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Case Report

3D laparoscopic resection of renal venous aneurysms: a rare case report

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Abstract: Objective: Visceral venous aneurysms are very rare, especially in the kidney. The diagnosis of renal venous aneurysms is difficult. If complications such as thrombosis, embolism or rupture, there can be corresponding clinical symptoms. In severe cases, it can lead to the death of the patient. Endoscopic resection of renal venous aneurysms has not been reported in the literature. This paper preliminarily discusses the experience of laparoscopic resection of renal venous aneurysms. Methods: Recently, a patient with left retroperitoneal space occupying lesion was admitted to our hospital. More than a year ago, the patient was found to have left retroperitoneal space occupying lesion by CT plain scan, accompanied by occasional upper abdominal and precordial discomfort at night. After admission, enhanced CT showed that the size of the space occupying lesion was about 3.0×2.0×2.0 cm, adjacent to the left abdominal aorta, left renal artery and left renal vein. The space occupying density was similar to that of renal parenchyma in the unenhanced phase, whereas the enhancement was less pronounced in the arterial phase, more pronounced in the venous phase, and the attenuation was less pronounced in the delayed phase. After further refining the preoperative preparation, the surgical approach was "transabdominal 3D laparoscopic left retroperitoneal space occupying resection". Intraoperatively, a space occupying was found at the angle between the abdominal aorta and renal pedicle vessels, which were dark red, soft in quality and had a heavy adhesion to the renal artery. An atraumatic vascular clip was used to block the left renal artery, the gap between the free renal artery and the space occupying, and then the renal artery noninvasive vascular clip was loosened. Continuing free space occupying, we found that the space occupying originated from the left renal vein, gradually enlarged, terminated at the psoas muscle, and connected with the renal vein approximately 1 cm in width. Closely apposed renal veins were blocked with a vascular clip, clipped, and finally a complete resection space was taken. Results: The procedure was uneventful, without trauma to the surrounding tissue organs. After complete resection of retroperitoneal mass, the patient recovered well. No complications were found, and the discomfort symptoms disappeared. The pathological result was renal venous aneurysm, which was considered due to lumbar venous variation. Conclusion: No treatment modality for the endoscopic resection of renal venous aneurysms has been documented, and the previous treatment modalities were usually nephrectomy or intervention. This surgical procedure may be the first in the world and open a new way for the diagnosis and treatment of renal venous aneurysms.

Keywords: Resection of renal venous aneurysms, laparoscope, renal aneurysms

Introduction

Visceral venous aneurysms are extremely rare and renal venous aneurysms are the rarest of these [1]. Renal venous aneurysm is a hemangioma of renal vein. Due to the lack of specific clinical symptoms, the diagnosis of renal venous aneurysms is more difficult. Most cases are incidentally discovered during the physical examination by routine abdominal ultrasonography (US).

Venous aneurysms can be detected with color Doppler US, contrast-enhanced computed tomography (CT), and magnetic resonance (MR) imaging [2]. On us and CT, they usually demonstrate aneurysmal dilatation of vascular structures. On MR imaging, because the blood flow rate in venous aneurysms is very slow, the grading of signal intensity ("layered gadolinium sign") can be seen after taking gadolinium contrast agent [3].

No treatment modality has been documented for the endoscopic resection of renal venous aneurysms. We report a case of 3D laparoscopic resection of renal venous aneurysm, hoping to play a reference role in the diagnosis and

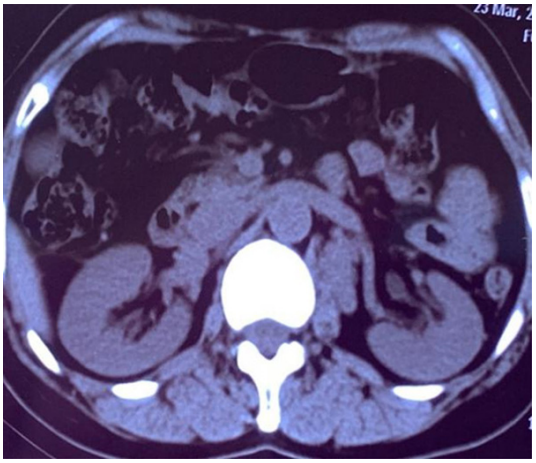

Figure 1. CT plain scan phase.

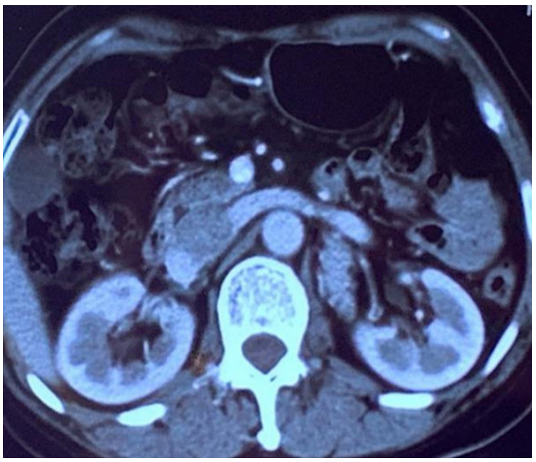

Figure 3. CT venous phase.

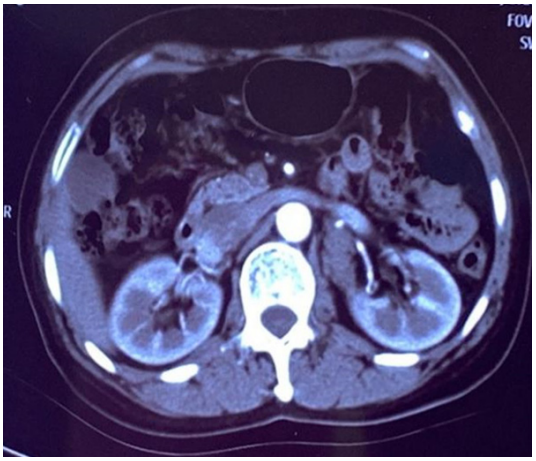

Figure 2. CT enhancement phase.

treatment of renal venous aneurysm in future clinical work.

Medical records

Clinical data

A 60-year-old woman was admitted to our hospital because of "physical examination revealed retroperitoneal mass for over a year". More than one year ago, during physical examination, the patient found retroperitoneal space occupying lesions on abdominal CT. There was no low back pain, no frequent urination, no urgency, no gross hematuria, and occasional upper abdominal and chest discomfort at night. During the period when the patient did not receive treatment, she was rechecked regularly. Recently, the patient requested surgical treatment and went to our hospital for abdominal CT examination: it indicated retroperitoneal space occupying lesions. And the outpatient was admitted to the hospital with "retroperitoneal mass". All vital signs were stable during the course of the disease, and specialist physical examination showed no positive findings. The enhanced CT found that the space occupying size was about 3.0×2.0×2.0 cm, which was immediately adjacent to the left abdominal aorta, left renal artery, left renal vein. The space occupying density was similar to that of renal parenchyma in the unenhanced phase (**Figure 1**), whereas the enhancement was less pronounced in the arterial phase (**Figure 2**), more pronounced in the venous phase (**Figure 3**), and the attenuation was less pronounced in the delayed phase (**Figure 4**).

Diagnosis and treatment process

The patient was admitted to the hospital to perfect the relevant examinations. The enhanced CT found that the space occupying size was about 3.0×2.0×2.0 cm, which was immediately adjacent to the left abdominal aorta, left renal artery, left renal vein. The space occupying density was similar to that of renal parenchyma in the unenhanced phase (**Figure 1**), whereas the enhancement was less pronounced in the arterial phase (**Figure 2**), more pronounced in the venous phase (**Figure 3**), and the attenuation was less pronounced in the delayed phase (**Figure 4**). So, it was considered as a renal hemangioma.

After further refining the preoperative preparation, the surgical approach was "transabdominal 3D laparoscopic left retroperitoneal space

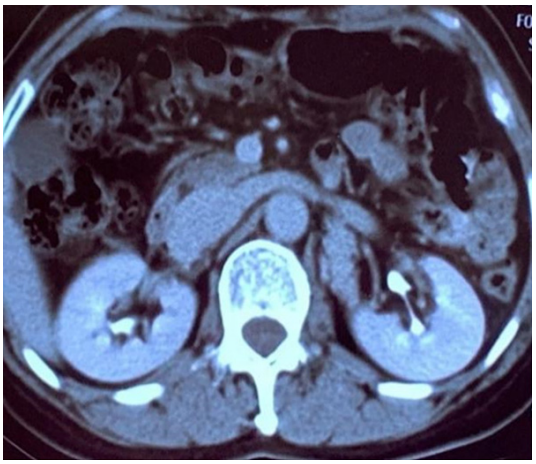

Figure 4. CT delay phase.

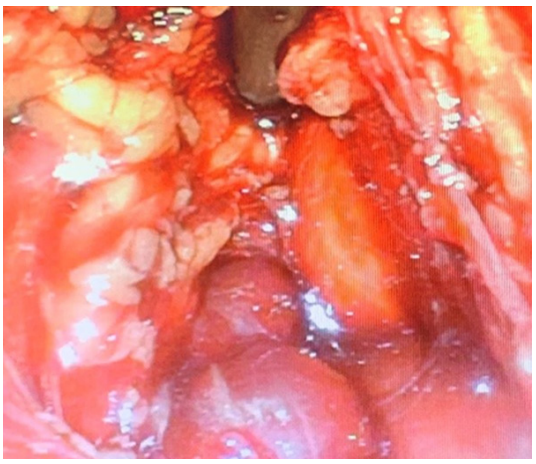

Figure 5. Intraoperative contour of irregular renal venous aneurysms.

occupying resection". Intraoperatively, a space occupying was found at the angle between the abdominal aorta and renal pedicle vessels, which were dark red, soft in quality and had a heavy adhesion to the renal artery (**Figure 5**). An atraumatic vascular clip was used to block the left renal artery, the gap between the free renal artery and the space occupying, and then the renal artery noninvasive vascular clip was loosened. Continuing free space occupying, we found that the space occupying originated from the left renal vein, gradually enlarged, terminated at the psoas muscle, and connected with the renal vein approximately 1 cm in width. Closely apposed renal veins were blocked with a vascular clip, clipped, and finally a complete resection space was taken (**Figure 6**). The operation went well, and the patient returned to the

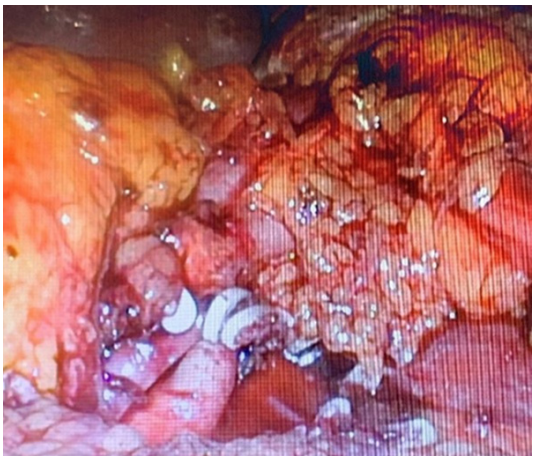

Figure 6. The renal vein after resection of the renal venous aneurysms.

ward in good condition. After the operation, she actively received anti-infection, analgesia and rehydration treatment.

Research method

By reviewing the examination, diagnosis, treatment and follow-up of the patient, combined with relevant literature reports, this paper summarizes the current situation of diagnosis and treatment of renal venous aneurysms, and discusses the laparoscopic resection of renal venous aneurysms.

Result

The procedure was uneventful, without trauma to the surrounding tissue organs. After complete resection of retroperitoneal mass, the patient recovered well. No complications were found, and the discomfort symptoms disappeared. The pathological result was renal venous aneurysm, which was considered due to lumbar venous variation (**Figure 7**).

Follow up

One and a half months after operation, CT reexamination showed that there was no obvious abnormality in the left renal vein (**Figure 8**).

Discussion

Visceral venous aneurysms have rarely been reported. A recent study identified a total of 198, including all available English and French literature, of which only six cases of renal

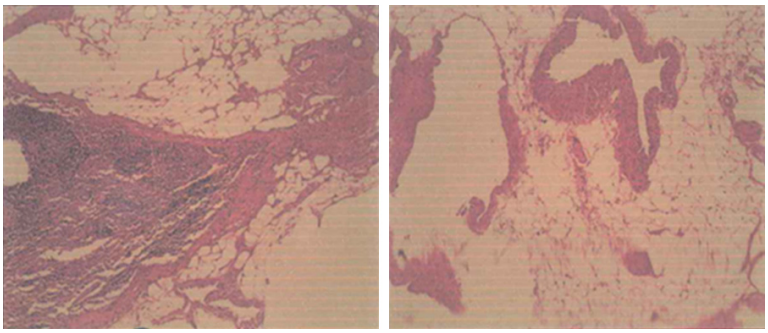

Figure 7. Pathological diagnosis: (retroperitoneal) consistent with hemangioma, peripheral lymphoid hyperplasia, lymphoid follicle formation.

Figure 8. The left renal vein was unremarkable.

venous aneurysms have been reported [1]. The causes of the renal venous aneurysms are unclear and may be congenital or acquired. Congenital renal venous aneurysms may be associated with incomplete regression of the original structures or inherent defects of the venous wall, whereas acquired renal venous aneurysms may be associated with portal hypertension or elevated venous pressure associated with jackhammer - pick syndrome [4].

The incidence of left-sided renal venous aneurysms is higher than that of right-sided, which is mainly due to the unique anatomy of renal veins. The left renal vein originates from the left kidney, courses medially, passes between the superior mesenteric artery and the aorta, and finally drains into the inferior vena cava. During embryonic development, the left renal vein is longer than the right renal vein, so it is more vulnerable [2, 5]. The left renal vein is compressed between the superior mesenteric artery and the abdominal aorta, which can cause nutcracker syndrome. Compression of the left renal vein would lead to obstruction of left renal venous return, which increased venous pressure and easily caused left renal varices and acquired left renal venous aneurysm. When diagnosed, both should be differentiated. Renal venous aneurysms usually result from a variant of a thin vein with medial atrophy and are likely to be solitary. Whereas renal varices typically show hyperplasia, thinning of the tunica media as well as fibrous thickening, there may also be a dilated venous network distally [4, 6]. Us is the imaging method of choice for the diagnosis and follow-up of venous aneurysms and is able to show the hemodynamic status of the lesion and surrounding vessels well [7]. By detecting the very slow flow velocity in venous aneurysms, they can be easily diagnosed and differentiated [8]. Besides that, some other diseases such as aortic aneurysm of renal venous fistula, arteriovenous malformation, portal hypertension, etc. should also be distinguished from renal venous aneurysms. Associated vascular malformations, especially those in the renal hilum, can be excluded by angiography or venography [9].

In this case, we choose laparoscopic therapy over unconventional interventional therapy, in order to explore the innovation of the treatment of renal venous aneurysms.

Abdominal venous aneurysms up to 3 cm in diameter are at high risk for complications such as abdominal pain, gastrointestinal bleeding, acute venous obstruction, and pulmonary embolism [11]. Therefore, renal venous aneurysms with diameter > 3 cm and corresponding clinical symptoms such as thrombus, embolism, or rupture are usually considered to be the indication for surgical intervention.

So far, there is no consensus on the treatment of renal venous aneurysms. Possible treatment options include surgical excision or ligation of the feeding vessel, endovascular stenting, and medication including anticoagulant [2, 10]. The

traditional method of resection of renal venous aneurysms was resection of the aneurysm and one-stage repair [12]. Watchful waiting with serial follow-up is usually an adequate and appropriate treatment option for small, asymptomatic renal venous aneurysms [2].

Herein, we report a case of successful resection of renal venous aneurysm by 3D laparoscopy. Compared with traditional nephrectomy or interventional therapy, this operation retains the normal function of the kidney to a great extent, greatly reduces postoperative complications such as infection and thrombosis, shortens the hospitalization cycle, improves the prognosis of patients and improves the quality of life of patients. However, this treatment method has a high risk, and this article only provides a case report. We hope to develop innovative methods in the later diagnosis and treatment of renal venous aneurysms.

Recently, there have been successful cases of renal aneurysms removed by robotic surgery, but there has been no report of renal venous aneurysms removed by laparoscopy or robotic surgery. This paper has explored and proved that this method for the treatment of renal venous aneurysms is successful, but there is still a lack of large sample research.

Conclusion

No treatment modality for the endoscopic resection of renal venous aneurysms has been documented, and the previous treatment modalities were usually nephrectomy or intervention. This surgical procedure may be the first in the world and open a new way for the diagnosis and treatment of renal venous aneurysms.

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Disclosure of conflict of interest

None.

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