CASE REPORT

Solitary Fibrous Tumor of the Kidney Treated with Laparoscopic Partial Nephrectomy: A Case Report

Xing Chen, Jianfeng Wang*, Zhenshan Ding, Xiaofeng Zhou

Department of Urology, China-Japan Friendship Hospital, Beijing 100029, China

Key words: solitary fibrous tumor; kidney; laparoscopic partial nephrectomy

Abstract We herein reported a 27-year-old woman with a right renal mass for two years. She underwent laparoscopic partial nephrectomy. Immunohistochemical examination of the specimen confirmed the diagnosis of solitary fibrous tumor by revealing its positive staining for cluster of differentiation (CD)34, epithelial membrane antigen (EMA), B-cell lymphoma-2 (Bcl-2) and CD99 in the tumor cells. No adjuvant treatment was carried out. The patient was in good health without local recurrence or metastasis during 2 years of follow-up. Laparoscopic partial nephrectomy for renal solitary fibrous tumor is an alternative treatment to radical nephrectomy. It can provide a good outcome. However, further follow-up and more cases of renal solitary fibrous tumor treated with laparoscopic partial nephrectomy are necessary to compare the oncological outcome with radical nephrectomy.

A SOLITARY fibrous tumor (SFT) is a rare mesenchymal neoplasm. It is characterized by patternless proliferation of spindle cells. The final diagnosis is made by immunohistochemical examination.¹ Most frequently it originates from the pleura.² However, a number of diverse extrapleural originated SFT cases were reported.³⁻⁵ Less than 100 cases of SFTs occurred in the kidney have been reported in literature.⁵⁻⁸ Most of the cases were treated with radical nephrectomy. We present a case of SFT originated from the kidney and treated with lapa-

roscopic partial nephrectomy without autotransplantation.⁹

CASE DESCRIPTION

On August 21st, 2014, a 27-year-old woman was referred to our hospital for a solid mass centrally located in the right kidney accompanied with hydronephrosis, which had been found by ultrasonography since two years before. She presented none of the following abnormalities: flank pain, abdominal pain, hematuria, urgency, frequency or dysuria. Serum creatinine was 67.3 $\mu\text{mol/L}$. Intravenous pyelogram (IVP) revealed dilated right renal calyces and filling defect of renal pelvis (Fig. 1A). No tumor cell was seen in continuous three days urine cytology. Abdominal computed tomography (CT) showed an oval mass of 4 cm in long diameter with the clear border located between right renal artery and pelvis. The tumor was isodensity on non-enhanced CT scan (Fig. 1B) and enhanced heterogeneously in

Received for publication March 11, 2017. Published online: 2018-03-07.

*Corresponding author Tel: 86-10-84205133, E-mail: zryhy1@126.com

Cited this article as: Xing Chen, Jianfeng Wang, Zhenshan Ding, Xiaofeng Zhou. Solitary Fibrous Tumor of the Kidney Treated with Laparoscopic Partial Nephrectomy: A Case Report. Chinese Medical Sciences Journal 2018; 33(1): 64-68.

arterial phase (Fig. 1C), indicating it was a hypervascular tumor. The R.E.N.A.L. nephrometry score¹⁰ was 9 ph. No renal vein or inferior vena cava thrombosis was seen. No enlarged lymph nodes were found in the abdomen. Renal dynamic imaging examination showed that glomerular filtration rate of the right and left kidney was 47.69 ml/min and 47.52 ml/min, respectively. Rigid ureteroscopy did not detect any neoplasm in the right renal pelvis, except for the extruded wall of pelvis. Biopsy of renal pelvic mucosa at the extruded area did not find any tumor cells.

Combining all these examination results, we considered the diagnosis should be renal tumor, rather than pelvic tumor. We arranged retroperitoneal laparoscopic partial nephrectomy for her. Under general anesthesia, she was placed in the lateral decubitus position. Convention laparoscopic retroperitoneal approaches were applied with three trocars (12 mm trocar inserted in the posterior axillary line below twelfth costal margin, 10 mm trocar inserted subcostal in the anterior axillary line, and 10 mm trocar placed in the

midaxillary line 2 cm above the iliac spine). After incising the Gerota's fascia, the renal pedicle was dissected precisely. The kidney was fully mobilized and the renal tumor was explored. The tumor was capsule coated, located at the hilum, just close to the renal artery and pelvis. Half of the tumor was outside the kidney. We dissected the outside part of the tumor with ultrasonic harmonic scalpel (UHS) (SonoSurg, Olympus, Japan) at the extracapsular plane. Afterwards, the renal artery was clamped with bulldog clamp, and the inside part of the tumor was further excised with UHS (Fig. 2A). The tumor was en bloc resected with complete capsule (Fig. 2B). The bulldog clamp was disentangled after 10 minutes of artery occlusion. No hemorrhage was occurred, and no suture was applied. The renal tumor was removed with a laparoscopic specimen bag through the hole in the posterior axillary line. The total estimated blood loss was about 30 ml. The serum creatinine level 7 days after surgery was 78.4 $\mu\text{mol/L}$. She had an uneventful postoperative course.

Gross examination showed a 4 cm×3 cm×2.5 cm,

Figure 1. A. Intravenous pyelogram revealed dilated right renal calyces (black arrows) and filling defect of right renal pelvis (white arrow). B. Abdominal non-contrast CT showed an oval isodensity mass (white arrow) of 4 cm in long diameter with the clear border located between right renal artery and pelvis. C. Abdominal contrast enhanced CT showed the tumor (white arrow) was enhanced heterogeneously in arterial phase.

Figure 2. A. The inside part of the tumor (black arrow) was excised from the kidney (white arrow) after renal artery occlusion. *: renal artery. #: renal pelvis. B. The tumor (black arrow) was en bloc resected with complete capsule. White arrow: kidney. *: renal artery. C. Gross examination showed a 4 cm×3 cm×2.5 cm, capsule coated, pale, nodule-like, solid mass.

capsule coated, pale, nodule-like, solid mass (Fig. 2C). Microscopically, the neoplasm consisted of spindle-shaped cells with scant cytoplasm. Prominent hyalinized collagenous tissue was present. The tumor showed hemangiopericytomatous pattern (Fig. 3A). Immunohistochemical staining revealed it was positive for cluster of differentiation (CD) 34 (Fig. 3B), epithelial membrane antigen (EMA), CD99 (Fig. 3C) and B-cell lymphoma-2 (Bcl-2, Fig. 3D). Nevertheless, stainings for cytokeratin (CK), desmin, glial fibrillary acidic protein (GFAP), S-100 monoclonal, S-100 polyclonal, human melanoma black 45 (HMB45), melan-A, and α -smooth muscle actin were negative.

On account of the pathological and immunohistochemical features, the diagnosis of renal SFT was established. The patient did not receive any adjuvant therapy. After 2 years of follow-up, she was in good health with serum creatinine 69.2 $\mu\text{mol/L}$, and no local recurrence (Fig. 4) or metastasis had occurred.

DISCUSSION

SFT is an uncommon tumor comprising patternless spindle-shaped cells that might originate from fibroblast and primitive mesenchymal tissue.¹¹ It generally occurs from the pleura.² SFT of the kidney, which was first described by Gelb *et al*,¹² is extremely rare. Usuba *et al*⁵ reviewed 82 cases of renal SFT in 2016. The mean age was 52.8 (3-85) years old and the mean

mass size was 9.5 (2-29) cm. Most of the SFTs were incidentally detected by imaging examinations without obvious symptoms, similar to the case we presented. The remaining common clinical manifestations included flank pain, abdominal pain and gross hematuria. The patient who presented at our hospital had hydronephrosis due to the obstruction by the tumor, while no flank pain or pyonephrosis was accompanied.

The majority of SFTs of the kidneys are found by radiological examination. Renal SFTs are described as hyperechogenic or hypochoic masses with clear boundaries on ultrasonography.¹³ Non-enhanced CT scan shows well-circumscribed lobulated mass, and contrast enhanced CT scan reveals strong enhancement. However, these characteristics on CT scanning are nonspecific for renal SFT.⁷ This patient presented with renal mass and hydronephrosis. The subsequent IVP showed dilated right renal calyx and filling defect of renal pelvis, which reminded us whether the tumor was located in the renal parenchyma or renal pelvis. Therefore, the following rigid ureteroscopy was performed, but no neoplasm was seen in the pelvis. Biopsy of renal pelvis mucosa and urine cytology did not find any tumor cell. Combined with CT scan result, we considered that it was a kidney tumor, rather than pelvic tumor.

The golden standard therapeutic modality for renal SFT is complete resection of mass.¹ Of 82 cases of renal SFT reviewed by Usuba *et al*⁵, most of the patients underwent nephrectomy. Makris *et al*⁹ reported a

Figure 3. A. Microscopic picture of renal solitary fibrous tumor showed hemangiopericytomatous pattern. (HE, $\times 100$). B. Immunohistochemical staining was positive for CD34 (brown). ($\times 100$) C. Immunohistochemical staining was positive for CD99 (brown). ($\times 100$) D. Immunohistochemical staining was positive for Bcl-2 (brown). ($\times 100$)

Figure 4. Non-contrast CT scan after 2 years of follow-up showed no local recurrence.

case of centrally located renal SFT, undergoing partial nephrectomy and autotransplantation. The case we presented underwent laparoscopic partial nephrectomy without autotransplantation, though the tumor was centrally located at the renal hilus. After 2-year follow-up, her renal function almost restored to preoperative level, and no local recurrence or metastases occurred. Although there is no evidence to verify whether partial nephrectomy has the same oncological outcome as radical nephrectomy or not,¹ the subsequent persistent follow-up is needed.

Grossly, SFT of the kidney usually forms a well-defined pseudocapsule, and it is lobulated, rubbery or firm. The cut surface of the tumor exhibits homogeneous gray or tan-white.¹ The pseudocapsule of SFT of our case, as well as its relatively small size, made it feasible to be dissected and perform partial nephrectomy with negative surgical margin.

The kidney SFT is microscopically characterized by pattern-less spindle cell proliferation. It usually combines alternating hypocellular and hypercellular areas separated by thick bands of hyalinized and branching hemangiopericytoma-like vessels.¹⁴ The cancerous cells are featured by pleomorphism, increased cellularity and mitotic activity (more than 4 mitoses per 10 high power fields).¹

Immunohistochemical examination plays the key role in diagnosing the kidney SFT. SFT of the kidney is usually positive for CD34, Bcl-2 and CD99. Strong CD34 activity is currently regarded as a characteristic and indispensable diagnostic marker although it is not specific for SFT.¹⁵ The staining for epithelial membrane antigen and smooth muscle actin is positive in about 25% of renal SFTs, and immunostaining for S100 protein, cytokeratins and/or desmin is usually absent or

only focal and limited.¹⁵ All these immunohistochemical results are valuable in differential diagnosis of SFT from several epithelial and mesenchymal neoplasms.¹⁵

The majority of the kidney SFTs have benign biological behavior, while several malignant cases have been published.¹⁶ In our present case, no recurrence or metastasis were observed after 2-year follow-up. However, long term follow-up is still needed since metastasis can still happen even after more than 15 years.⁹

In conclusion, we report a case with SFT of the kidney undergoing laparoscopic partial nephrectomy without autotransplantation. After 2 years of follow-up, the patient was in good health without recurrence or metastasis. On account of the less of nephron sparing surgery carried out, further follow-up and more cases of renal SFTs treated with nephron sparing surgery are necessary to compare the oncological outcome with radical nephrectomy.

Conflicts of interest statement

The authors have no conflicts of interest to disclose.

REFERENCES

1. Kuroda N, Ohe C, Sakaida N, et al. Solitary fibrous tumor of the kidney with focus on clinical and pathobiological aspects. *Int J Clin Exp Pathol* 2014; 7(6):2737-42.
2. de Perrot M, Fischer S, Bründler MA, et al. Solitary fibrous tumors of the pleura. *Ann Thorac Surg* 2002; 74(1):285-93. doi: 10.1016/S0003-4975(01)03374-4.
3. Kayani B, Sharma A, Sewell MD, et al. A review of the surgical management of extrathoracic solitary fibrous tumors. *Am J Clin Oncol* 2016; 10. doi: 10.1097/COC.0000000000000348.
4. Chuang IC, Liao KC, Huang HY, et al. NAB2-STAT6 gene fusion and STAT6 immunorexpression in extra-thoracic solitary fibrous tumors: the association between fusion variants and locations. *Pathol Int* 2016; 66(5):288-96. doi: 10.1111/pin.12408.
5. Usuba W, Sasaki H, Yoshie H, et al. Solitary fibrous tumor of the kidney developing local recurrence. *Case Rep Urol* 2016; 2016:1-8. doi: 10.1155/2016/2426874.
6. Cuello J, Brugués R. Malignant solitary fibrous tumor of the kidney: report of the first case managed with interferon. *Case Rep Oncol Med* 2013; 2013:1-6. doi: 10.1155/2013/564980.
7. Khater N, Khaulil R, Shahait M, et al. Solitary fibrous

- tumors of the kidneys: presentation, evaluation, and treatment. *Urol Int* 2013; 91(4):373-83. doi: 10.1159/000354394.
8. Sasaki H, Kurihara T, Katsuoka Y, et al. Distant metastasis from benign solitary fibrous tumor of the kidney. *Case Rep Nephrol Urol* 2013; 3(1):1-8. doi: 10.1159/000346850.
 9. Makris A, Tabaza R, Brehmer B, et al. Solitary fibrous tumor of the kidney: a case report. *Can J Urol* 2009; 16(5):4854-6.
 10. Kutikov A, Uzzo RG. The R.E.N.A.L. nephrometry score: a comprehensive standardized system for quantitating renal tumor size, location and depth. *J Urol* 2009; 182(3):844-53. doi: 10.1016/j.juro.2009.05.035.
 11. Ide F, Obara K, Mishima K, et al. Ultrastructural spectrum of solitary fibrous tumor: a unique perivascular tumor with alternative lines of differentiation. *Virchows Arch* 2005; 446(6):646-52. doi: 10.1007/s00428-005-1261-z.
 12. Gelb AB, Simmons ML, Weidner N. Solitary fibrous tumor involving the renal capsule. *Am J Surg Pathol* 1996; 20(10):1288-95. doi: 10.1097/00000478-199610000-00016.
 13. Park SB, Park YS, Kim JK, et al. Solitary fibrous tumor of the genitourinary tract. *AJR Am J Roentgenol* 2011; 196(2):W132-7. doi: 10.2214/AJR.09.3787.
 14. Hirano D, Mashiko A, Murata Y, et al. A case of solitary fibrous tumor of the kidney: an immunohistochemical and ultrastructural study with a review of the literature. *Med Mol Morphol* 2009; 42(4):239-44. doi: 10.1007/s00795-009-0456-9.
 15. MacLennan GT, Cheng L. Solitary fibrous tumor of the kidney. *J Urol* 2009; 181(6):2731-2. doi: 10.1016/j.juro.2009.03.006.
 16. Wang H, Liao Q, Liao X, et al. A huge malignant solitary fibrous tumor of kidney: case report and review of the literature. *Diagn Pathol* 2014; 9:13. doi: 10.1186/1746-1596-9-13.