Metanephric adenoma of the right kidney: a challenging diagnosis in a 49-year-old female

Nikolina Stavrinou[1], Aikaterini Roidou[1], Georgia Mitropoulou[2], Georgios Liadakis[1], Ioannis Provatas[1*]

European Journal of Medical Case Reports
Volume 4(6):213–217

https://doi.org/10.24911/ejmcr/173-1586977338

ABSTRACT

Background: Metanephric adenoma of the kidney is a rare, usually solitary, and benign tumor of the kidney, predominately affecting female patients in the fifth or sixth decade of life. It is considered by some specialists to be the hyperdifferentiated benign end of the Wilm's tumor spectrum.

Case Presentation: The case was a 49-year-old woman with abdominal pain, a palpable mass in the right abdomen, and mild hematuria, without any other symptoms or laboratory findings. An ultrasonography and computed tomography revealed a tumor in the upper pole of the right kidney with a diameter of 5.3 cm. There was no infiltration of the neighboring structures and tissues. The differential diagnosis included papillary renal cell carcinoma, adult Wilm's tumor, and metanephric adenoma. A partial nephrectomy was followed. The histological examination of the tumor revealed relatively small unvarying basophilic epithelial cells with scant cytoplasm, uniform nuclei, and some areas with nuclear grooves, delicate chromatin, and indistinct nucleoli in a loose non-cellular stroma and developed in a tightly packed alveolar, tubular, and rarely papillary pattern. The mitotic rate was extremely low. Tumor cells were positive for paired box gene 8, cluster differentiation 57, and Wilm's tumor 1 and negative for racemase, cytokeratin 7, and EMA. The cell proliferation rate Ki-67 was extremely low, and there was diffuse, strong cytoplasmic positivity for BRAF V600E staining. Based on morphology and immunohistochemistry, the diagnosis of metanephric adenoma was made.

Conclusion: Although metanephric adenomas may be difficult to diagnose clinically, the histological examination and the immunohistochemistry assay, including BRAF V600 staining, can make a safe diagnosis, avoiding the administration of incorrect treatment.

Keywords: Kidney, metanephric adenoma, benign, tumor, BRAF.

Received: 28 April 2020 **Accepted:** 18 May 2020

Type of Article: CASE REPORT **Specialty:** Pathology

Funding: None.

Declaration of conflicting interests: The authors declare that there is no conflict of interest regarding the publication of this case report.

Correspondence to: Ioannis Provatas
*Department of Pathology, Athens General Hospital O Evangelismos, Athens, Greece.
Email: iannispro@yahoo.co.uk
Full list of author information is available at the end of the article.

Background

Metanephric adenoma of the kidney is an infrequent benign tumor of the kidney, composed of small primitive cells resembling early metanephric tubular differentiation, considered by some to be the hyperdifferentiated benign end of the Wilms tumor spectrum. The median age of the patients at the presentation is approximately 41 years (ranging from 11 months to 83 years), predominately affecting females (male to female ratio 1:2) [1, 2]. More than 50% of these tumors are discovered during the investigation of other diseases although patients may present abdominal or flank pain, palpable mass, hematuria, and paraneoplastic symptoms such as hypercalcemia and polycythemia [3]. The majority of metanephric adenomas are 3–6 cm in diameter although larger tumors (up to 20 cm) have been reported. They are usually unencapsulated, and in several instances, they present cystic features and/or calcifications.

Histologically, metanephric adenomas generally resemble the solid variant of papillary renal cell carcinoma and adult Wilm's tumor [4], a fact that may lead to incorrect diagnosis and insufficient treatment. Metastases and lymph node infiltration have not been reported in tumors with classic morphology and immunohistochemical profile.

Case Presentation

A 49-year-old woman presented with abdominal pain in the right side of the abdomen without any other specific symptoms. The physical examination revealed a palpable mass on the right central–lateral abdomen. The blood and biochemical tests did not exhibit abnormal results although the urinalysis showed a mild hematuria. An ultrasonography and non-contrast computed tomography of the abdomen revealed a heterogeneous mass located in the upper pole of the right kidney, 5.3 cm in maximum diameter. Signs suggesting hydronephrosis or infiltration of the ipsilateral ureter, renal pelvis, and/or the perirenal soft tissues were not revealed. Furthermore, the liver, pancreas, spleen, and large intestine were not affected.

Lymphadenopathy was not detected. Preoperative diagnosis was not definite, and the differential diagnosis included papillary renal cell carcinoma [5], Wilm's tumor [6], and metanephric adenoma. A partial–segmental right nephrectomy was performed. The surgical specimens sent for histological assessment included a portion of the right kidney with the tumor, a portion of the perirenal and two portions of renal parenchyma marked as "surgical margins of right kidney tumor centrally and peripherally." Fixation in 10% formalin was followed. Macroscopically, the tumor measured 4.5 cm × 2.8 cm × 2 cm, and on the cut surface, it was well delineated, tan, and lobulated, surrounded by a thin discontinuous capsule.

Microscopically, the tumor was surrounded by a thin fibrous capsule, consisting of relatively small unvarying basophilic epithelial cells with scant cytoplasm, uniform nuclei, and in some areas, nuclear grooves, delicate chromatin, and indistinct nucleoli. The neoplasm was composed of cells which had developed in a tightly packed alveolar, tubular, and rarely papillary pattern, in a loose non-cellular stroma (Figures 1–4) [7]. The mitotic rate was very low, whereas the features suggesting infiltration of the capsule were not revealed. Calcifications, vascular emboli, or vascular infiltration was not detected. The specimens sent separately as "surgical margins" were both free of tumor cells.

The immunohistochemistry assay revealed diffuse positivity of the tumor cells for paired box gene 8 (Figure 5), Wilm's tumor 1 (WT-1) (Figure 6), and cluster differentiation 57 (CD57) (Figure 7) and no staining for racemase (p504s) (Figure 8), cytokeratin 7 (CK7) (Figure 9), EMA, RCC, carbonic anhydrase-IX (CA-IX), and CD10. The cell proliferation rate Ki-67 (Figure 10) was extremely low (~2%). In addition, there was diffuse, strong cytoplasmic positivity for BRAF V600E (Figure 11) staining.

Based on the morphological and immunohistochemical findings, the diagnosis of metanephric adenoma was made. The patient has remained disease free and without symptoms for 1 year.

Discussion

Metanephric adenoma is a rare, benign, mostly asymptomatic, and usually solitary tumor of the kidney. It is reported more often in the fifth or sixth decade of life and affects a higher number of females than males. This

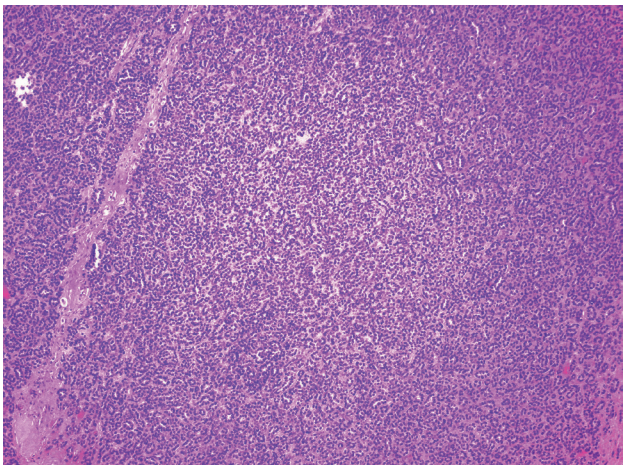

Figure 1. *Hematoxylin–eosin stain (10×).*

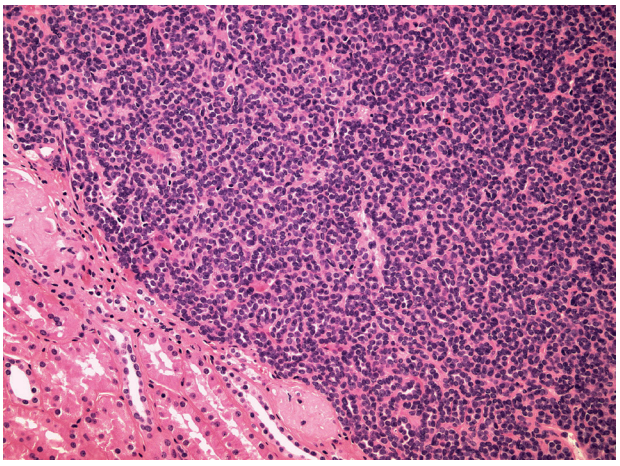

Figure 3. *Hematoxylin–eosin stain (20×).*

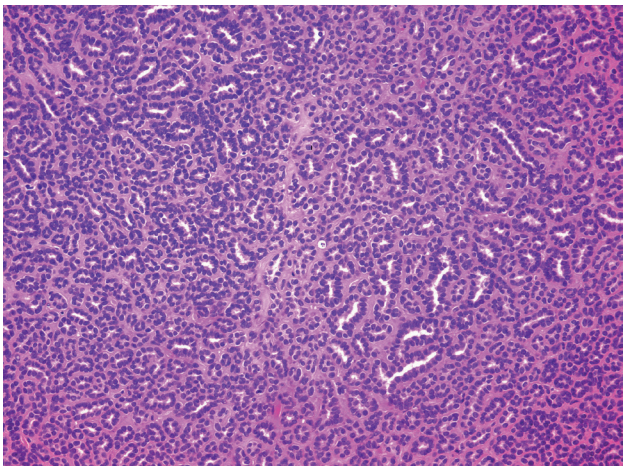

Figure 2. *Hematoxylin–eosin stain (20×).*

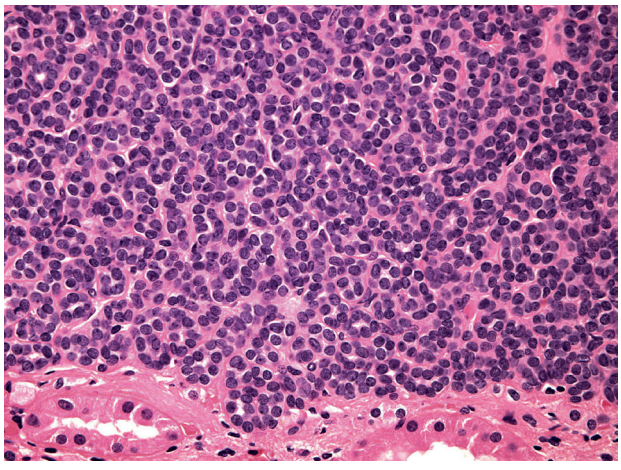

Figure 4. *Hematoxylin–eosin stain (40×).*

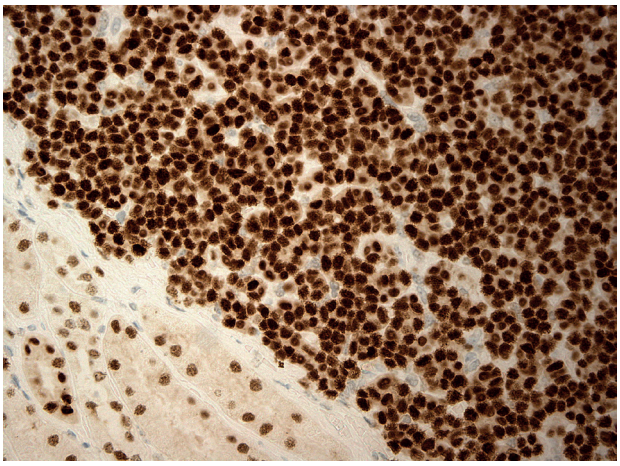

Figure 5. *Strong and diffuse positivity for PAX-8.*

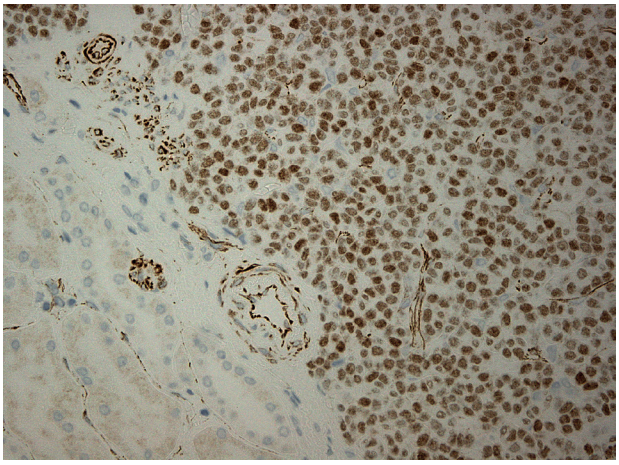

Figure 6. *Strong and diffuse positivity for WT-1.*

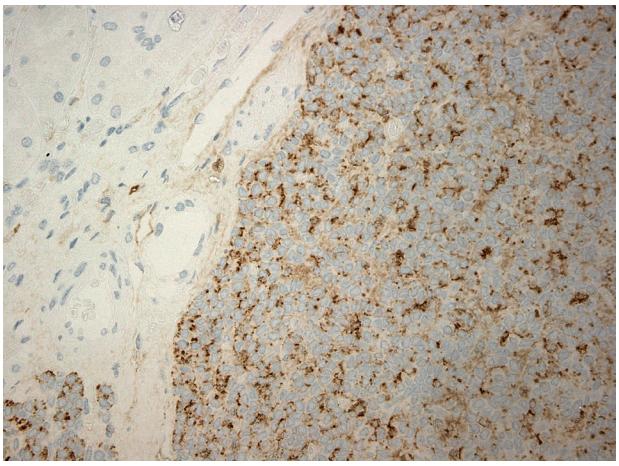

Figure 7. *Strong and diffuse positivity for CD57.*

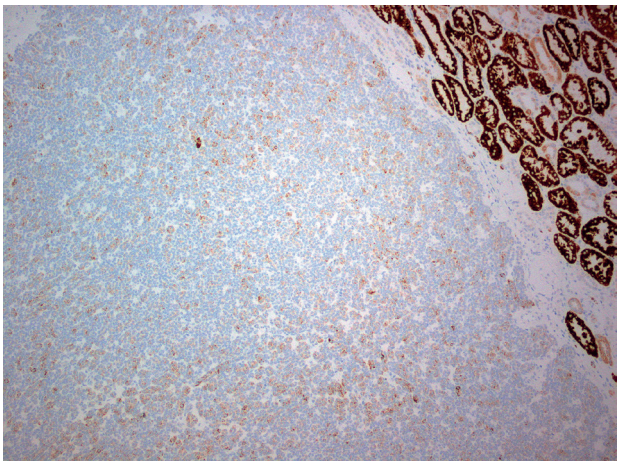

Figure 8. *Negativity for p504s (10×).*

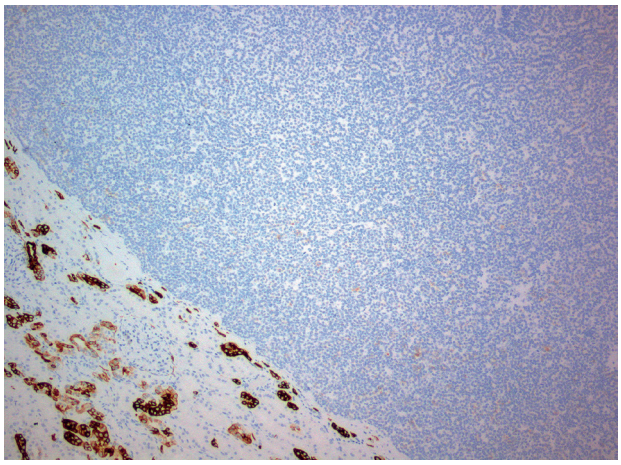

Figure 9. *Negativity for CK7 (10×).*

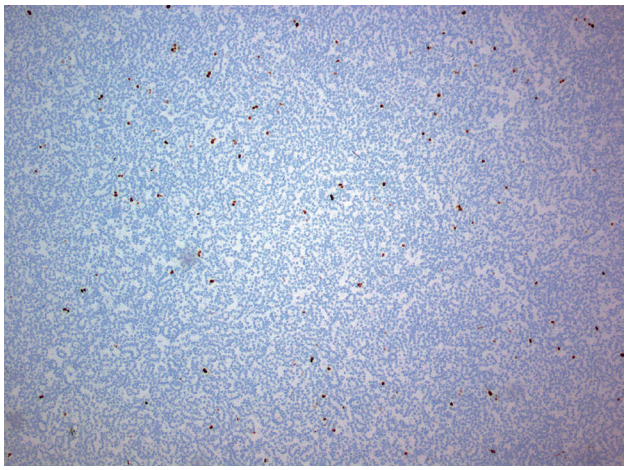

Figure 10. *Low cell proliferation rate Ki-67 (10×).*

benign, highly cellular epithelial neoplasm of the kidneys is composed of small, uniform, primitive, embryonal-looking cells, which resemble early metanephric tubular differentiation, making part of the spectrum of neoplasms that include metanephric adenofibroma and metanephric stromal tumor. In this case, there was no clear clinical suggestion. However, the morphological findings, including the lack of capsular infiltration, the absence of vascular invasion, and the very low mitotic rate, as well as the results of immunohistochemistry (strong diffuse staining for CD57 and WT-1), lead us to the diagnosis of metanephric adenoma, given that a strong

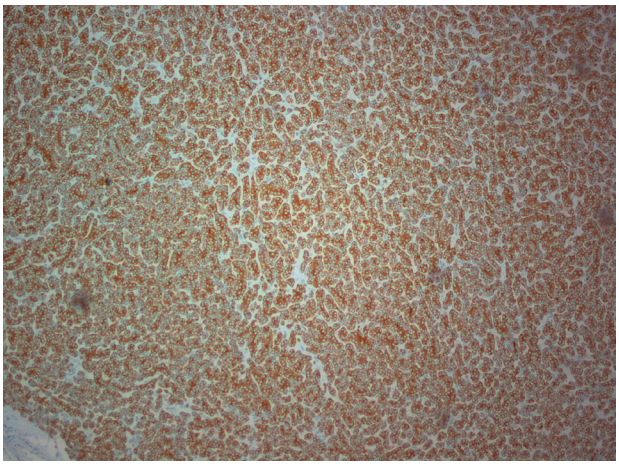

Figure 11. *Strong cytoplasmic positivity for BRAF V600 (10×).*

diffuse positivity excluded the possibility of Wilms tumor, and the lack of staining for CK7, p504s, and CA-IX ruled out papillary renal cell carcinoma [8,9].

In addition, an immunohistochemical assay for BRAF V600E mutation was performed, as the somatic mutation of BRAF oncogene had been recently detected immunohistochemically and molecularly in most of the metanephric adenomas [10]. Most of these BRAF alterations relevant to the V600E mutation, making the VE1 antibody a trustworthy detector of BRAF V600E mutation. In this case, strong diffuse cytoplasmic positivity for BRAF V600 staining strongly supported the diagnosis of metanephric adenoma.

Conclusion

Although metanephric adenoma may be difficult to diagnose clinically, the histological examination, including a full panel of immunohistochemistry tests, could lead to a safe diagnosis and the avoidance of misdiagnosis and consequently incorrect treatment [11].

What is new?

Metanephric adenomas are renal tumors that may be difficult to be recognized clinically. Histological examination of such tumors, including immunohistochemical assessment of BRAF V600 staining, may be very useful for the establishment of the correct diagnosis.

List of Abbreviations

CD10	Cluster differentiation 10
EMA	Epithelial membrane antigen
RCC	Renal cell carcinoma antigen
CA-IX	Carbonic Anhydrase-IX
CD57	Cluster differentiation 57
CK7	Cytokeratin 7
p504s	Racemase
WT-1	Wilm's tumor 1

Consent for publication

Written informed consent was taken from the patient.

Ethical approval

Ethical approval is not required for publishing an anonymous case report at our institution.

Author details

Nikolina Stavrinou[1], Aikaterini Roidou[1], Georgia Mitropoulou[2], Georgios Liadakis[1], Ioannis Provatas[1]

1. Department of Pathology, Athens General Hospital O Evangelismos, Athens, Greece
2. Department of Pathology, Athens Children's Hospital Agia Sofia, Athens, Greece

References

1. Mahul B , Amin MD, Satish K, Tickoo MD. Diagnostic pathology. Genitourinary. 2nd ed. Philadelphia, PA: Amirsys-Elsevier; 2016. pp 147–55.
2. Moch H, Humphrey PA, Ulbright TM, Reuter VE. WHO classification of tumours of the urinary system and male genital organs. Geneva, Switzerland: WHO; 2016. pp 45–7.
3. Wang P, Tian Y, Xiao Y, Zhang Y, Sun FA, Tang K. A metanephric adenoma of the kidney associated with polycythemia: a case report. Oncol Lett. 2016;11(1):352–4. https://doi.org/10.3892/ol.2015.3868
4. Saremian J, Kubik MJ, Masood S. Cytologic features of metanephric adenoma of the kidney: case report and review of the literature. Lab Med. 2015;46(2):153–8. https://doi.org/10.1309/LMW2MHDM6EILGQH2
5. Obulareddy SJ, Xin J, Truskinovsky AM, Anderson JK, Franklin MJ, Dudek AZ. Metanephric adenoma of the kidney: an unusual diagnostic challenge. Rare Tumor. 2010;2:e38. https://doi.org/10.4081/rt.2010.e38
6. Li G, Tang Y, Zhang R, Song H, Zhang S, Niu Y. Adult metanephric adenoma presumed to be all benign? a clinical perspective. BMC Cancer. 2015;15(1):310. https://doi.org/10.1186/s12885-015-1211-3
7. Patel RD, Frederick L, Kohler T, Schwartz B. A Case of a metanephric adenoma of the kidney surgically treated with robot-assisted laparoscopic partial nephrectomy. Case Rep Urol. 2013;2013:703859. https://doi.org/10.1155/2013/703859
8. Kinney SN, Eble JN, Hes O, Williamson SR, Grignon DJ, Wang M, et al. Metanephric adenoma: the utility of immunohistochemical and cytogenetic analyses in differential diagnosis, including solid variant papillary renal cell carcinoma and epithelial-predominant nephroblastoma. Mod Pathol. 2015;28:1236–48. https://doi.org/10.1038/modpathol.2015.81
9. Pins MR, Jones EC, Martul EV, Kamat BR, Umlas J, Renshaw AA. Metanephric adenoma-like tumors of the kidney: report of 3 malignancies with emphasis on discriminating features. Arch Pathol Lab Med. 1999;123(5):415–20.
10. Caliò A, Eble JN, Hes O, Martignoni G, Harari SE, Williamson SR, et al. Distinct clinicopathological features in metanephric adenoma harboring BRAF mutation. Oncotarget. 2016;8(33):54096–105. https://doi.org/10.18632/oncotarget.11117
11. Szukalski J, Neska-Długosz I, Kwiatkowski S, Cześnin J, Patalas A, Marszałek A. Metanephric adenoma of the left kidney in a 59-year-old female. Contemp Oncol (Pozn). 2014;18(special issue).

Summary of the case

1	**Patient (gender, age)**	A 49-year-old female
2	**Final diagnosis**	Metanephric adenoma
3	**Symptoms**	Palpable mass of the right abdomen, mild hematuria
4	**Medications**	-
5	**Clinical procedure**	Partial nephrectomy, histopathological examination
6	**Specialty**	Pathology