Case Report

Mucinous Tubular and Spindle Cell Carcinoma of the Kidney with Sarcomatoid Differentiation

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Abstract: We report a unique case of mucinous tubular and spindle cell carcinoma (MTSC) of the kidney with extensive sarcomatoid differentiation, multiple metastases, and a rapidly fatal clinical course. The patient presented with back pain and a pathologic L1 fracture. Diagnostic imaging revealed a large retroperitoneal mass arising from the left kidney and compressing the spinal cord. Radiotherapy and surgery were performed, but the patient died from disease progression three weeks postoperatively. MTSC is a recently recognized entity that is considered to be a low-grade carcinoma with a favorable prognosis. Our case demonstrates that although MTSC is usually a low-grade carcinoma, sarcomatoid differentiation may occur and lead to a fatal course, as in all other types of renal cell carcinomas. Adequate sampling and the exclusion of sarcomatoid differentiation in the spindle cell component are necessary for proper management and prognostication. To our knowledge, this is the first reported case of MTSC with sarcomatoid differentiation and a fatal outcome.

Key Words: mucinous tubular and spindle cell carcinoma, sarcomatoid differentiation, renal cell carcinoma, renal tumor

Introduction

Mucinous tubular and spindle cell carcinoma (MTSC) of the kidney is a recently recognized entity of renal cell carcinoma. It was first described in 1998 and previously classified in the category “renal cell carcinoma, unclassified” [4]. Histologically, these tumors consist of cuboidal and spindle cells with low grade nuclei and a mucinous extracellular matrix. Their resemblance to tubules of the lower nephron or loop of Henle and low-grade appearance has resulted in several different names referring to this morphology [7, 8, 11, 13, 14]. The recent World Health Organization (WHO) classification of renal tumors officially included mucinous tubular and spindle cell carcinoma as a separate category [17]. This tumor is considered to be a low-grade carcinoma having a favorable prognosis, with only two cases reported to have regional lymph node metastasis. Here we report an unusual case of MTSC of the kidney with extensive sarcomatoid differentiation (SD), multiple metastases and a rapidly fatal clinical course.

Clinical History

A 64-year-old female presented with back pain unresponsive to muscle relaxants that led to radiological examination, which revealed an L1 fracture. Because of an acute increase of back pain and lower extremity weakness, an orthopedic consultation was subsequently obtained. Magnetic resonance imaging revealed a large mass in the retroperitoneum arising from the left kidney and compressing the spinal cord. Two other lesions were identified in the thoracic vertebral bodies. The patient received high-dose steroids with minimal neurological response and underwent a CT-guided biopsy of the mass. The patient then received radiotherapy for five days followed by tumor embolization and a radical nephrectomy with vertebral body resection. Follow up imaging studies revealed additional vertebral body lesions, a parietal bone lesion, liver lesions, and possible malignant pleural...
effusions. There was no further therapeutic intervention and the patient expired three weeks after the surgery.

### Table 1 Immunohistochemical results

<table>
<thead>
<tr>
<th>Antibodies</th>
<th>MTSC</th>
<th>Sarcomatoid</th>
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<tbody>
<tr>
<td>Pancytokeratin</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>Cytokeratin 5/6</td>
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<td>Negative</td>
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<tr>
<td>Cytokeratin 7</td>
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<td>Negative</td>
</tr>
<tr>
<td>Cytokeratin 18</td>
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<td>Cytokeratin 20</td>
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</tr>
<tr>
<td>CD10</td>
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<td>Negative</td>
</tr>
<tr>
<td>Epithelial Membrane Antigen</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>Alpha-methylacyl-CoA racemase</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>Vimentin</td>
<td>Positive</td>
<td>Positive</td>
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</table>

### Pathologic Findings

The specimen received consists of a left kidney with a 15 x 11.5 x 10.5 cm tumor arising in the upper pole and extending into the perirenal fat but without involvement of Gerota’s fascia. The calyces and pelvis, along with the ureter are not involved by the tumor. The tumor is mostly necrotic on sectioning with some viable tan-yellow glistening soft areas and tan-white firm nodular zones.

Histologically, the tumor consists of cords and tubules of cuboidal cells with low-grade nuclear features, and areas of spindle cell configuration, which are separated by a mucinous stroma (Figure 1A). A prominent component of SD is also present with large pleomorphic cells and high-grade nuclei (Figure 1B), which comprises more than 50% of the viable tumor. No vascular invasion is identified. A metastatic nodule, measuring 0.3 x 0.2 cm, is identified in the accompanying adrenal gland. This metastatic nodule consists of atypical pleomorphic cells with high nuclear to cytoplasmic ratio, morphologically similar to the sarcomatoid component of the renal tumor.

Immunohistochemical study shows that the tumor cells are positive for pancytokeratin, vimentin, CD10, cytokeratin 7 (Figure 1C), cytokeratins 18 and 19, epithelial membrane antigen, and alpha-methylacyl-CoA racemase or P504s (AMACR; Figure 1D). They are negative for cytokeratins 5/6 and 20. The tumor cells with SD are positive for pancytokeratin, cytokeratins 18 and 19, and vimentin; but negative for cytokeratins 5/6, 7 and 20, CD10, epithelial membrane antigen, and AMACR. The immunohistochemical profile is summarized in Table 1. The adrenal nodule stained positive for cytokeratin cocktail and negative for neuroendocrine markers (CD56, chromogranin A). The morphologic appearance and immunohistochemical profile are consistent with a diagnosis of mucinous tubular and spindle cell carcinoma of the kidney with extensive sarcomatoid differentiation and metastasis to the ipsilateral adrenal gland.

### Discussion

Mucinous tubular and spindle cell carcinoma of the kidney was initially described in 1998 by He et al [7] as an “unclassified renal cell carcinoma with histology mimicking lower-nephron nephrogenesis”. Subsequent reports describing a renal tumor with similar clinical, histological and immunohistochemical features gave different appellations to this group of tumors, such as “low-grade renal cell carcinoma arising from the lower nephron”, “low-grade myxoid renal epithelial neoplasms with distal nephron differentiation”, and “spindle and cuboidal renal cell carcinoma” [8, 11, 13, 14]. The common findings in the initial 22 reported tumors led to the designation MTSC at the WHO consensus conference on
the classification of renal neoplasms in December, 2002 [4]. The 2004 WHO classification of renal tumors describes MTSC as low-grade tumors with a favorable prognosis, a wide age range (17-82 years) and a female preponderance [17]. Similar to other renal tumors, it typically presents as an asymptomatic mass, although flank pain and hematuria may occur. Since then these tumors have been well characterized and distinguished from other renal epithelial tumors by immunohistochemical and cytogenetic studies [2, 5, 14-16]. Fine et al [6] documented the histological spectrum of MTSC, describing several MTSCs with unusual features and absence of the typical abundant extracellular matrix, which they termed a “mucin-poor” variant of MTSC. MTSCs with focal neuroendocrine differentiation have also been reported, adding to the variety of subtypes associated with this entity [9]. Due to this abundance of histological variations, renal tumors with features of MTSC require careful histological examination and judicious use of immunohistochemical stains to exclude other histological types of renal cell carcinoma.

Figure 1. A. Mucinous tubular and spindle cell carcinoma of kidney. Tubules (T) of cuboidal cells with intermingling mucinous stroma and spindled cells (S). H&E, 100 x. B. Sarcomatoid differentiation of MTSC of the kidney. Sheets of disorganized, large pleomorphic cells with high grade nuclei. H&E, 40x. C. Cuboidal cells of MTSC showing positive staining for cytokeratin 7. CK7, 200 x. D. Cuboidal cells of MTSC showing positive staining for alpha-methylacyl-CoA racemase. P504s, 400 x.

Sarcomatoid differentiation has been recognized to arise in all types of renal cell carcinoma since the Heidelberg classification of renal cell tumors was published in 1997 [10]. The presence of SD in renal cell carcinoma represents high-grade transformation that has a deleterious effect on prognosis. Tumors containing SD have a decreased 5-year survival rate from 79% to 22% in stage-matched patient cohorts; tumors containing >50% SD have an even worse prognosis [3]. Therefore, the presence of SD is a harbinger of poor prognosis and must be reported in any types of renal cell carcinoma.

Our case is an unusual MTSC that presented with symptoms related to bone metastasis. The tumor also has SD on histological
examination that leads to a rapidly fatal outcome, a histological finding and clinical examination, which to our knowledge has not been reported in MTSC. The histological appearance of MTSC is similar to papillary renal cell carcinoma (PRCC), a tumor that can undergo SD, from which MTSC must be distinguished [12]. The presence of low-grade cuboidal cells in tubules and cord with intimately mixed areas of benign spindle cells is diagnostic in this case for MTSC. Likewise, the immunohistochemical profile of the tumor in our case is consistent with previously reported immunohistochemical characterization of MTSC and not PRCC [8, 12, 14, 16]. The areas of SD are markedly different from the spindle cell component of the MTSC portion of the tumor, both histologically and immunohistochemically, confirming that the spindle cell component seen is part of the MTSC and not the SD portion of the tumor. To date, all cases of MTSC were reported to carry a favorable prognosis with one case of local recurrence and two cases of regional lymph node metastasis [5, 7, 8, 11, 13, 14]. The poor outcome in our case is consistent with previous studies depicting a worse prognosis for renal carcinomas with SD, regardless of histological subtype [1, 3].

In summary, we report an atypical case of MTSC with extensive sarcomatoid differentiation, multiple bone and visceral metastases, and a rapidly fatal course in a 64 year old woman who presented with back pain. This is the first reported case of MTSC with sarcomatoid differentiation and a rapidly fatal course. The presence of spindle cells in MTSC may obfuscate the presence of small areas of SD, thereby requiring adequate sampling and careful histological examination of MTSC cases. It is essential that areas of atypical spindle cells, especially when associated with necrosis should be reported and the possibility of SD considered. The presence of SD in MTSC indicates a poor prognosis and requires a close follow up with further clinical and radiological studies to exclude possible metastatic disease.

References


