

Ultrasonographic features of testicular metastasis from renal clear cell carcinoma that mimics a seminoma

A case report

He Huang, MD, Wenwu Ling, MD, Tingting Qiu, MD, Yan Luo, MD*

Abstract

Rationale Testicular metastases from renal cell carcinoma (RCC) are extremely rare. To the best of our knowledge, only 35 cases have been described in the literatures.

Patient concerns A 64-year-old male presented to our urology clinic for a palpable painless mass on his right side of the scrotum by self-examination 1 week ago, with a general abdominal ultrasonographic report showing a mass in his right kidney.

Diagnoses and interventions Scrotal B-mode ultrasound revealed a 15 × 13 × 15 mm well-defined round homogeneously hypoechoic nodule with a halo at the upper pole of the right testis. Color Doppler and spectral Doppler ultrasound detected abundant intranodular and perinodular blood flow signals including both arteries and veins. Malignancy was suspected. Abdominal contrast-enhanced computed tomography identified an irregular tumor in the posterior side of the right kidney, highly suspicious for renal carcinoma. The patient received right radical nephrectomy and right partial orchiectomy. Histologically, the right renal mass was diagnosed as RCC, clear cell type, grade 2. As to the right testicular mass, a metastasis from renal clear cell carcinoma was confirmed.

Outcomes The patient has lived with no recurrence for at least 17 months without adjuvant therapy.

Lessons In the case, we focus on the ultrasonographic features of the testicular metastasis from RCC. Ultrasound could provide initial and helpful information for diagnosis. When finding a mass in the testicle on the ultrasound, although most of them are primary, it is important to know whether the patient has tumor history from other parts of the body. A halo may be a special feature for metastases. Contrast-enhanced ultrasound (CEUS) and ultrasonic elastography could provide more information for differential diagnoses.

Abbreviations: CEUS = contrast-enhanced ultrasound, EDV = end-diastolic velocity, PSV = peak systolic velocity, RCC = renal cell carcinoma, RI = resistance index.

Keywords: renal cell carcinoma, testicular metastasis, ultrasound

1. Introduction

About 25% to 30% percent of patients with renal cell carcinoma (RCC) will present with metastases at the time of diagnosis.^[1] Typically, the most common attacked sites are the lungs (50%), bones (49%), lymph nodes (32%), skin (11%), liver (8%), and brain (3%).^[2] To our best knowledge, testicular metastasis from RCC is extremely rare. Appropriately 35 cases have been

reported in the literature.^[3–6] A very few of them have reported the ultrasonographic features of metastases from RCC.^[1,3] We present a case of a patient with a right testicular metastasis secondary to clear cell RCC and describe its features on duplex ultrasound in order to assist diagnosis.

2. Case presentation

A 64-year-old male presented to our urology clinic for a palpable painless mass on his right side of the scrotum by self-examination 1 week ago. A general abdominal ultrasonography, performed at local hospital 3 months ago, showed a mass in the patient's right kidney. During this period, the patient denied any history of clinic manifestation or trauma. His medical history was significant only for hypertension. Physical examination revealed percussed pain in his right flank. Scrotal examination found a palpable, stiff, painless mass in his right testis which is still in the normal size. Superficial lymph nodes were not palpable, nor was inguinal hernia. Scrotal B-mode ultrasound, using an iU22 ultrasound system (Royal Philips, Amsterdam, The Netherlands) equipped with a high-frequency (5–12 MHz) linear array transducer, revealed a well-defined round, homogeneously hypoechoic nodule with a halo at the upper pole of the right testis (Fig. 1A). The size of the mass was about 15 × 13 × 15 mm. The color Doppler

Editor: N/A.

The authors have no conflicts of interest to disclose.

Department of Ultrasound, West China Hospital, Sichuan University, Chengdu, Sichuan, China.

* Correspondence: Yan Luo, Department of Ultrasound, West China Hospital, Sichuan University, No. 37, Guoxue Xiang, Chengdu 610041, China (e-mail: luoyanddoc@163.com).

Copyright © 2018 the Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial License 4.0 (CCBY-NC), where it is permissible to download, share, remix, transform, and buildup the work provided it is properly cited. The work cannot be used commercially without permission from the journal.

Medicine (2018) 97:40(e12728)

Received: 8 June 2018 / Accepted: 14 September 2018

<http://dx.doi.org/10.1097/MD.00000000000012728>

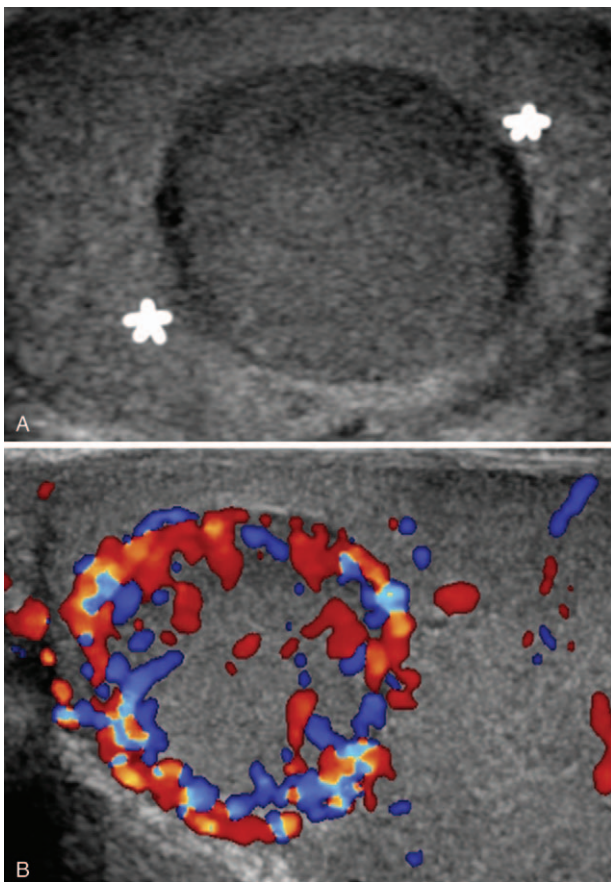


Figure 1. Transverse B-mode ultrasound image (A) showing a $15 \times 13 \times 15$ mm sized well-defined round homogeneously hypoechoic mass with a halo at the upper pole of the right testis (white star). Longitudinal color Doppler ultrasound image (B) detecting abundant intranodular and perinodular blood flow signals including veins and arteries.

ultrasound (Fig. 1B) and spectral Doppler ultrasound detected abundant intranodular and perinodular blood flow signals, including veins and arteries (peak systolic velocity (PSV): 6.14 cm/s, end-diastolic velocity (EDV): 2.29 cm/s, resistance index (RI): 0.63). Malignancy was highly suspected. Meanwhile abdominal contrast-enhanced computed tomography identified a $5.4 \text{ cm} \times 4.7 \text{ cm}$ sized irregular inhomogeneous enhanced mass in the posterior side of the right kidney, which broke through the kidney capsule, still within Gerota's fascia, without obvious renal vein, adrenal, or retroperitoneal involvement (Fig. 2). Other imaging examinations for evaluating metastasis were negative. The laboratory tests were within normal level. Then a right radical nephrectomy was performed in December 2016, followed by a right partial orchiectomy a few days later. Grossly, the right kidney's tumor was red-and-white fish-like appearance with liquefied necrotic component, adhered to peripheral tissue with renal capsular invasion, and close to Gerota's fascia. Histologically, it was diagnosed as RCC, clear cell type, grade 2. As to the right testicular mass, macroscopic examination of the operate specimen showed a yellow hard lesion at the upper pole of the right testis with clear margins, within the albuginea. Pathologic study revealed metastasis from RCC (Fig. 3). Immunohistochemically, the tumor cells showed positivity for CD10 and CA9 and negativity for inhibin- α and WT-1. These results were compatible with a metastasis from renal clear cell carcinoma. Postoperative



Figure 2. Abdominal contrast-enhanced computed tomography identifying a $5.4 \text{ cm} \times 4.7 \text{ cm}$ irregular inhomogeneous enhanced tumor in the posterior of the right kidney (white arrow), which broke through the kidney capsule, still within Gerota's fascia.

follow-up examination showed no other metastases. The patient has lived with no recurrence for at least 17 months without adjuvant therapy.

In this paper, ethical approval was not necessary, as this article is a case report, which is based on the clinical information of the patient. Informed written consent was obtained from the patient for publication of this case report and accompanying images.

3. Discussion

Testicular metastases are uncommon, which are most often incidentally found at autopsy in patients who have died of cancer.^[7] Metastases represented 1.4% of all testicular tumors biopsied.^[8] The most common primary sources are prostate tumors (35%), lung tumors (19%), malignant melanoma (9%), colon tumors (9%), and kidney tumors (7%).^[9] Bandler et al^[4] reported the first case of RCC metastatic to the testis in 1946. Through the reported 35 cases, all of which were clear cell carcinoma except for 1 case. These patients' ages ranged from 46 to 87 years old (mean 65). They did not have any histories of

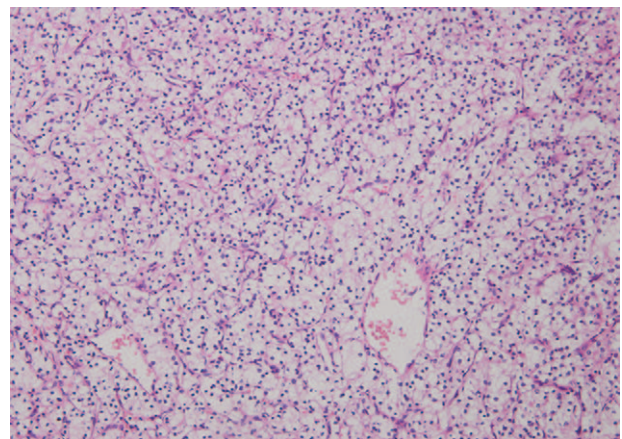


Figure 3. Microscopic section of the left testicular tumor showing ($\times 200$) cells with small oval nuclei and abundant clear cytoplasm: revealing metastases from renal clear cell carcinoma.

scrota diseases. A total of 17 patients, nearly 50 percent, had multiple metastases. The majority of patients had an ipsilateral metastasis. However, there was no significant difference whether it was ipsilateral left or right. Moriyama et al^[5] reported the only case of bilateral testicular metastases from RCC. After viewing the previous literatures, one of the main explanations of testicle involvement in RCC is a retrograde venous spread via the spermatic vein according to anatomic outlet of spermatic vein into renal vein at left side,^[6] which could hardly explain the contralateral or ipsilateral right metastases, such as the case we report. Arterial extension, lymphatic extension and endocanalicular spread have also been mentioned.^[10] The clinic presentation of testicular tumors from RCC was most commonly painless enlargement of the testis or a palpable mass,^[8] which was not specific, but could lead to a scrotum ultrasonic examination.

Ultrasound is an initial imaging modality to detect testicular masses with a nearly 100% detective sensitivity,^[11] which also indicate whether the mass is intratesticular or intertesticular. There were a very few cases including ultrasonographic features of testicular metastases from RCC, let alone detailed descriptions. In our case, the main ultrasonographic features of the testicular metastasis included distinct borders, round shape, decreased echogenicity, ample intranodular and perinodular vascularities and a halo. Kawamoto et al^[12] examined the relationship between the sonographic classification and histological type and reported that the majority of seminomas were focal or diffused mass with decreased echogenicity and all the seminoma were hypervascular in his article. Because of many ultrasonographic similarities, it is easy to misdiagnose metastasis as a primary testicular neoplasm as we did, especially when the sonologist does not know the patient's primary tumor history.

Seminoma is the commonest testicular malignancy, which accounts for 35% to 50% of germ cell tumors, and germ cell tumors accounts for 95% of testicular cancer.^[11] Despite the similarities, a halo of metastases may be an important particular ultrasonographic feature that seminomas do not have. Llarena Ibarguren et al^[3] also described a halo around the testicular metastasis from RCC. Also, epidemiologic factors may help. Patients affected by testicular metastases are older on average than men with seminoma, which occurs most often in men in their 40 seconds, and of which the cryptorchism, Klinefelter syndrome and gonadal dysgenesis are risk factors.^[11] Lymphoma are the most common testicular malignancy in men 60 years of age and older.^[11] So the possibility of lymphoma should be considered since most of the patients with testicular metastasis from RCC were older than 60. Kawamoto et al^[12] also mentioned metastases from lymphoma, which were diffuse hypervascular regions of decreased echogenicity. However, metastases to testis from RCC are often solitary. Contrast-enhanced ultrasound (CEUS) and ultrasonic elastography may contribute to differentiation from benign intratesticular lesions to avoid unnecessary

orchiectomy.^[13] Finally when it is difficult to make the certain diagnosis by image, immunohistochemistry can be helpful. In our case, the patient had a good prognosis with no metastases at other sites. Ultrasonography could be a good modality at the follow-up.

There are also some limitations in our case: firstly, we did not use ultrasonic elastography and CEUS to get more information for the diagnosis. Secondly, ultrasonographic images of the primary renal tumor could not be obtained. For a testicular mass detected on B-mode image, when it is difficult to make a diagnosis, further CEUS and ultrasonic elastography, combining the patient's history, laboratory tests and other image examinations, could help make differential diagnoses and improve diagnostic accuracy, but still need more researches.

Author contributions

Supervision: Yan Luo.

Writing – original draft: He Huang.

Writing – review & editing: Wenwu Ling, Tingting Qiu.

References

- [1] Marzouk K, Alyami F, Merrimen J, et al. Metastatic renal cell carcinoma to the testis: a case report and review of the literature. *Can Urol Assoc J* 2014;8:e924–7.
- [2] Steiner G, Heimbach D, Pakos E, et al. Simultaneous contralateral testicular metastasis from a renal clear cell carcinoma. *Scand J Urol Nephrol* 1999;33:136–7.
- [3] Llarena Ibarguren R1, García-Olaverri Rodríguez J, Azurmendi Arin I, et al. Metachronic testicular metastasis secondary to clear cell renal adenocarcinoma. *Arch Esp Urol* 2008;61:531–3.
- [4] Bandler CG, Roen PR. Solitary testicular metastasis simulating primary tumor and antedating clinical hypernephroma of the kidney: report of a case. *J Urol* 1946;55:663–9.
- [5] Moriyama S, Takeshita H, Adachi A, et al. Simultaneous bilateral testicular metastases from renal clear cell carcinoma: a case report and review of the literature. *Oncol Lett* 2014;7:1273–5.
- [6] Camerini A, Tartarelli G, Martini L, et al. Ipsilateral right testicular metastasis from renal cell carcinoma in a responder patient to interleukine-2 treatment. *Int J Urol* 2007;14:259–60.
- [7] Ulbright TM, Young RH. Metastatic carcinoma to the testis: a clinicopathologic analysis of 26 nonincidental cases with emphasis on deceptive features. *Am J Surg Pathol* 2008;32:1683–93.
- [8] Dutt N, Bates AW, Baithun SI. Secondary neoplasms of the male genital tract with different patterns of involvement in adults and children. *Histopathology* 2000;37:323–31.
- [9] Dogra VS, Gottlieb RH, Oka M, et al. Sonography of the scrotum. *Radiology* 2003;227:18–36.
- [10] Blefari F, Risi O, Pino P. Secondary tumors of testis: two rare cases and review of the literature. *Urol Int* 1992;48:469–70.
- [11] Appelbaum L, Gaitini D, Dogra VS. Scrotal ultrasound in adults. *Semin Ultrasound CT MRI* 2013;34:257–73.
- [12] Kawamoto A, Hatano T, Saito K, et al. Sonographic classification of testicular tumors by tissue harmonic imaging: experience of 58 cases. *J Med Ultrason* 2018;45:103–11.
- [13] Auer T, De Zordo T, Dejaco C, et al. Value of multiparametric US in the assessment of intratesticular lesions. *Radiology* 2017;285:640–9.