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Collision metastasis: Renal cell carcinoma and prostatic adenocarcinoma to a retroperitoneal lymph node

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ABSTRACT

Prostatic adenocarcinoma and renal cell carcinoma (RCC) can coexist. However, the incidence of collision metastasis of both prostatic adenocarcinoma and RCC is a rare phenomenon. A 50-year-old non-smoker male with end stage renal disease and a history of prostate adenocarcinoma was noted to have a left renal mass in the upper pole during CT surveillance. With the use of immunohistochemical stains the collision of two distinct malignancies from two different topographical regions was elucidated in a retroperitoneal lymph node. We report the second known case of collision metastasis of RCC and prostatic adenocarcinoma to a retroperitoneal lymph node.

1. Introduction

Renal cell carcinoma (RCC) has a tendency to metastasize with up to 30% of patients presenting with metastasis at diagnosis.[1] Prostatic adenocarcinoma is usually indolent and insidious, but it can present with metastatic disease or incidentally upon autopsy or surgical resection for a different purpose. Prostatic adenocarcinoma and RCC have been demonstrated to coexist, as well as with other primary cancers such as bladder, rectal, non-Hodgkin's lymphoma, and breast cancer.[2,3] As such, two simultaneous primary malignancies is a relatively common phenomenon. However, the incidence of collision metastasis of both prostatic adenocarcinoma and RCC is a rare phenomenon. To our knowledge, this appears to be the second case of collision metastasis of prostatic adenocarcinoma and RCC reported in the literature.[4]

Collision metastasis is defined as two histologically distinct malignant neoplasms appearing simultaneously within the same organ "colliding" with one another from separate topographical primaries.[4] We present a case report of metastasis of RCC and prostatic adenocarcinoma to a retroperitoneal lymph node in a 50-year-old male.

2. Case report

A 50-year-old non-smoker male with end stage renal disease since age 17, currently on hemodialysis, received a CT scan during workup for his third renal transplant. The CT incidentally showed an enhancing left renal mass in the upper pole measuring 2.8 × 2.7 × 2.4cm and a concerning mixed cystic and calcified left retroperitoneal lymph node, concerning for metastatic lymphadenopathy, which was favored to be secondary to the renal mass. He has a history of prostate adenocarcinoma, Gleason score 7 (3 + 4), grade group 2, stage pT2cNxMx for which he underwent robotic assisted laparoscopic prostatectomy eight years previously, as well as salvage external beam radiation. Prostatic specific antigen (PSA) surveillance shows a slow uptrend from 0.3 to 0.89 over the preceding 18 months. Left radical nephrectomy and retroperitoneal lymph node dissection revealed RCC of variable morphology with features of acquired cystic disease (ACD) associated renal cell carcinoma within the kidney, and metastatic RCC and prostatic adenocarcinoma within the same retroperitoneal lymph node.

Hematoxylin and eosin-stained sections of the left kidney showed RCC with variable features. In additional to papillary RCC and clear cell RCC like areas, much of the tumor showed variably sized cystic spaces including sieve-like areas, cells with abundant eosinophilic cytoplasm, large nuclei with prominent nucleoli, and numerous intratumoral crystals (Figs. 1 and 2). No rhabdoid or sarcomatoid features were identified. The tumor was positive for Pax-8 and CK7. The separate retroperitoneal mass showed lymph node parenchyma involved by large areas of

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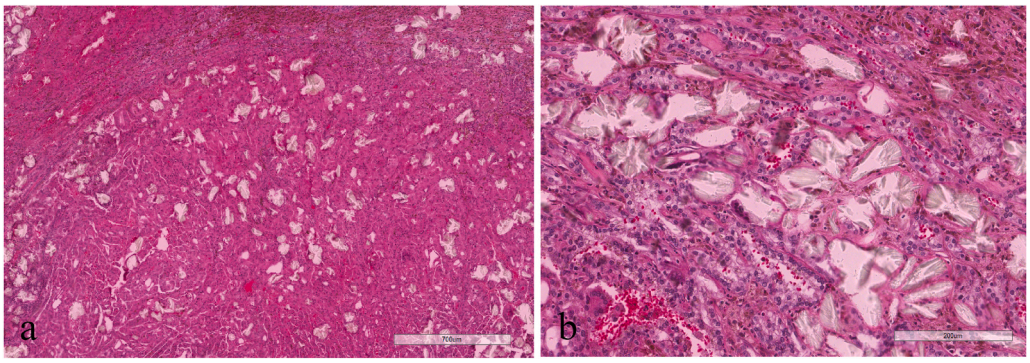

Fig. 1. Representative section of the left kidney shows ACD-associated RCC. a) H&E 40X microcystic spaces and oxalate crystals. b) H&E 100X shows cells with abundant eosinophilic cytoplasm, large nuclei and prominent nucleoli. Also, intra- and inter-cytoplasmic sieve-like areas can be seen.

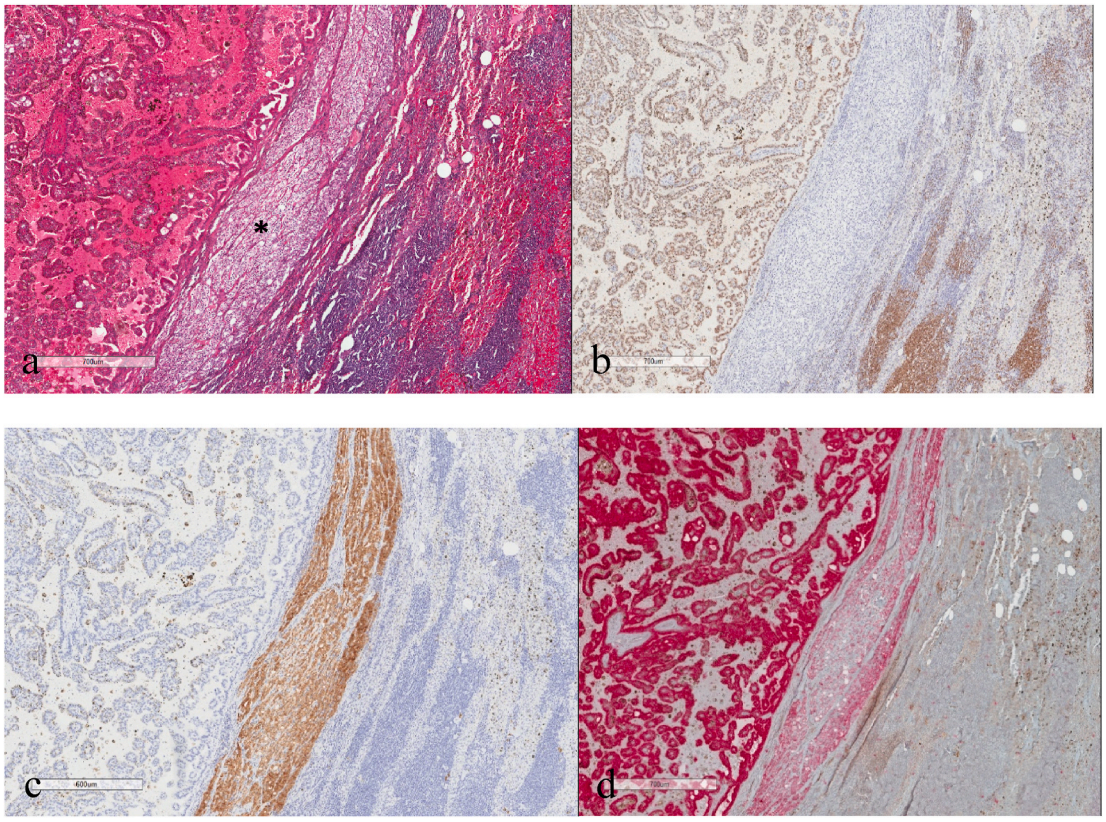

Fig. 2. Retroperitoneal lymph node with a collision metastasis of renal cell carcinoma and prostate adenocarcinoma. On H & E, x40 (a), the lymph node shows RCC involvement in the top left with an area clear cell change in the center (*) which had high power features of prostatic adenocarcinoma. The collision metastasis is highlighted by immunopositivity for PAX8 in the RCC (b), PSA for prostate adenocarcinoma (C), and racemase (AMACR) for both (d).

morphologically similar RCC. However, adjacent to the RCC within the same lymph node were small foci of glands and cords of smaller cells with clear to light pink cytoplasm. Given the patient's history, additional immunohistochemical stains were performed. The RCC was again positive for Pax-8 and was also positive for racemase (AMACR). The separate foci were positive for AMACR as well as prostate specific antigen (PSA). This confirmed the presence of metastatic prostate cancer in the same lymph node as the metastatic RCC. The patient was referred to hematology oncology for adjuvant treatment while continuing to be followed by urology.

3. Discussion

The pathologic definition of a collision metastasis has been defined with variation by multiple authors. Consensus includes separate and distinct histologic pattern of a topographically different origin, with different cell origins, and a location abutting one another. In general, the definition differs on whether a transitional pattern is allowed at the site of collision of mixed structure, as that could suggest a composite tumor.[4] The collision metastasis found within the patient portrays distinct borders with histologic staining providing evidence of true collision metastasis.

Multiple theories have been postulated for the mechanism behind the occurrence of a collision metastasis. (1) The meeting of two primary tumors by chance, with the possibility of a prior exposure or stimuli that sparked change in the two primary malignancy locations. (2) The alteration of a microenvironment by the first tumor for which the second primary tumor is drawn. (3) A pluripotent stem cell that provides a

source for the differentiation into separate malignancies that collide. (4) Concurrent growth of separate cell lines within the same organ.[3,4] The patient's history of prostatic adenocarcinoma begs the question of an alteration of a microenvironment from the recurrence of prostate cancer; however, the retroperitoneal lymph node in question is not a common location for prostate cancer to metastasize. The chance meeting of two primary tumors is also a possibility, as was hypothesized by Vyas et al. due to the high vascularity of RCCs and the minute volume received by the kidneys.[4] Our case differs from Vyas et al. with the collision metastasis in a lymph node rather than the kidney. The obturator, hypogastric, and external iliac nodes are the most common lymph nodes for metastasis of prostatic adenocarcinoma. For RCC para-aortic and paracaval lymph nodes are common locations for metastasis.[3] The collision metastasis in question aligned with the metastatic pattern of RCC.

As previously stated, RCC commonly presents with a second primary cancer; the incidence reaching 26.8%.[2,3] After a radical prostatectomy, biochemical reoccurrence is defined as a PSA of >0.2ng/mL, with 20–40% of patients experiencing such 10 years post-surgery. Of those with biochemical reoccurrence, 24–34% experience clinical manifestations, such as metastasis.[5] Our patient was suspected to have metastasis to the retroperitoneal lymph node with RCC as the primary malignancy. However, with the use of immunohistochemistry prostatic metastasis was revealed, which is supported by the rise in PSA from 0.3 to 0.89.

4. Conclusion

RCC and prostatic carcinoma occurring simultaneously is not uncommon. The collision metastasis of both primary malignancies is a rare phenomenon. With evaluation of a lymph node thought to be metastasis of one primary, it is important to keep a high index of suspicion for collision metastasis with variation in histologic features. Immunohistochemistry allows for confirmation if the suspected lymph node appears to be a collision metastasis. The importance is illustrated by our patient thought to only have RCC but shown to concurrently have prostate cancer and RCC through a collision metastasis to a retroperitoneal lymph node.

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Declaration of Competing Interest

There are no conflicts of interest.

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