



Hand-Assisted Laparoscopic Nephrectomy and Auto-Transplantation for a Hilar Renal Artery Aneurysm: A Case Report

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A 52-year-old man was admitted with an incidentally detected right renal artery aneurysm (RAA). Computed tomographic angiography with three-dimensional reconstruction revealed that the aneurysm was 2.2 cm in diameter and located at the renal hilum. We performed hand-assisted laparoscopic nephrectomy with ex vivo repair of the RAA and auto-transplantation with minimal elongation of Gibson incision. The operation and postoperative course were uneventful. At last follow-up, the patient was alive with a well-functioning auto-transplant. Hand-assisted laparoscopic nephrectomy and auto-transplantation is a useful treatment option for hilar RAA.

Key Words: Renal artery aneurysm, Auto-transplantation, Hand-assisted laparoscopy

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INTRODUCTION

Renal artery aneurysm (RAA) is a rare clinical entity with a prevalence of 0.15% to 0.1% in the general population. In most cases, patients present asymptotically and the diagnosis is made incidentally [1]. RAAs greater than 2 cm in diameter or expanding aneurysms need to be treated to prevent rupture [2]. Incidental RAAs in pregnant women also need to be treated, regardless of their diameter [3]. A proximal RAA can be endovascularly repaired using coil or stent graft. However, an RAA located at the renal hilum may require extracorporeal arterial reconstruction and auto-transplantation [4,5]. With recent advances in laparoscopic surgical techniques, cases of RAA treatment via laparoscopic nephrectomy and auto-transplantation have been reported [6,7].

We report a successful case of hand-assisted laparoscopic nephrectomy, ex vivo vascular repair, and auto-transplantation in the treatment of hilar RAA.

CASE

A 52-year-old man was referred to Samsung Medical center for a second opinion regarding an asymptomatic right RAA. He had no history of hypertension. Computed tomography (CT) imaging with three-dimensional reconstruction revealed a 2.2 cm wide right RAA without calcifications located at the hilum of the kidney (Fig. 1). An endovascular treatment was not chosen due to the location of the aneurysm and, therefore, surgical treatment was planned. His preoperative laboratory tests revealed normal renal function without microscopic hematuria. CT angi-

ography did not reveal any atherosclerotic changes in the iliac arteries. The surgical team decided to perform hand-assisted laparoscopic nephrectomy, ex vivo repair, and auto-transplantation in right iliac fossa.

The surgery was performed under general anesthesia. The patient was placed in the left lateral decubitus position. A para-median incision, allowing for extension to a Gibson incision, was made into the peritoneal cavity. A Gel-Port was placed to accommodate the surgeon's arm. Two 12 mm ports were inserted at the midclavicular and anterior axillary lines. The ascending colon was mobilized medially, and the renal vessels were identified. The renal artery was ligated with a Hem-o-lock and two metal clips and divided. Next, the renal vein was divided using an endovascular gastrointestinal anastomosis stapler. The ureter was transected at the level of the iliac vessels. The kidney was extracted through the GelPort, placed in an ice slurry, and perfused with a histidine-tryptophan-ketoglutarate solution. The peritoneum was closed, but the muscle and skin layers

were left open. Two main renal artery branches originating from the RAA were identified (Fig. 2A). The aneurysm was resected and the artery was reconstructed with the cryopreserved iliac artery, which was reconfigured into a Y shape using 7-0 prolene interrupted sutures (Fig. 2B). The renal vein was also elongated using the cryopreserved vein graft. The patient was then moved into a supine position. A Gibson incision was created by continuing the previously made para-median incision, and the right iliac fossa was exposed for auto-transplantation (Fig. 3). The external iliac artery and common iliac vein were used for anastomosis in an end-to-side fashion (Fig. 4). The ureter was re-implanted into the bladder without the use of a double-J catheter. The cold ischemia time was 115 minutes and the total operation time was 5 hours and 30 minutes.

The patient's postoperative course was uneventful and serum creatinine and blood urea nitrogen (BUN) levels remained within the normal range during this time. Doppler

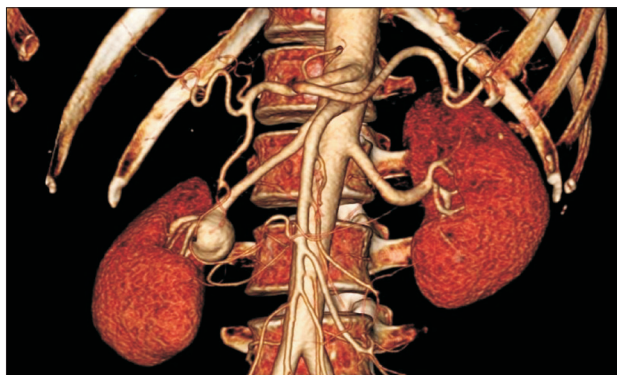


Fig. 1. Computed tomography with 3-dimensional reconstruction revealed 2.2-cm-sized renal artery aneurysm without calcification located at hilum of right kidney.



Fig. 3. The para-median incision was made just upper the Gibson incision for hand port. With this method, surgeon could handle the renal vessels more easily.

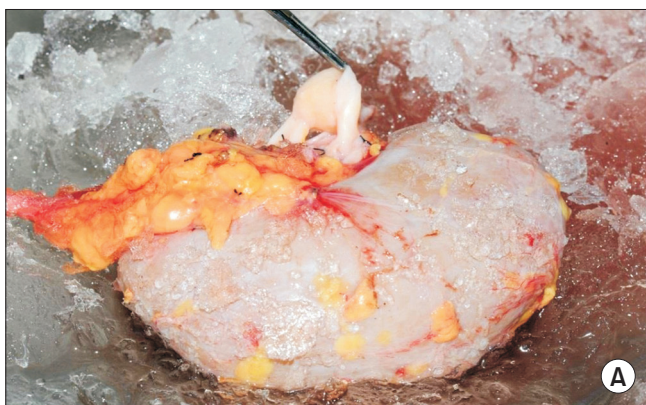


Fig. 2. (A) Two main branches of renal artery were originated from the renal artery aneurysm. (B) After aneurysm resection, renal artery was repaired with a cryopreserved iliac artery allograft tailored in Y shape.

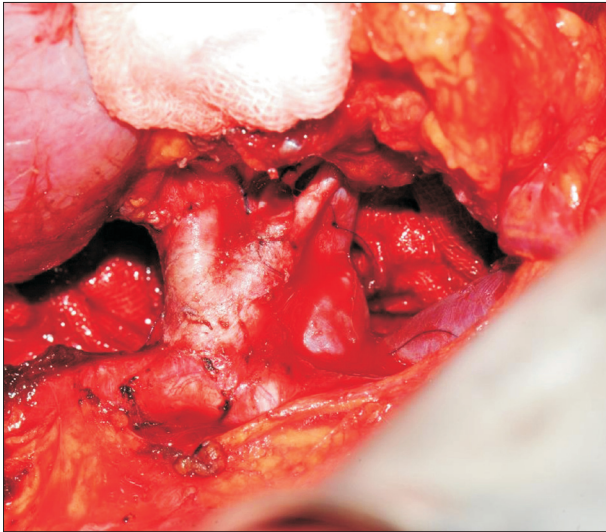


Fig. 4. External iliac artery and common iliac vein were used for anastomosis in end to side fashion.

ultrasonography performed on postoperative days (POD) 1 and 10 revealed a patent renal artery and vein and no ureteral complications. The patient was discharged from the hospital on POD 13 and continued to recover without any incident. The pathologic findings of the resected aneurysm showed cystic medial degeneration with focal intimal hyperplasia. The patient was followed for 1 year, during which he maintained normal renal function as estimated via serum creatinine and BUN monitoring.

DISCUSSION

The risk of RAA rupture is very low; however, the rupture can be fatal [8]. Therefore, treatment of RAA is recommended when there is high risk of rupture. The indications for treatment of an asymptomatic RAA include an aneurysm larger than 2 cm in diameter, an expanding aneurysm,

the presence of a thrombus, or any incidence in a woman of child bearing age considering pregnancy [3,9]. In the case we presented here, the patient was asymptomatic and had a 2.2 cm RAA without calcifications located at the hilum of the right kidney. Therefore, we opted to repair the RAA. Endovascular treatment was not considered due to the location of the RAA. The surgical team decided to perform hand-assisted laparoscopic nephrectomy over an open nephrectomy, given reportedly shorter hospital stays, less pain, and decreased time to return to full function with the hand-assisted laparoscopic technique [10].

Recent studies have been reported the use of hand-assisted laparoscopic nephrectomy in combination with auto-transplantation for the treatment of RAA [2,7,8]. Our approach was guided by these studies and modified to shorten the distance between the renal vessels and the hand port. To accomplish this, we made a para-median incision just superior to the Gibson incision and inserted a hand port through that incision, as shown in Fig. 3. This method enables the surgeon to handle the renal vessels and control the operation field more easily. The duration of time between the incision and kidney extraction was 58 minutes, and therefore, we propose that this method could shorten the total operation time.

Repair of the renal artery after aneurysm resection is challenging especially when the RAA involves multiple main branches. In the present case, we identified two main branches of the renal artery originating from the RAA and used a cryopreserved iliac artery allograft tailored into a Y shape in the repair, as shown in Fig. 2B. With this allograft, we were able to obtain a renal artery of sufficient length to make an anastomosis with the external iliac artery while sparing the internal iliac artery.

Hand-assisted laparoscopic nephrectomy with ex vivo repair and auto-transplantation is feasible option for treating RAA located at the hilum of the kidney. A carefully designed operation is necessary to achieve the best outcome.

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