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Preoperative Diagnosis of Solitary Fibrous Tumor of the Kidney with Percutaneous Fine Needle Biopsy and Management with Laparoscopic Partial Nephrectomy: One Case Report and Literatures Review

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Introduction

Solitary fibrous tumor (SFT) of the kidney is a rare spindle cell neoplasm and all reported SFTs of the kidney were diagnosed through pathological examination and immunohistochemical study after open nephrectomy or open radical nephrectomy[1-3]. We present a case of SFT of the kidney diagnosed through fine needle core biopsy preoperatively in a 50-year-old female and managed with laparoscopic partial nephrectomy. Due to the difficulty in discriminating between malignant and benign growth pattern of this tumor entity, a regular follow-up after conservative treatment is mandatory.

Case Report

A 50-year-old female presented with a 3-month history of right lumbodynia, without gross hematuria. Physical examination and laboratory findings were unremarkable. Abdominal ultrasonography demonstrated a hypoechoic mass measured approximately 3.0 cm in diameter in the right kidney. A computed tomography scan of the abdomen and pelvis revealed a 3.0 cm × 2.8 cm mass in the mid pole of right kidney which showed no apparent encontrastment (Fig.1). The patient underwent IVU (intravenous urogram) which was noncontributory. There is no local invasion or lymphadenopathy was identified.

The patient was in prone position and under local anesthesia of the track for fine needle biopsy. Percutaneous biopsy was performed with ultrasound guidance using an 18 gauge needle allowing three 1.5 cm × 0.1 cm cores to be obtained. Histopathological evaluation of the cores was performed with hematoxylin and eosin staining after the cores were fixed by formalin and embedded in paraffin. Microscopic evaluation revealed a variably cellular neoplasm composed of a proliferation of bland spindle cells. The appearance varied from a storiform pattern to regions with parallel bundles of collagen fibers with areas reminiscent of a "patternless pattern." The neoplasm was infiltrated by patchy lymphocytes and histiocytes. Hemorrhage, mitotic activity, and necrosis were not present (Fig.2). Immunoperoxidase staining for CD34 staining was strongly and diffusely positive (Fig.3). Immunostains directed against CD99, Bcl-2, and vimentin were also positive. Immunoreactivity for S100, desmin, α smooth

muscle actin, HMB45, and cytokeratin were negative.

Preoperative histopathological examination and immunohistochemical analysis of biopsy cores along with computed tomographic findings confirmed the diagnosis of SFT. Subsequently, laparoscopic right partial nephrectomy was performed. The retroperitoneal laparoscopic nephron-sparing procedure using the harmonic scalpel (Ethicon Endo-Surgery, Johnson & Johnson, Cincinnati, Ohio) was previously described by zhang et al.[4] and the patient underwent wedge resection of the tumor. All surgical margins were negative. No violation of the collection system was apparent, but as a precaution, a closed-suction perinephric drain was placed. The postoperative course was uneventful, and the patient was discharged on the third postoperative day. The histopathological diagnoses established from surgically resected tissue and biopsy specimens were identical. At the last examination, 22 months after the operation, she had no evidence of disease recurrence on strict follow-up.

Discussion

The SFT as an unusual spindle cell neoplasm of adults was first described in 1931[5]. It generally involves the serosal surface, especially the pleura-based intrathoracic regions. However, extrathoracic SFTs that occurred in the meninges, orbit, upper respiratory tract, salivary glands, thyroid, peritoneum, liver, spleen, retroperitoneum, pelvis, and urogenital organs have been reported in recent years[6]. SFTs of the kidney are exceptional, only 20 cases have been reported to date[1-3].

Reported renal SFTs in the literature have an age distribution ranging from 33 to 85 years, with the majority found in patients more than 50 years old, similar to that reported for renal cell carcinoma. The ratio of male to female appears to be nearly equal (1.5:1)[1,6]. The tumors measured approximately 2.0 cm to 25.0 cm in diameter (mean, 8.9 cm). Presented symptoms for SFTs of the kidney are nonspecific and most commonly include abdominal/flank pain, asymptomatic hematuria, or both. Laboratory findings are usually unremarkable. In one case report, the patient had been asymptomatic for 2 years before resection[2].

Computed tomography and magnetic resonance imaging often reveals a well-delineated, encapsulated tumor of the kidney that presented no or slight enhancement with contrast medium[7]. A key consideration in the differential diagnosis of an enhancing renal mass is renal cell carcinoma. However, there was no evidence of necrosis within the mass on computed tomography and magnetic resonance images despite a large size. Areas of necrosis or degradation would be expected in a renal cell carcinoma of this size. SFTs seem to be able to grow to large sizes without developing necrosis or degradation, even though the histologic appearance of SFTs is very variable[8]. Also, the lack of collateral vessels around the lesion is atypical for renal cell carcinomas. Furthermore, the absence of enlarged lymph nodes in our patient suggested it be a benign tumor. In the studies of SFTs of the kidney, no reports showed enlarged lymph nodes or local invasion, even though some of them were in larger sizes compared with those in the patient of our study.

All SFTs of the kidney reported are verified through pathological exmination and immunohistochemical stains after open nephrectomy or radical nephrectomy. Gelb et al.[3] reported that a 48-year-old woman with an SFT involving the right renal capsule underwent multiple biopsies at the referring site and the results were negative. Durand et al.[9] has reported CT-guided needle biopsy on SFT was also non-diagnostic. However, it is crucial to consider SFTs in the kidney preoperatively, because they are usually misdiagnosed as renal cell carcinoma and the confirmation of SFT may be an indication for attempting nephron-sparing surgery which may minimize morbidity, shorten convalescence, and improve cosmesis.

Even thinking of the potential risks such as tumor cell seeding, bleeding or infection, fine needle core biopsy of solid renal masses may be an important diagnostic tool especially in small renal tumors because of the comparatively high incidence of benign lesions. Some investigators have reported a comparatively high sensitivity and specificity[10]. We performed ultrasound guided percutaneous fine needle core biopsy in this case and obtained three 1.5 cm × 0.1 cm tissue cores for histopathological evaluation and immunohistochemistry. The

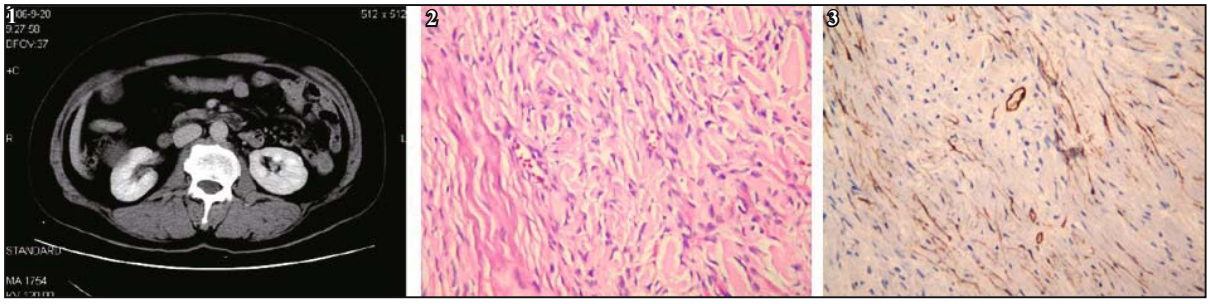

Fig.1. Demonstrating the absence of enhancement of the well-demarcated right renal mass (3.0 cm × 2.8 cm).
Fig.2. Microscopic evaluation revealing a variably cellular neoplasm composed of a proliferation of bland spindle cells (H&E stain, × 200).
Fig.3.The tumor cells stained diffusely and strongly for CD34 (original magnification × 200).

combined clinical and pathological findings in this case were most consistent with the features of SFT described in the literature. SFTs are characterized by spindle cell proliferation showing a storiform patten or patternless architecture with a combination of alternating hypocellular and hypercellular areas separated from each other by thick bands of hyalinized collagen and branching hemangiopericytoma-like vessels. They are typically immunoreactive for CD34, CD99, and vimentin and the majority are negative for S100, desmin, cytokeratin, and αsmooth muscle actin. Immunoreactivity for Bcl-2, when performed, was positive in all of the kidney SFT cases, including our report, suggesting that it may also be a sensitive marker for SFTs[6].

In cases of mesenchymal tumor of the kidney presenting with spindle-cell neoplasias, the differential diagnosis of SFT should be considered. It is strictly necessary-although sometimes difficult to clearly differentiate it from other malignant or benign entities such as sarcomatoid renal cell carcinoma, leiomyosarcoma, leiomyoma, angiomyolipoma, fibroma, or fibroepithelial polyps.

Sarcomatoid renal cell carcinoma must be taken in the differential diagnosis of renal SFT because of its frequency when compared with other entities, as well as its histologic features. Interwoven bundles of spindle cells exhibiting hemangiopericytoma-like growth may be seen in sarcomatoid renal cell carcinoma just as they are commonly seen in SFT. However, the absence of the usual renal cell carcinoma component and cytokeratin positivity help to rule out a sarcomatoid renal cell carcinoma.

Fibroepithelial polyps occur in younger patients, presenting with gross hematuria and have a fibrous stalk with a CD34-negative connective tissue core. Fibromas are often incidentally found at autopsy in the medulla and are composed of stromal cells staining negatively for CD34. Angiomyolipomas consist of variable amounts of fat, thick-walled vascular structures, and smooth muscle cells that are immunoreactive for smooth muscle markers (smooth muscle actin and desmin) and HMB-45, and negative for CD34. Strong, diffuse staining for muscle markers in smooth muscle–derived tumors (leiomyoma and leiomyosarcoma), along with a lack of CD34 immunoreactivity help to separate them from SFTs [11].

The histogenesis of SFT of the kidney is difficult to determine and remains controversial. Some reported cases of SFT of the kidney were proposed to arise from the renal capsule, renal pelvis, renal parenchyma, or peripelvic soft tissue. The prognosis of SFT is generally favorable, but cases with aggressive behavior tumors have been reported in 10% to 15% of intrathoracic SFTs and in up to 10% of extrathoracic SFTs[6]. Recently, Fine et al.[12] reported the first case of malignant renal SFT, likely representing transformation from a histologically documented benign SFT component. The 76-year-old patient underwent radical nephrectomy, and 4 months postoperation returned with multiple small nodules in lung consistent with metastases from the primary renal tumor. Therefore, complete resection with long-term follow-up and surveillance is warranted because of its unpredictable behavior especially when laparoscopic nephron-sparing surgery has been chosen. In summary, we have described a new case of SFT of the kidney, to our knowledge, the first case of SFT of the kidney confirmed by fine needle biopsy preoperatively and managed with laparoscopic nephron-sparing procedure. Long-term follow-up is needed to assess the outcomes of the treatment.

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