Twelve years after receiving a renal transplant, a 50-year-old woman developed asthmatic symptoms. Chest CT revealed a descending thoracic aortic aneurysm. She had undergone percutaneous coronary intervention to treat the left anterior descending artery 10 years earlier. Coronary artery angiography revealed restenosis of the left anterior descending artery (99%, #6 in-stent). Because cardiopulmonary bypass may cause problems for transplanted kidney, we performed off-pump coronary artery bypass grafting (left internal thoracic artery to left anterior descending artery) and thoracic endovascular graft placement to treat the aortic aneurysm. Considering that the artery of the transplanted kidney was attached to the right iliac artery, and then the left common femoral artery was selected as the access root for GORE TAG® endografts (34 × 200 and 34 × 150 mm) (stentgrafts were deployed for the descending aortic artery). Postoperative angiography showed a patent bypass graft. Postoperative CT confirmed the absence of endoleaks. The postoperative course was uneventful, and she was discharged without complications. Ischemic heart disease and descending thoracic aortic aneurysm in recipients of kidney transplants can be treated using off-pump coronary bypass grafting and thoracic endovascular graft placement. The transplanted kidney was protected without using cardiopulmonary bypass (CPB).

Keywords: aneurysm, cardiovascular surgery, renal transplantation, ischemic heart disease
computed tomography (CT) revealed a descending thoracic aortic aneurysm (DTAA). She was referred to our department where she underwent a preoperative evaluation.

Patient background: The patient had received a living-donor renal transplant at 38 years of age to treat chronic renal failure caused by systemic lupus erythematosus (SLE). Renal transplant rejection was being suppressed with prednisolone, azathioprine and tacrolimus (2.5, 50 and 2 mg/day, respectively). She had undergone percutaneous coronary intervention (PCI) for the left anterior descending artery (LAD) at 40 years of age.

Findings upon admission: Blood pressure, 120/80 mmHg; heart rate, 65 beats/min; cardiac murmur absent.

Blood tests: BUN, 25 mg/dl; serum creatinine, 1.0 mg/dl; 24-hour CCR, 64.9 l/day.

Spirography: Vital capacity, 2.2 L; %vital capacity, 84.2%; forced expiratory volume after 1 s, 1.48 L; %forced expiratory volume after 1 s, 75.1%.

ABI: Right, 1.15; left, 0.95.

Echocardiography: Asynergy, negative; ejection fraction, 65%; mitral regurgitation, negative.

Computed tomography (CT): Descending thoracic aortic aneurysm (DTAA) (max diameter, 60 mm).


Therapeutic strategy: A preoperative evaluation revealed DTAA and coronary artery disease. Because CPB affects several various biological systems and causes severe problems for transplanted kidneys, we scheduled off-pump coronary artery bypass (OPCAB) initially to treat the coronary artery disease for the protection of the transplanted kidney. Thoracic endovascular aortic repair (TEVAR) for the DTAA then proceeded 1 month later. Preoperative CT showed that the 9-mm diameter of the left external iliac artery met the anatomical criteria for TEVAR.

OPCAB: The left intrathoracic artery (LITA) was harvested through a standard median sternotomy using a Harmonic Scalper with complete skeletonization. Heparin sodium was injected and then the LAD was exposed using LIMA sutures and stabilized using an octopus stabilizer. A 1.5-mm intracoronary shunt tube was inserted through an arteriotomy for the anastomosis. The end of the LITA graft was anastomosed to the LAD using an 8-0 polypropylene suture. The transit flow meter showed a good flow with a mean flow rate of 48 ml/min.

TEVAR: The artery of the transplanted kidney was attached to the right iliac artery (Fig. 1), the left femoral artery as the access route was selected to deliver a Gore TAG® (W. L. Gore and Associates, Flagstaff, AZ, USA) endograft under the general anesthesia. The left common femoral artery was cut down. The preoperative CT had revealed that the caliber of the left common iliac and femoral arteries was suitable for access. Thus, the introducer sheath could be accommodated, and an arterial access site could be prepared for the interventional procedure. The right brachial artery was also percutaneously punctured using a standard single-puncture needle and a

![Fig. 1](image.png) Enhanced computed tomography image shows transplanted kidney (white arrow). Artery of transplanted kidney was attached to right common iliac artery.
5-Fr sheath was introduced. Thoracic aortography was performed before stent deployment, and we measured the distance from the origin of the left subclavian artery to the distal end of the DTAA using a pigtail catheter. Heparin sodium was injected, and then a 22-Fr introducer was inserted into the left femoral artery. Gore TAG® (34 × 150 and 34 × 200 mm) endografts were deployed on the distal side of the aneurysm and on the proximal side just distal to the left subclavian artery. A tri-lobe balloon tip was inflated to ensure adequate and complete stent expansion. Post-deployment angiography demonstrated no endoleak.

Postoperative blood tests: Peak values of BUN and serum creatinine were 15 and 0.9 mg/dl, respectively, and renal function had not deteriorated.

Postoperative course: The patient resumed immune suppression agents on postoperative day (POD) 1. Angiography revealed a patent LITA graft patent (Fig. 2) and enhanced CT confirmed the absence of endoleaks in the aneurysm (Fig. 3). Leg paraplegia did not develop, and the patient was discharged without complications.
Discussion

The combination of advances in surgical techniques, organ preservation, and immunosuppressive agents has improved the survival of renal transplant recipients. However, cardiovascular disease is a frequent cause of death in such patients. The incidence of cardiovascular surgery in renal transplant recipients is likely to increase in the future. Cardiovascular surgery usually requires CPB, but it decreases renal perfusion pressure and suppresses the immune system, and thus is detrimental to patients with renal grafts. Several renal protection strategies have been reported. Bolman et al. have stated that they maintain a mean systemic perfusion pressure of ≥70 mmHg throughout CPB and continuously infuse furosemide and mannitol during the entire procedure to maintain urine flow of at least 50 to 100 ml/h. Matsuiiya et al. have stated that acute renal graft rejection and opportunistic infections can be prevented after surgery by continuously infusing patients with cyclosporin in a sterile room. A combination of trimethoprim-sulfamethoxazole (TMP/SMX) is administered, in addition to routine antibiotics, and patients are encouraged to gargle with antifungal agents and tetracycline. Many perioperative factors, such as surgical stress, blood concentration of immune suppression agents, host liver and renal function, interact, thus preventing the establishment of a standard procedure for immune suppression. Perioperative immune suppression should be the focus of future investigation.

Coronary artery disease (CAD) influences the mortality of renal transplant recipients. The reported success rate of PCI in such patients is low because of calcified coronary arteries. One author has stated that CABG is more effective than PCI for patients with renal transplants from the perspectives of survival rates and reductions in the incidence of cardiac death or AMI. Furthermore, OPCAB is safer and less invasive than conventional CABG as part of CPB for these patients and thus is more useful.

In conclusion, minimally invasive TEVAR has recently become a widespread treatment for thoracic aortic aneurysms with outcomes comparable to those of open surgery. If the anatomical criteria are met, TEVAR is useful for treating high-risk patients.

Minimally invasive surgical procedures such as OPCAB and TEVAR have allowed us to treat a combination of cardiovascular diseases without complications in several patients with renal transplants.

Disclosure Statement

We declare that there are no conflicts of interest associated with this report.

References