A rare case of tumor-to-tumor metastasis: Prostate cancer to chromophobe renal cell carcinoma

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An 80-year-old man was admitted to the Instituto do Câncer do Estado de São Paulo (ICESP) with a metastatic prostate cancer, at the initial prostate biopsy he had an adenocarcinoma group 2 (Gleason score 7 (3 + 4)) and a prostate specific antigen (PSA) of 917 ng/mL. At diagnostic evaluation, extensive bone metastasis were identified on the bone scan. During follow up, the patient presented with acute urinary retention requiring a transurethral resection of the prostate with a biopsy. After 10 months of surgical castration, PSA continued to rise so a complete androgenic blockade was attempted with bicalutamide, and a PSA nadir of 26.2 ng/mL was achieved. The testosterone level was < 20 ng/dL. Twelve months latter a computerized tomography was performed and a right-sided 4.6 cm solid renal lesion with close proximity to the renal sinus was identified (Fig. 1).

The patient underwent and uneventful laparoscopic right partial nephrectomy, the operative time was 300 minutes with 29 minutes of ischemia and a 700 ml bleeding. A blood transfusion was not required, he recovered uneventfully.

At final pathologic examination, macroscopically the tumor weighted 53.6 g, measured 6.4 x 4.7 x 4.0 cm (Fig. 2).

Microscopic analysis revealed a chromophobe type RCC, the tumor was limited to the kidney and the resection margins were negative, it was staged as pT1b according to the 2010 TNM classification system. In addition, a focal prostatic adenocarcinoma with cribriform pattern infiltrating the renal neoplasm was identified. This was confirmed by immunohistochemistry analysis with positivity for PSA, PSAP, Racemase and androgen receptor markers, therefore the final diagnosis was a tumor-to-tumor metastasis from prostate adenocarcinoma to chromophobe RCC. (Fig. 3).

Discussion

The rare phenomenon of metastasis from malignant tumor to another preexisting malignant tumor in a distant organ is defined as tumor-to-tumor metastases. There are few cases described in the literature on this phenomenon and this scarcity of evidence make difficult to define and standardize these tumors for the pathologist. Campbell et al. back in 1968 proposed the criteria to define this entity: there must be more than one primary tumor; the recipient tumor is a true benign or malignant neoplasm; metastatic neoplasm is a true established growth metastasis in the host tumor, not a result of contiguous growth (collision tumor) or embolization of tumor cells. Tumors metastases to the lymphatic system, where there are already malignant lymphoreticular tumors, are excluded from this classification.

A tumor-to-tumor metastasis should be differentiated from collision tumors, since the latter are defined as two adjacent histologically and morphologically different malignant neoplasms coexisting in a single organ without histological mixing. Collision tumors have been reported in various organs such as kidneys, gastrointestinal tract, lung, adrenal and others.

RCC are the most common metastasis receptors, whereas lung tumors followed by breast, gastrointestinal and prostate tumors are the most common tumors that cause metastases to other tumors.
RCC subtypes, clear cell RCC are the most common tumor metastasis receptor, with other subtypes being less commonly reported. There are two theories that explain why renal cell carcinoma is the primary host. The first is known as “seed and soil theory” and states that a high concentration of micronutrients such as glycogen and lipid are found in RCC which may make it an attractive environment for metastases. The second theory is called the “mechanical theory”, where the access to this sites is facilitated due to the great renal blood flow and rich vascularization of RCC.

Although RCCs are the main hosts of metastasis in the tumor-to-tumor phenomenon, there are not many reported cases of metastases from prostate adenocarcinoma to renal cancers. In our understanding, the case we have portrayed is the second case of metastasis to chromophobe RCC described. Previously Shin et al. \(^5\) reported a colorectal carcinoma metastasis for chromophobe RCC, making our case the first described as prostate adenocarcinoma metastasis to a chromophobe RCC, tumor-to-tumor metastasis, when using MEDLINE database.

**Conclusion**

Tumor-to-tumor metastasis is a rare and a difficult to diagnose phenomenon, pathologists should always be aware of this possibility, especially in kidney tumors. Due that the literature is really sparse in this topic, the prognosis and best clinical approach for these patients is unknown.

**Conflicts of interest statement**

The authors declare that they have no competing interests.

**References**