Oncology

An unusual case report of pulmonary adenoid cystic carcinoma metastasis to the kidney. Case report and literature review

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\textbf{A B S T R A C T}

Adenoid cystic carcinoma (ACC) is a malignant neoplasm, frequently affecting the salivary glands, and rarely occurring in other locations. ACC is characterized by slow growth, perineural invasion, local and late recurrence after original treatment. However, renal metastasis of ACC is very rare. To our best knowledge, only 11 cases of ACC metastasis to the kidney have been reported in the English literature to date. Herein, we presented a rare case of a 70-year-old man with renal metastasis from ACC of the right lung after 3 years of primary presentation. Our patient underwent right radical nephrectomy and histologically confirmed as Metastatic Adenoid Cystic Carcinoma.

\textbf{Introduction}

Adenoid cystic carcinoma (ACC) constitutes approximately 10% of all tumors of the salivary gland, accounting for less than 1% of all malignant tumors of the head and neck. It is slightly more common in females, occurs in the sixth decade of life and is usually found in the major salivary glands. However, other sites such as minor salivary glands and Sino nasal tract can be involved. Adenoid cystic carcinoma has a lengthy clinical course with both local recurrence and late metastasis. ACC tends to metastasize to the lungs, bones, liver and brain. However, ACC metastasis to the kidney is extremely rare.\textsuperscript{1} Herein, we present such a case in a man with renal metastasis of ACC to improve awareness of this extremely rare occurrence and to avoid misdiagnosis as primary renal neoplasm.

\textbf{Case presentation}

A 70-year-old man presented to our hospital with a history of right flank pain and hematuria. He had medical history of adenoid cystic carcinoma of the lung three years ago, treated with right pneumonectomy as well as adjuvant fractionated radiotherapy. Computed tomography (CT) scan of the abdomen and pelvis was performed and revealed a 1.3 cm hypodense renal lesion in the right upper pole that was suspicious for neoplasm (Fig. 1a). A subsequent magnetic resonance imaging study showed a 1.6 cm cortical based solid renal lesion in the right upper pole and two similar lesions were also seen in the right lower pole (0.7 and 0.6 cm) (Fig. 1b). The largest tumor was biopsied, and showed cells arranged in solid and tubular growth patterns. The cells were small with scant cytoplasm and small angular normochromic nuclei. The tumor was morphologically similar to the previous lung adenoid cystic carcinoma (Fig. 2a). Immunohistochemically studies were performed using anti-CD117, anti-P63, anti-C7K, anti-PAX8, anti-RCC, anti-WT1, anti-CK18, anti-CK20 and anti-GATA3 (Ventana: pre-diluted). The epithelial cells showed positivity for CD117 and CK7, and the myoepithelial cells showed positivity for P63. In contrast to PAX 8, RCC, WT-1, CK18, CK20 and GATA3 which were negative. The findings were consistent with metastatic adenoid cystic carcinoma.

A right nephrectomy was performed and revealed three well-circumscribed white/grey solid lesions, confined to the renal parenchyma. The largest lesion measured 1.8 × 1.8 × 1 cm, located at the upper pole. The other two lesions were present at lower pole (1.5 and 1 cm in their greatest dimensions). Microscopic examination of the masses showed similar histological findings to the previous biopsy (Fig. 2b). The patient is currently alive without disease at 6 months of follow-up.

\textbf{Discussion}

Adenoid cystic carcinoma is a relatively uncommon neoplasm, most frequently involving salivary glands, and accounting for approximately 10% of all tumors of the salivary glands. Although most commonly observed in salivary glands,\textsuperscript{2} ACC also can rarely arise in nose, sinuses, palate, tongue, nasopharynx, lacrimal gland, bronchus, lung, breast, skin, esophagus, vulva, cervix and prostate.\textsuperscript{3} ACC presents in a wide-spread age distribution with slight sex predilection, female to male ratio of 3:2. ACC is characterized by an indolent clinical course and has a
tendency for delayed recurrence and metastasis after initial treatment.\(^3\) Thus, long-term follow-up is necessary. Histologically, ACC consists of two main cell types, including ductal and modified myoepithelial cells, and the two different cell populations are essential histopathological features for the diagnosis of ACC.\(^4\) There are three morphologic patterns of ACC: tubular, cribriform and solid. Each of these forms can be observed as the dominant component or more commonly as a part of a composite tumor. The stroma within the tumor is generally hyalinized and may manifest mucinous or myxoid features. Immunohistochemically, ductal cells are mainly positive for EMA, CK7, CEA and CD117, while myoepithelial cells are mainly positive for P63, SMA, Calponin, S-100, CK5/6, SMA. Immunohistochemically stains can highlight two different tumor cells differentiation, which provide an important clue for the diagnosis and differential diagnosis of ACC. The solid variant of papillary renal cell carcinoma is a major histological mimicker of adenoid cystic carcinoma and thus distinguishing them could be challenging. Immunohistochemical expression of PAX8 and PAX2 has greatly contributed in solving this dilemma. ACC characteristically shows infiltrative growth and perineural invasion, and tends to metastasize to the lungs, bones, liver and brain.\(^5\) Nevertheless, kidney metastasis of ACC is extremely rare. In 1984, Ladefoged et al.\(^5\) first described metastatic ACC of the kidney, 23 years after right pneumonectomy for ACC of lung.\(^5\) To our knowledge, only 11 cases of ACC metastatic to the kidney have been described in detail in the English literature to date. (Table). The clinicopathologic features of the 12 cases including our case were summarized in Table 1. It seems that renal metastasis from ACC is more likely to occur in female. Among 12 cases, the most common primary tumor site was lung, followed by breast and lacrimal gland. To date, surgery and radiotherapy are major treatment for primary ACC developed at any site. Five cases underwent surgical treatment for primary tumors, 4 cases (including our case) treated with surgical resection and radiotherapy, 2 cases underwent surgical resection, radiotherapy and chemotherapy, and 1 case only received chemotherapy. Moreover, 11 cases have developed kidney metastasis. Up to now, surgery is the main treatment method for ACC metastasis to the kidney. In our patient in last follow up is no clinical evidence of local recurrence or new metastasis at 24 months after left radical nephrectomy, and the present patient is still being followed up.

**Conclusion**

We report a case of renal metastasis of ACC after 3 years of right pneumonectomy. The patient was presented with multiple metastatic lesions in the lower and upper pole of right kidney. ACC may mimic primary renal tumor particularly solid variant of papillary renal cell carcinoma. Therefore, clinical history as well as ancillary study is of great help in resolving such cases. Since metastasis may occur years after resection of the primary ACC, lifelong follow-up is recommended.

**Appendix A. Supplementary data**

Supplementary data to this article can be found online at https://
Table 1

Clinical and Pathological features of ACC cases metastatic to the kidney.

| Reference | Age/sex | Clinical features | Primary tumor location/Size (cm) | Treatment of primary tumor | Kidney metastasis time (Yrs) | Metastatic tumor location/Size (cm) | Treatment of metastatic tumor |
|-----------|---------|-------------------|-------------------------------|---------------------------|-----------------------------|-----------------------------------|-----------------------------|
| Ladefoged C et al. | 47 M | Hematuria | between the middle and the lower lung lobe/not reported | Right Pneumonectomy | 23 | Left kidney/9.0 cm | Radical nephrectomy |
| Herzberg A et al. | 57 F | Gross Hematuria | Breast/1.5 cm | Modified radical mastectomy | 12 | Right kidney/6.0 cm | Radical nephrectomy |
| Blochle C et al. | 58 F | Incidental | Left lacrimal gland/not reported | Excision + Radiotherapy | 1 | Intracranial metastases: 1 = intracranial metastases; 2 = lung metastases; 22 = liver and kidney metastases | |
| Manoharan M et al. | 76 F | Abdominal pain, hematuria and frequency | Breast/1.8 cm | Mastectomy | 5 | Right flank pain | Not mentioned |
| Vranić S et al. | 71 F | Not mentioned | Right flank pain | Right hemimaxillectomy, chemotherapy and radiotherapy | 8 | Right flank pain; right upper pole of the right kidney/6.0 cm | Not mentioned |
| Goyal J et al. | 70 M | Hematuria and flank pain | Breast/1.8 cm | Surgical resection, chemotherapy and radiotherapy | 7 | Right flank pain; right upper pole of the right kidney/6.0 cm | Not mentioned |
| Our case | 70 M | Gross hematuria and flank pain | Right upper lobe of the right lung/not reported | Surgical resection radiotherapy | 3 | Lower pole of the right kidney/2.5 cm | Not mentioned |

M = Male, F = Female, ANED = Alive with no evidence of disease.

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