



CASE REPORT

Surgical repair of a complex renal artery aneurysm through bench surgery and autotransplantation



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Abstract A 58-year-old woman with underlying medically controlled hypertension presented after an episode of sudden-onset chest pain. Chest computed tomography imaging revealed a left renal artery aneurysm (RAA) measuring 1.6 cm in diameter with mural thrombi in the distal left renal artery at bifurcation level. An interval enlargement of approximately 0.4 cm in diameter was noted within a 6-month period; however, endovascular intervention was not feasible because of the complex RAA pattern. She was hospitalized and received a hand-assisted laparoscopic nephrectomy, *ex vivo* repair of the RAA, and autotransplantation into the left iliac fossa. The procedure was successful, and the postoperative course went smoothly. The kidney graft was evaluated using a magnetic resonance angiography 1-year postoperatively, which showed no signs of surgical complications or RAA recurrence.

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1. Introduction

A renal artery aneurysm (RAA) is a rare vascular lesion with an incidence rate of approximately 0.1% based on reported studies, although the true incidence and natural history remain elusive.^{1,2} Currently accepted indicators of an RAA requiring intervention include a lesion size of >2 cm, interval enlargement, occurrence in a female of childbearing

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age, hematuria, medically refractory hypertension associated with renal artery stenosis, renal thromboembolism, dissection, and rupture.^{3–5} Management options include conservative treatment, endovascular intervention, or surgical reconstruction; however, endovascular intervention and *in vivo* repair are difficult to perform with complex RAAs because of the size and location of the aneurysm. Previous studies have described successful extracorporeal bench aneurysmectomy followed by reconstruction with or without autotransplantation.^{6,7} In the present study, we report a complex RAA case that was managed using hand-assisted laparoscopic nephrectomy, followed by *ex vivo* repair of the aneurysm and autotransplantation into the iliac fossa.

2. Case Report

A 58-year-old woman with underlying medically controlled hypertension presented to the emergency department because of sudden-onset tearing chest pain. Computed tomography (CT) was performed to rule out aortic dissection. A complex RAA at the bifurcation of left renal artery was noted, measuring 1.6 cm in diameter (Figure 1). No abdominal pain, flank pain, or hematuria was indicated by the patient, and her creatinine (Cr) level was measured as 1.13 mg/dL. The patient was subsequently referred to a urologist for further evaluation. CT angiography and a three-dimensional reconstruction revealed a fusiform RAA, located where the left renal artery splits into the anterior and posterior branches (Figure 2A). Because the RAA was asymptomatic without impaired renal function or medically refractory hypertension, regular follow-up examinations were recommended. However, during the 6-month CT follow-up, the aneurysm showed interval enlargement to 2.0 cm × 1.7 cm with mural thrombi in the left renal artery at bifurcation (Figure 2B). As there was an absence of a distinctive narrow neck, and because of the location of the RAA in the left renal artery at bifurcation, endovascular interventions such as coil embolization or stent graft placement were not deemed feasible. Similarly, *in vivo* aneurysm resection with angioplasty reconstruction presented a surgical challenge because of the morphology and anatomical location of the RAA. Kidney

sparing was also considered because of the presence of chronic kidney disease. The patient elected to receive hand-assisted laparoscopic nephrectomy, combined with backbench *ex vivo* repair and followed by autotransplantation.

Under general anesthesia, the patient was placed in a lateral decubitus position with the affected side up. A low midline incision was made, and a hand-assisted device disk was introduced at the incision site. After establishing the pneumoperitoneum, two 12-mm laparoscopic ports were placed as usual for donor nephrectomy.⁸ Using a hand-assisted technique, laparoscopic dissection was initiated by reflecting the descending colon and gaining access to the retroperitoneum; standard donor nephrectomy was subsequently performed.⁸ The renal artery and vein were then separated laparoscopically and ligated using hemoloks beyond the fusiform RAA and over the bifurcation of the left renal artery (Figure 3A). The ureter was divided till the common iliac vessel level and the kidney was then extracted through the hand-assisted port and infused with a cold solution (University of Wisconsin, Madison, Wisconsin, United States) for renal preservation; the total warm ischemia time was 3 minutes. Bench preparation (*ex vivo* resection of RAA and primary reanastomosis) was subsequently performed by the vascular surgeon (Figures 3B and 3C), and the patient was placed in a supine position in preparation for simultaneous autotransplantation. Open surgical dissection of the external iliac artery, vein, and urinary bladder was performed. Kidney autotransplantation was relatively straightforward, using end-to-side anastomosis with the external iliac vessels extending into the left iliac fossa (Figure 3D). Ureteroneocystostomy was then performed through an extravesical approach, with one double J ureteral stent left in place. Finally, the kidney was placed in a hilum medial position, and the wound was closed in standard fashion. The cold ischemic time was approximately 180 minutes, and the overall operation time was 6.5 hours. The intraoperative blood loss was 400 mL without transfusion.

Postoperative care occurred on an ordinary surgical ward to monitor the patient's vital signs and urine output. The recovery course was smooth and without complications. A mild interval increase in her Cr level occurred after surgery, but returned to baseline after a few days

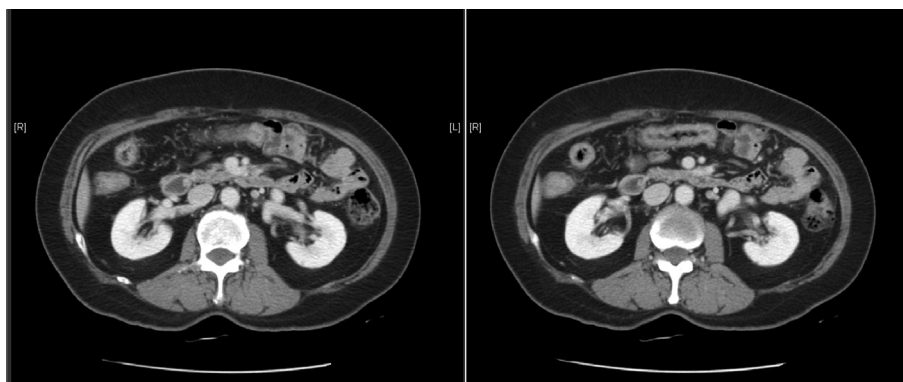


Figure 1 Axial chest CT images showing an aneurysm measuring 1.6 cm in diameter with mural thrombi in the distal left renal artery at bifurcation. CT = computed tomography.

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