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Case Report

Open surgery for renal artery aneurysm: a case report

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Abstract: Renal artery aneurysm (RAA) is a rare vascular entity in general population, which diameter usually exceeds twice of a normal renal artery. RAA is usually asymptomatic and is diagnosed incidentally by imaging examinations. We report the open surgery of an estimated diameter of 3.0 cm left RAA performing renal aneurysmectomy and reconstruction through translumbar approach. The operative duration was 250 min and estimated blood loss was 50 mL. Sixth month follow up after surgery showed aneurysm turn smaller compared with the preoperative one. We conclude that open surgery is effective and safe management for RAA as shown by our results.

Keywords: Renal artery aneurysm, open surgery, renovascular

Introduction

Renal artery aneurysm (RAA) is uncommon clinical entity with approximated incidence of 1% in all of the aneurysms, which is the fourth most common visceral artery aneurysm after splenic, hepatic and superior mesenteric artery aneurysms and estimate of the prevalence vary from 0.01%-1% of the general population [1, 2]. Meanwhile, several epidemiological studies have shown that RAA frequently affects women and left kidney [3, 4]. In recent years, along with widely using of color Doppler ultrasound, digital subtraction angiography (DSA), computerized tomography angiography (CTA) and magnetic resonance angiography (MRA), the detection rate of RAA is found to be significantly higher [5]. In general, RAA is usually asymptomatic, which is accidentally diagnosed by imaging examinations such as color Doppler ultrasound, computed tomography (CT) and CTA. There are several complications including rupture, embolism, thrombosis and hematuria and so on. Herein, if the diameter of RAA exceeds 2 cm, the most effective and radical method is surgical treatments [6], which contain endovascular treatment, aneurysmectomy and renal artery reconstruction, nephrectomy or partial nephroectomy. This study reports a case of the surgical treatment of left RAA in a female patient who has not apparent symptoms.

Case presentation

A 62-year-old female patient who discover left RAA and left renal stones in a routine physical examination in the absence of any other symptoms was referred to our department on Dec, 2015. Color Doppler ultrasound suggested that there existed fluid dark area with blood flow signal in left renal hilum of approximately 3.2×2.7 cm and several strong echo light with acoustic shadow with maximum diameter of 5 mm. Meanwhile, RAA-related symptoms were vacant, such as hypertension, abdominal pain and so on. Gross hematuria happened twice in the course of RAA. Apart from transurethral resection of the bladder tumor (TURBT) which was performed 2 years ago, other concomitance's disease was inexistent. After admission, blood pressure, a vital sign, was normal and physical examination was benign. Laboratory tests showed that there were within normal limits except for abnormality in urinalysis (leukocyte 31/uL, erythrocyte 38/uL and crystal 15/uL). Computed tomography (CT) and contrast enhanced CT scan of urinary system revealed the left RAA which consist of four bifurcation was about 3.0 cm in diameter located in the renal hilum and left renal pelvis stones (**Figure 1**). Computed tomography angiography (CTA) demonstrated a 3.12×2.23 cm aneurismal dilatation at the trunk of the left renal artery adjacent to the renal hilum (**Figure**

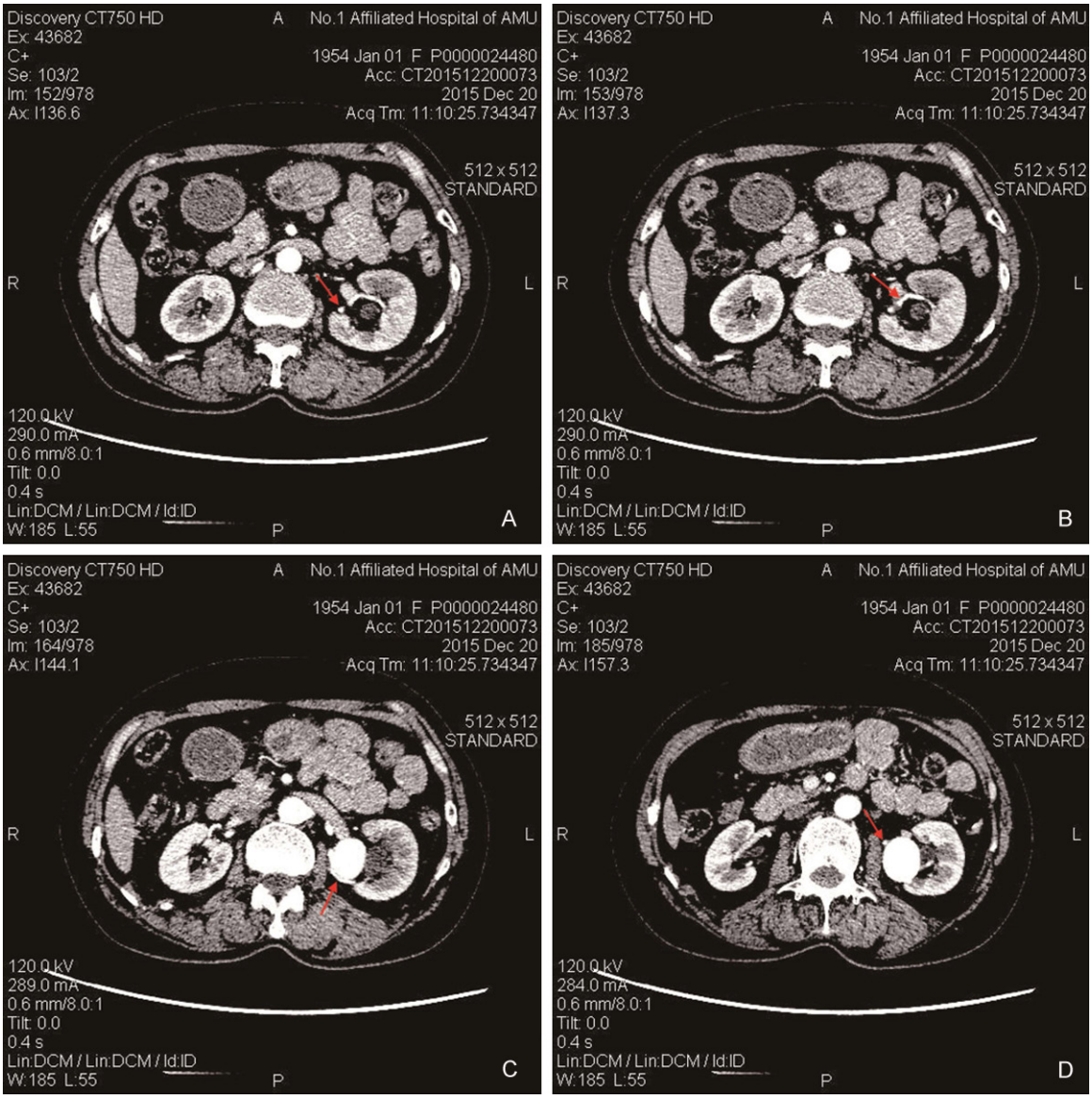

Figure 1. Preoperative contrast enhanced computed tomography revealed the left RAA which consist of four bifurcation located in the renal hilum and left renal pelvis stones. A: The first bifurcation. B: The second bifurcation. C: The third bifurcation. D: The fourth bifurcation.

2). Selective renal artery angiogram documented an intrarenal renal artery aneurysm in the left kidney (**Figure 3A**). Renogram indicated the glomerular filtration rate of left kidney was 48.4 ml/min and right kidney was 40.1 ml/min, respectively.

The preoperative diagnosis of left renal artery aneurysm and stones was consistent with the result of medical history, imaging and laboratory tests. Taking left RAA located in the trunk of the left renal artery adjacent to the renal hilum and oppressed pelvis into account, endovascular interventional surgery was ruled out. Based on the size, shape and adjacent anatomy relationship of left RAA and informed consent of patient, left renal aneurysmectomy and reconstruction through translumbar approach was performed.

Intraoperatively, the middle and lower segment of left RAA was integrallty dissociated but three arterioles of posterior branch of RAA was not separated (**Figure 3B**). On the basis of reserving the trunk of left renal artery and three arterioles of posterior branch of RAA, the

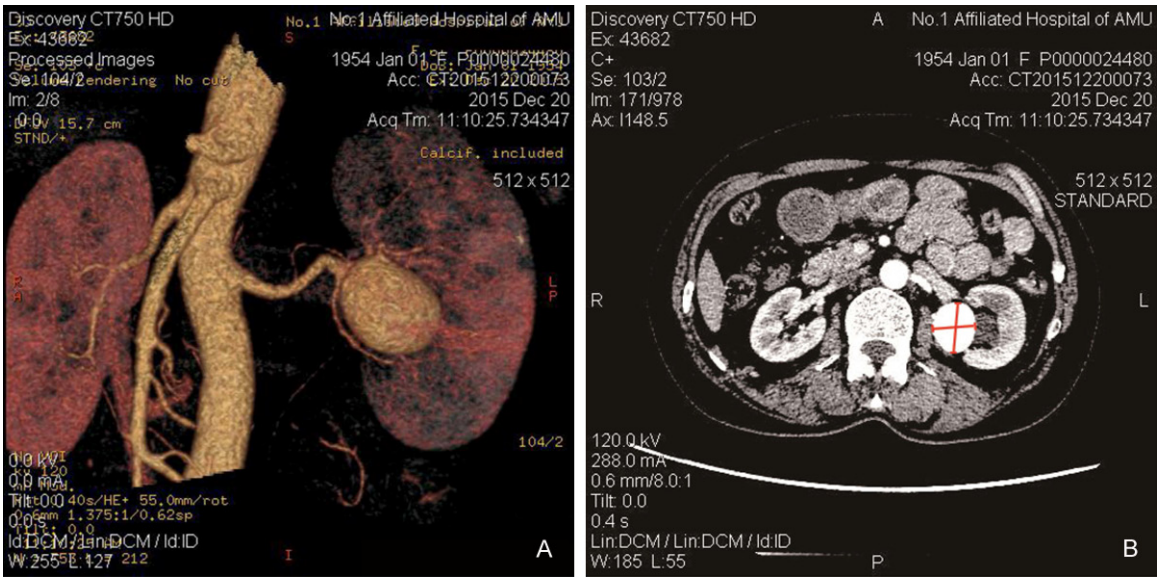

Figure 2. A: Preoperative computed tomography angiography showed a 3.12×2.23 cm aneurismal dilatation at the trunk of the left renal artery adjacent to the renal hilum. B: Preoperative contrast enhanced computed tomography demonstrated the size of left RAA was 3.0×2.2 cm.

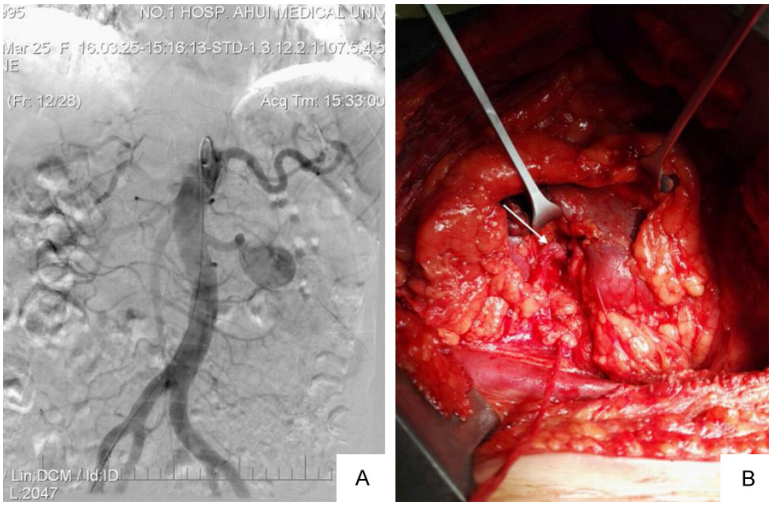

Figure 3. A: Selective renal artery angiogram documented an intrarenal renal artery aneurysm in the left kidney. B: Intraoperative findings revealed the distal location of RAA adjacent to the renal hilum.

aneurismal sac was excised and parent vessel was reconstructed to the greatest extent under the protection of cooled renal perfusion supplemented with mannitol. Renal artery reconstruction contained that endangium and vessel wall were completely continuous sutured by means of side-to-side anastomosis using 5-0 prolin prolene. The operative duration was 250 min and estimated blood loss was 50 mL. Warm renal ischemia was 20 min and the operation was successful. The patient was followed with renal function examinations on the sixth postoperative day, which revealed creatinine was 65 umol/L and blood urea was 3.38 mmol/L. The peritoneal drainage was removed on the seventh day after surgery. The histopathologic examination of aneurysm wall described dense fibrous connective tissue accompanied by hyalinization. There was no serious complication at the time of hospitalization. With regard to treating kidney stones, the patient was referred for flexible ureteroscope with a holmium laser three months after surgery. At sixth month follow up, color Doppler ultrasound demonstrated that aneurysm turn smaller compared with the preoperative one.

Discussion

It is generally known that RAA is a well-known clinical entity and the relevant knowledge of RAA is still a controversial issue in the surgical system. RAA can be classified into four categories according to their morphology and anatomic location, which consist of saccular aneurysm,

fusiform aneurysm, dissecting aneurysm and intralobar aneurysm [7]. RAA is a multifactorial disease, which exact pathogenesis is still remain unclear. There are many risk factors of RAA for development including age, gender, fibromuscular dysplasia, uncontrolled hypertension and alternate arterial aneurysms [8]. One possible reason for RAA is that the medical arterial wall is abnormal, which could be due to the deficiency of arterial media with loss or fragmentation of the internal elastic lamina and the reduction of smooth muscle [1]. In addition, degeneration of elastic fibers and mediolysis, atherosclerotic lesion [1] and arterial fibromuscular dysplasia [9] which might play a vital role in the development of RAA give rise to weakening of vessel wall and expanding of vessel. Also, hormonal levels and metabolic disturbance result in increases of vessel wall transformation, blood flow and intraabdominal pressure, which might be associated with the etiology of RAA [1].

In most cases, RAA does not induce any symptoms, which is consistent with this case. However, the recent research reported that the most common symptom is hypertension and abdominal pain and hematuria account for 4%-23% of symptoms in the RAA [8]. With respect to indications for treatment of RAA, most surgeons generally adopt that indications are the diameter of RAA > 2 cm, pregnancy in female patients, aneurysm morphology and location and presence of relevant symptoms including uncontrolled hypertension, flank pain, hermaturia or rupture [10]. Nevertheless, several studies recently addressed that there is a significant controversy for the treatment criteria of RAA. Concretely, Klausner et al. [11] showed that question concerning size criteria for repair of asymptomatic RAA at 2 cm may be aggressive according to asymptomatic RAA rarely rupture even when the diameter > 2 cm and the growth rate of RAA is 0.086± 0.08 cm/y. Likewise, Wayne et al. [12] demonstrated that the risk of RAA rupture or short-term growth is low and the pre-emptive repair of asymptomatic or small diameter RAA is not supported.

The selection of treatment methods for RAA will depend on the location and size of the aneurysm. Management options of RAA include surgical reconstruction (aneurysm resection with primary angioplastic closure accompanied by branch reimplantation or not, with path angioplasty, with primary re-anastomosis, with interposition or aorto-renal or splanchno-renal bypass) and endovascular interventions (coil embolization and stent grafting) [8]. To date, several researches have paid much attention to compare the clinical efficacy of endovascular treatment and open surgery. On the one hand, some studies suggested that endovascular treatment has been proposed as the first line treatment of RAA [13, 14]. On the other hand, some investigations shown that there is no significant difference between open surgery and endovascular treatment in terms of postoperative complication, mortality and renal function [15, 16]. In our case, due to aneurysm was too close to the renal hilum and three arterioles of posterior branch was located on the dorsal parts, we were inclined to perform open surgery instead of endovascular treatment.

We consider that open surgery was effective and safe management as well as endovascular treatment for RAA. Therefore, we performed open surgery when endovascular treatment may not be appropriate for some patients. Meanwhile, we must strengthen the diagnostic ability of RAA. It is still important to perform postoperative follow up although no proper guidelines exist for the follow up. Color Doppler ultrasound examination, renal function and blood pressure should be assessed in every follow up.

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Disclosure of conflict of interest

None.

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