First Successful Combined Heart and Kidney Transplant in Iran: A Case Report

Zargham-Hossein Ahmadi,1 Seyed Mohsen Mirhosseini,2 Mohammad Fakhri,3 Amirhossein Mozaffary,4 Mojtaba Lotfaliany,3 Seyed Mohammad Reza Nejatollahi,4 Seyed-Ali Marashi,4 Neda Behzadnia,2 Babak Sharif-Kashani5

Abstract

Combined heart and kidney transplant has become an accepted therapy for patients with coexisting heart and kidney failure. This method, compared with single-organ transplant, has a better outcome. Here, we report the first successful combined heart and kidney transplant in Iran.

The patient was a 36-year-old man with end-stage renal disease owing to IgA nephropathy, admitted to Masih Daneshvari Hospital in Tehran, Iran for progressive dyspnea and chest pain. Inpatient evaluations revealed cardiomyopathy leading to end-stage heart failure. Owing to concurrent heart and kidney end-stage diseases, combined cardiorenal transplant was done. Eight months after his transplant, routine follow-ups have not shown any signs of acute rejection. He is now New York Heart Association functional class I. Both cardiac and renal functions are within normal ranges. Good outcome during follow-up for this case justifies simultaneous heart plus kidney transplants as an alternate treatment for patients with advanced disease of both organs.

Key words: Combined heart and kidney transplant, End-stage heart disease, End-stage renal disease

Introduction

Standard treatment for end-stage heart failure is heart transplant. Renal failure, as an important contraindication for this treatment, is a common finding among patients awaiting a heart transplant. Conversely, in many patients with end-stage kidney disease, consequent cardiovascular disease is a problem. Combined heart and kidney transplant has become an accepted therapeutic method for patients with severe heart failure and simultaneous end-stage renal disease.1

In 1978, the first combined cardiorenal transplant was reported.2 From 1978 to 2007, the International Society of Heart and Lung Transplant reported 336 successful combined cardiorenal transplants.3 It is assumed that simultaneous heart and kidney transplant, compared with single-organ transplant, has a better outcome. Here, we report the first successful combined heart and kidney transplant in a 35-year-old man with cardiomyopathy in Iran owing to chronic kidney disease.

Case Report

A 35-year-old man was referred to the Masih Daneshvari Medical Center in Tehran, Iran because of dyspnea, chest pain, recurring fever, shaking chills, cyanosis, and generalized weakness. The history of his dyspnea was progressive and initiated from grade 1 of modified medical research council dyspnea scale to grade 4.

On physical examination, he was afebrile, his heart rate was 95 beats per minute, blood pressure
was 105/80 mm Hg, the respiratory rate was 23 breaths/minute, and oxygen saturation without any oxygen supplementation was 89%. Cardiac examination showed tachycardia with a regular rhythm, a normal S₁, physiologic splitting of S₂ with increased intensity of P₂, a summation gallop at the left lower sternal border, and a grade 3/6 holosystolic murmur at the left lower sternal border. Both lungs were clear on auscultation. There was no hepatomegaly. His arms and legs were warm, and perfusion of both was well.

He had a history of hypertension from 2006 (5 years before his admission to our hospital), and his medications consisted of hydralazine (50 mg/d), losartan (100 mg/d), and furosemide (160 mg/d). Results of a previous kidney biopsy were compatible with IgA nephropathy. In July 2008, in association with progressive renal decompensation, his serum creatinine level raised quickly from 176.8 μmol/L to 477.36 μmol/L. A same pattern of increase in blood urea nitrogen was detected (1.071 mmol/L to 3.213 mmol/L). Within 3 months, his chronic kidney disease led to irreversible renal failure that required chronic hemodialysis. Six months before admission to our hospital, he developed cardiac signs including dyspnea on exertion, chest pain, palpitations, generalized weakness, and lower extremity edema.

At the time of admission to the hospital, his serum creatinine level was 282.88 μmol/L and blood urea nitrogen level was 459.68 μmol/L. At this time, his estimated glomerular filtration rate was 10 mL/minute. The results of an initial electrocardiogram showed sinus tachycardia. An echocardiography was performed, and positive findings for dilated cardiomyopathy were detected: left ventricular spherical dilatation, reduced wall thickness, 4-chamber cardiac enlargement, and reduced ejection fraction (less than 30%), but there were no positive findings for endocarditis. According to concurrent irreversible heart and kidney failure, the patient was listed for combined kidney and heart transplant.

The transplant was done in 2 phases. First, an orthotopic bicaval heart transplant was done after an ischemic time of 65 minutes. After general anesthesia, the chest was opened and an inferior vena cava cannula was placed in the inferolateral portion of the right atrium and oriented to the inferior vena cava. Then, the superior vena cava was cannulated just above the junction of the superior vena cava and the right atrium. Pulmonary artery pressure was measured and it was 25 mm Hg. At the same time, the arterial blood pressure was 80 mm Hg. The patient was weaned off cardiopulmonary bypass with no need for inotropic support. After stopping the extracorporeal circulation and reversing anticoagulation, a renal transplant was performed with 3 hours’ cold ischemia. Both organs were recovered from a 36-year-old woman who died of brain death owing to cranial hemorrhage during a car accident. The man’s recovery was good and he was admitted to the intensive care unit after his surgery.

Three days after transplant, his serum creatinine level was 353.6 μmol/L and blood urea nitrogen level was 2.32 mmol/L. The patient did not require hemodialysis because he did not have hypokalemia, acidosis, or uremia. Four days after transplant, there was no positive echocardiographic findings of heart failure. After removing the Foley catheter, urinary retention developed and permanent catheterization was performed. Posttransplant immunosuppression protocol included mycophenolate mofetil (1 g/d), tacrolimus (1 g/d), and prednisolone (5 mg/kg/d). Seven days after transplant, the patient was discharged from the hospital.

In December 2011, he was readmitted to our hospital with fever and shaking chills. Clinical investigations revealed a liver abscess, so we performed a computed tomographic-guided drainage followed by wide-spectrum antibiotic therapy.

Within 6 months of the transplant, routine endomyocardial biopsies failed to demonstrate any graft rejection. Echocardiographic findings were compatible with normal graft function with 55% ejection fraction. Kidney function was normal with a serum creatinine level of 97.24 μmol/L and blood urea nitrogen of 1.428 mmol/L.

At the time of this writing, 8 months after surgery, he can do his daily functions without activity limitations. He is New York Heart Association functional class I, and his quality of life has improved significantly.

**Discussion**

Chronic kidney disease, which is manifest by proteinuria (albuminuria) or reduced glomerular filtration rate, seems to be an independent risk factor...
Patients with chronic kidney disease are considered the highest risk group for consequent cardiovascular diseases. Most cardiovascular disease risk factors, such as older age, systolic hypertension, diabetes mellitus, left ventricle hypertrophy, dyslipidemia, low/high-density lipoprotein cholesterol, hyperhomocysteinemia, oxidant stress, and elevated inflammatory markers, are commonly seen in chronic kidney disease patients.

Hypertension owing to chronic kidney disease initiates pressure overload and can result in concentric left ventricular hypertrophy, while fluid overload, anemia, and arteriovenous fistulas cause volume overload and principally initiate left ventricular dilatation with left ventricular hypertrophy. These structural abnormalities cause problems in the functioning of the heart that finally can lead to cardiomyopathy, which can result in severe heart failure. Similarly, in our case, IgA nephropathy caused chronic kidney disease and irreversible renal failure. Subsequently, cardiomyopathy owing to irreversible renal failure developed and caused end-stage heart failure.

One of the accepted therapeutic approaches for this group of patients that can relieve symptoms and lead to better outcomes is a transplant. Concurrent renal failure can be a major problem and may increase mortality if a heart transplant is done alone. Also, heart failure can make the patient ineligible for a kidney transplant. Combined heart and kidney transplant has been approved as an optimal therapeutic method for patients with coexisting renal and heart failure. According to previous comparisons, the 1-year survival rate for renal and heart graft in a group of patients undergoing combined transplant is 79.8% and 78.3%, with a 79.2% patient survival rate, while in isolated renal and heart transplants, the 1-year graft survival rates are 87.3% and 84.4%, with patient survival rates of 94.6% and 84.9%.

Success in prior simultaneous heart and kidney transplants in Western literature is evident, but there is a paucity of data regarding outcomes of this surgery in the Middle East. To the best of our knowledge, although there have been successful combined cardiorenal transplants in our region, there is a paucity of reports regarding the issue and thus—our successful experience might open avenues for future reports.

References