Experiences of Renal Transplants From Donors With a Renal Artery Aneurysm After a Laparoscopic Donor Nephrectomy and Ex Vivo Reconstruction of the Renal Artery

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Abstract

Objectives: Renal artery aneurysms are uncommon, and various surgical options to treat renal artery aneurysms have been described. We report 2 cases of renal transplants from donors with renal artery aneurysm, after resection of aneurysm, and ex vivo renal artery reconstruction.

Materials and Methods: Two women, aged 52 and 45 years, had diagnoses of hilar renal artery aneurysms during evaluation for left flank pain and hematuria. In both cases, radiologic interventions were impossible because of anatomical relations. Both patients were informed of the therapeutic options available, including nephrectomy, autotransplant, and kidney donation. The patients and their families decided on a kidney donation. Results: Renal function test results of both patients satisfied the living-donor selection criteria. The left and right kidney of each patient was removed laparoscopically, and ex vivo resection of the aneurysm and reconstruction of the renal artery was performed under a surgical microscope. The repaired kidneys were successfully transplanted to 2 men, aged 36 and 37 years.

Conclusions: In cases of renal artery aneurysms that necessitate treatment, a renal allograft transplant should be considered as a treatment option. It provides safety and benefit to the recipient as well the donor.

Key words: Kidney transplant, Renal artery aneurysm, Hand-assisted laparoscopic donor nephrectomy

Introduction

Renal artery aneurysms (RAAs) are uncommon, occurring in about only 0.1% of the general population. Recent development of an endovascular therapeutic technique and existing various surgical techniques has allowed treatment of RAA without nephrectomy. Nevertheless, about an 20% of cases still require a nephrectomy. Autotransplant, which is performed after nephrectomy, followed by resection of the aneurysm and ex vivo reconstruction of the renal artery, has been reported rarely as a treatment option for patients who require nephrectomy. However, in the era of donor shortages, a kidney transplant to any willing recipient is a treatment option for patients with RAA. We report 2 cases of a renal transplant from donors with RAA, in which hand-assisted laparoscopic nephrectomy, followed by resection of the aneurysm and ex vivo renal artery reconstruction were performed.

Materials and Methods

Two women aged 54 and 45 years were diagnosed with hilar RAA, measuring 2 cm and 2.4 cm, during an evaluation of left flank pain and hematuria. In both cases, radiologic interventions were impossible because of anatomical relations. Both patients were informed of the therapeutic options available, including nephrectomy, autotransplant, and kidney donation. The patients and their families decided on kidney donation. The procedures were approved by the Ethical Committee of our institution and adhered to the 1975 Declaration of Helsinki. Both patients gave written, informed consent.
The renal function test results of the donors satisfied the living-donor selection criteria (creatinine, 53 and 65 μmol/L; estimated glomerular filtration rate, 98 and 117 mL/min; creatinine clearance, 134 and 124 mL/min). The left and right kidney of each patient were removed laparoscopically, and ex vivo resection of the aneurysm and reconstruction of renal artery were done under a surgical microscope.

**Figure 1.** (A, B) Abdominal Computed Tomography Angiogram Showing a Saccular Aneurysm at the Renal Hilum

**Figure 2.** (A) RAA on the Kidney Graft After Hand-Assisted Laparoscopic Donor Nephrectomy; (B) Aneurysm After Resection on the Benching Table; (C) After Renovascular Reconstruction was Completed Using the Recipient’s Internal Iliac Artery Under a Surgical Microscope, an End-to-Side Anastomosis of the Reconstructed Renal Artery to the External Iliac Artery of the Recipient was Performed and Kidney was Reperfused

**Surgical technique**
A 54-year-old woman has a 2-cm aneurysm at the bifurcation of the left renal artery (Figure 1). We excise the aneurysm, and perform a vascular reconstruction, using a Y-graft from the recipient’s right internal iliac artery (to give enough length for the anastomosis); and with a surgical microscope, we perform a single artery anastomosis. We perform an end-to-side anastomosis of the renal artery to the external iliac artery of the recipient (Figure 2). A 45-year-old woman has a 2.4-cm aneurysm at the hilum of the right kidney, and an accessory artery arising directly from the aorta. Once we excise the aneurysm, we note 3 artery stumps. Because each artery has sufficient length and diameter for reconstruction, under a surgical microscope, we perform a side-to-side anastomosis to give a single artery anastomosis to the recipients’ external iliac artery.

**Results**
Two male, end-stage renal disease patients on the transplant waiting list, aged 36 and 37 years, received these kidneys and were informed of all the conditions. The repaired kidneys were successfully transplanted in the recipients, and both renal perfusion and function were excellent posttransplant. Cold ischemic times were 50 and 85 minutes. The recipients’ final creatinine levels were 106 and 92 μmol/L, and donors’ postoperative creatinine levels were 80 and 88 μmol/L.

**Discussion**
Renal artery aneurysms are rare clinical entities with a prevalence in the general population of approximately 1%.1,2 Most patients are asymptomatic; hence, RAAs are largely an incidental finding.3 Among symptomatic patients, hypertension is the most-common presentation, followed by gross or microscopic hematuria.1,3 Still, various treatment options exist for an RAA.

Until the 1990s, open surgical treatment was the only option for symptomatic patients with an RAA.8 Recently, endovascular techniques have developed rapidly and have become popular as treatment for select patients with an uncomplicated renal artery aneurysm. However, approximately 20% of cases still require a nephrectomy for inevitable circumstances, such as anatomic difficulty, size, location, and failure after an attempted revascularization.3

Recently, autotransplant after resection of the aneurysm and ex vivo reconstruction of the renal artery have been reported as treatment options with acceptable results.4-7 Considering the long operative time from its sequential nature and the potential morbidity it presents, the procedure might be excessive, especially for older patients. In this respect, a kidney transplant to any willing recipient
under the donor’s consent can be a treatment option for patients with RAAs who require nephrectomy.

Kidney transplant is the optimal treatment for select patients with end-stage renal disease. Because of the disparity between the number of donor organs available and the patients awaiting a kidney transplant, use of extended criteria donor grafts and grafts with anatomic abnormalities, which are amenable to ex vivo surgical repair, have increased worldwide. Some authors have reported excellent results from living donors with renal vascular disease. Nahas and associates reported 11 recipients who received kidneys with vascular abnormalities, including 3 RAA cases, after open nephrectomy and ex vivo reconstruction during bench surgery. All patients exhibited good results, with 124 μmol/L of median serum creatinine. Serrano and associates reported on 5 living donors with unilateral renovascular disease that included an RAA, an arteriovenous malformation, localized atherosclerosis, and fibromuscular renal artery stenosis. All were successfully grafted into the 5 recipients.

Presently, laparoscopic surgery is well established and tends to replace an open nephrectomy. The hand-assisted and full laparoscopic nephrectomy has various advantages for the donors regarding postoperative pain, length of hospital stays, and cosmetics. We used the hand-assisted laparoscopic nephrectomy in these 2 cases for the donors’ benefits.

In conclusion, in cases of an RAA that necessitate treatment, a renal allograft transplant should be considered. Despite the difficulties in the reconstruction of small, short vascular branches, the procedure, when supported by the surgeon’s skills, can be done safely, providing benefits to the recipients and donors. Furthermore, considering the benefits for the donor, laparoscopic technique should be applied.

References