Hindermann W, Schubert J:* Clonal origin of multifocal renal cell carcinoma as determined by microsatellite analysis. J Urol 2002, 168, 2632-2636.
11. *Kovacs G:* Clonal origin of multifocal renal cell carcinoma as determined by microsatellite analysis. J Urol 2003, 170, 1325-1326.
12. *Kovacs G, Akhtar M, Beckwith BJ, Bugert P, Cooper CS, Delahunt B, Eble JN, Fleming S, Ljungberg B, Medeiros LJ, Moch H, Reuter VE, Ritz E, Roos G, Schmidt D, Srigley JR, Storkel S, van den Berg E, Zbar B:* The Heidelberg classification of renal cell tumours. J Pathol 1997, 183, 131-133.
13. *Renshaw AA:* Subclassification of renal cell neoplasms: an update for the practising pathologist. Histopathology 2002, 41, 283-300.
14. *Sanders ME, Mick R, Tomaszewski JE, Barr FG:* Unique patterns of allelic imbalance distinguish type 1 and type 2 sporadic papillary renal cell carcinoma. Am J Pathol 2002, 161, 997-1005.
15. *Tekehara K, Nishikido M, Koga S, Miyata Y, Harada T, Tamaru N, Kanetake H:* Multifocal transitional cell carcinoma associated with renal cell carcinoma in a patient on long-term haemodialysis. Nephrol Dial Transplant 2002, 17, 1692-1694.
16. *Pavlovich CP, Walther MM, Eyler RA, Hewitt SM, Zbar B, Linehan WM, Merino MJ:* Renal tumors in the Birt-Hogg-Dube syndrome. Am J Surg Pathol 2002, 26, 1542-1552.
17. *Poston CD, Jaffe GS, Lubensky IA, Solomon D, Zbar B, Linehan WM, Walther MM:* Characterization of the renal pathology of a familial form of renal cell carcinoma associated with von Hippel-Lindau disease: clinical and molecular genetic implications. J Urol 1995, 153, 22-26.
18. *Rosai J:* Adrenal gland and other paraganglia. In: Ackerman's Surgical Pathology. Rosai J. ed. Mosby-Year Book, St Luis 1996, 1015-1058.

Address for correspondence and reprint requests to:
K. Okoń M.D.
Chair of Pathomorphology,
Collegium Medicum, Jagiellonian University
Grzegórzecka 16, 31-531 Kraków