Primary Renal Myxofibrosarcoma in a Woman: A Case Report and Literature Review

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Abstract

A 45-year-old previously healthy woman presented to our hospital with a right abdominal mass. Abdominal computed tomography (CT), magnetic resonance imaging, and bone scanning revealed a 15 cm × 10 cm × 14 cm, well-delineated, retroperitoneal tumor originating from the right kidney. No metastases detected. The patient underwent successful extirpation of the renal tumor. The tumor showed 50% necrosis without perirenal fat infiltration, and it was diagnosed as a high-grade (grade 3) myxofibrosarcoma without nodal positivity, according to the French Federation of Cancer Centers Sarcoma (FNCLCC) grading system. Tumor immunohistochemical staining revealed positive staining for CD34, Ki67, smooth muscle actin (SMA), and cluster of differentiation 68 (CD68), and negative staining for S100 protein, desmin, mast/stem cell growth factor receptor (c-kit), and melanoma marker antibody (HMB45). Three months post-surgery, follow-up CT revealed no new abdominal metastasis, and the patient is currently receiving routine follow-up without any additional systemic therapy. Myxofibrosarcoma of the kidney is an uncommon soft tissue tumor, and radical surgery is the treatment of choice. Long-term follow-up is recommended because of the tumor’s aggressive invasiveness and potential for distant metastasis.

Keywords: Kidney neoplasms; Retroperitoneal neoplasms; Ki-67 Antigen; Desmin

Case Description

A 45-year-old previously healthy woman presented with a right abdominal mass at our institution. Abdominal computed tomography (CT) showed a 15 cm × 10 cm × 14 cm, well delineated, retroperitoneal tumor, originating from the right kidney. Kidney MRI further confirmed the abdominal CT findings, and was suggestive of renal cell carcinoma.

Figure 1: Enhancing computed tomographic and magnetic resonance images of the tumor, (A) axial view (B) coronal view.
While no evidence of metastasis was found, abdominal CT revealed multiple uterine myomas (1.5 cm and 2.8 cm in size) and several small liver cysts. Chest CT showed no abnormal findings. Further bone scans revealed multiple suspicious abnormal bone uptakes in the 8th and 11th ribs. Additional radiography revealed degenerative findings (Figure 1). The patient underwent successful extirpation of the tumor and nodal dissection of suspiciously enlarged hilar and pericaval lymph nodes. Tumor invasion into the renal capsule was seen, but without perirenal fat infiltration. The mass was relatively well demarcated, but adhered to the kidney (Figure 2).

On sectioning, it appeared as a grayish white solid mass, with 50% necrosis nodular growth, and a prominent myxoid matrix (Figure 3A). Solid sheets and cellular fascicles of spindled and pleomorphic tumor cells were visible on histopathological examination (Figure 3B). The average mitotic count was seven per 50 high-powered fields, with no atypical mitotic figures. Immunohistochemical staining revealed positivity for CD34, Ki67, SMA, and CD68, and negativity for S100, desmin, c-kit, and HMB45 (Figure 4). A diagnosis of high-grade (grade 3) MFS without nodal positivity and with clear resection margin was made, according to the FNCLCC system. Follow-up CT 3 months post-surgery revealed no new abdominal or bony metastases. The patient is currently undergoing a routine surveillance protocol for renal cell carcinoma, without any additional systemic therapy.

Discussion

Myxofibrosarcoma is a mesenchymal tumor of fibroblastic origin characterized by a myxoid matrix, and was formerly described as a malignant fibrous histiocytoma. It is usually composed of a variety of spindled, pleomorphic, or sometimes focally epithelioid cells with variable mitotic activity [2]. This tumor constitutes a distinct clinicopathologic entity [5] included in the WHO classification of soft tissue tumors [8]. While MFSs of the visceral organs are uncommon, they have been reported to occur in the heart, the aorta, the thyroid gland, and the brain [2]. Urological MFS tumors of the penis, spermatic cord, kidneys, and prostate are also rare, and less than 30 cases have been reported in the period between 1970 and 2000 [1,5,7-9].

No specific genetic biomarkers exist for MFS, though cytogenetically multiple complex chromosomal aberrations are observed in most cases. A recent study of MFS tumors using next generation sequencing techniques showed intratumoral heterogeneity and mutations in the FGFR3, KIT, KDR, and TP53 genes [3]. Additionally, genetic analysis of cell lines established from MFSs revealed a mutation in the PTEN gene.
Immunohistochemical biomarkers have been used to characterize disease prognosis in previous studies of MFS. Reactivity for CD34 was observed in 38% of MFSs [10,11], supporting the fibroblastic nature of the neoplastic cells. Nuclear expression of B-cell lymphoma 2 (bcl2) and protein p53 serve as proliferative biomarkers, correlating with malignant transformation and aggressive behavior [2,12]. Overexpressed alpha-methylacyl-CoA racemase (AMACR) in MFS can be amplification-driven and is also associated with tumor aggressiveness [13]. Additionally, expression of CD99 has been reported in MFS [14].

For MFS, the most important differential diagnostic entities to be ruled out by immunohistochemistry include sarcomatoid squamous cell carcinoma (positive for cytokeratin, D5K5/6, and p63), and melanoma (positive for protein S100/SOX10) [10].

In the present case of localized MFS, immunohistochemical analysis revealed expression of CD34, Ki67, SMA, and CD68 biomarkers, while S100, desmin, c-kit, and HMB45 biomarkers were absent. Gross morphologic findings revealed a vaguely nodular growth pattern, and the presence of an abundant myxoid matrix. A prominent vascular pattern of elongated curvilinear small capillaries, fusiform, round or stellate tumor cells with indistinct cell margins and a striking inflammatory infiltrate especially around vessels and adjacent tumor cells was seen (Figure 3C). Pseudolipoblasts (cells with one large or multiple small cytoplasmic mucin-containing vacuoles) and giant cells with hyperchromatic atypical nuclei and acidophilic cytoplasm were prominent (Figure 3D). Tumor differentiation, mitotic activity, and focal areas of necrosis qualified our lesion as FNCLCC grade 3 MFS.

Prognostic stratification of malignant mesenchymal tumors is based on tumor size, surgical resection margins, and grade [6,11,15]. A local recurrence rate of 31% and a metastasis rate of 17% have been reported over the 3.5 years of follow-up post-surgery [16,17]. Lungs, bones, and lymph nodes are the most common metastatic sites of MFS [14,16,18]. Radical surgical eradication of the tumor with sufficient resection of surrounding margins is the recommended treatment option for MFS. Surgery combined with radiotherapy should be considered for all patients diagnosed with grade 2 or grade 3 MFS [18]. Chemotherapy with doxorubicin and ifosfamide has been used in cases of tumor recurrence. MFSs have a better 5-year overall survival rate of 61% than other types of sarcoma [16,18]. In conclusion, we present a rare case of a retroperitoneal MFS in a middle-aged woman, with histopathological and immunohistochemical findings, to help differential diagnosis in future cases. A long-term follow-up plan is recommended due to the high recurrence rate and potential for metastasis in this tumor type.

Ethics Statement
All study protocols conformed to the ethical guidelines of the "World Medical Association Declaration of Helsinki–Ethical Principles for Medical Research Involving Human Subjects". Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the journal editor. This case report has been granted an exemption of IRB approval from the ethics committee of the IRB in the National Cancer Center.

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Author Contributions
Park WS, Park SY, Lee JH carried out the histopathology and Immunohistochemical analysis. "Sung Han Kim" and "Yoon Seok Suh" are equally contributed for the manuscript as first authors. Chung JS, Park WS, Kim SH, Suh YS conceived of the study, participated in its design and coordination, and helped draft the manuscript. Chung JS and Kim SH carried out the surgery. Suh YS and Kim JK collected all the data. All authors have read and approved the final manuscript.

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