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## CLINICAL STUDY

# Cardiovascular surgery after renal transplantation – indications, complications and outcome

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## Abstract

Cardiovascular diseases are the major cause of morbidity and mortality in renal transplant recipients. We report our experience in the treatment of patients with renal allograft who required cardiovascular surgery. *Methods:* Indications for cardiovascular surgery, postoperative complications, and outcome were recorded in a cohort of renal transplant recipients. *Results:* Thirteen patients, five female and eight male, aged from 46 to 75 years underwent cardiac surgery after renal transplantation at University Hospital Centre Zagreb. Isolated coronary artery bypass grafting (CABG) was performed in five patients, valve replacement in six patients, reconstruction of ascending aorta, and aortic arch in one patient as well as the extraction of tumor formation from the heart. Three patients had simultaneous CABG and valve replacement. Four patients (31%) required acute hemodialysis after the surgery and two of them continued with dialysis after discharge. Postoperative course was complicated with infections of the lower respiratory tract in two patients, pericardial tamponade, unstable sternum with bleeding from the wound, increased drainage from the chest demanding additional hemostasis, and in-stent restenosis in the previously placed stents, in one patient each. Fatal outcome occurred in two patients who underwent simultaneous valvular replacement and CABG within one month from the surgery. *Conclusion:* In patients with functional renal allograft cardiovascular surgery procedures are safe, but associated with increased incidence of perioperative complications, with majority of patients maintaining their graft function.

## Keywords

Cardiovascular surgery, complications, outcome, renal failure, renal transplantation

## History

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## Introduction

Cardiovascular diseases (CVD) are not only highly prevalent, but they are also the major cause of graft loss and death in population of renal transplant recipients,<sup>1</sup> especially in the elderly. Patients suffer from different pathologies including valvular, coronary, and vascular diseases. When optimal medical therapy is exhausted, and progression of CVD occurs, surgical treatment is necessary. Data on the long-term outcomes and risk factors in this population are scarce. Herein, we report our experience with indications, complications, and outcome after cardiac surgery in renal transplant recipients.

## Methods

This retrospective study included 13 patients who underwent cardiovascular surgery after renal transplantation between 2010 and 2014 at University Hospital Centre Zagreb. All transplantations were from deceased donor. The

maintenance immunosuppressive regimen consisted of oral cyclosporine or tacrolimus, mycophenolic acid, and prednisone. Preoperative and postoperative laboratory values that were monitored included the complete blood count, coagulation parameters, urea, creatinine, and electrolytes levels. Indications for cardiovascular surgery, postoperative complications and outcome after the surgery were recorded.

## Results

Out of 1425 patients who received renal allograft at our institution, 13 patients underwent cardiac surgery. There were five female and eight male patients, aged from 46 to 75 (a median of 68) years, treated with dialysis for 6 years (range, 2–18 years). Two patients were treated with peritoneal dialysis, and 11 with hemodialysis. Primary renal diseases include polycystic kidney disease in two patients, juvenile nephronophthisis, hereditary nephritis, and focal segmental glomerulosclerosis in one patient each, while the others had chronic glomerulonephritis without biopsy. All patients had hypertension, and three of them developed new onset diabetes after transplantation. Immunosuppressive protocol included steroids and mycophenolate mofetil in all patients, while seven patients received cyclosporine and six tacrolimus.

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Trough levels for cyclosporine were 80–120 µg/L and 5–7 µg/L for tacrolimus.

Six patients (46%) had already had chronic renal allograft dysfunction with serum creatinine >3 mg/dL before the surgery. CVD was asymptomatic and was discovered incidentally during the clinical examination in 31% of patients, while in other patients, the leading symptoms were dyspnea and angina. Isolated coronary artery bypass grafting (CABG) was performed in five patients, valve replacement in six patients, reconstruction of the ascending aorta and aortic arch in one patient, and one patient underwent extraction of the cardiac myxoma. Three patients had simultaneous CABG and valve replacement. The interval between renal transplantation and cardiac surgery ranged between 1 and 243 months (a median of 65). Graft function transiently deteriorated in all patients. Four patients (31%) required acute hemodialysis after the surgery. Two of them gradually recovered renal function to preoperative values, while the other two patients lost their allograft function. Other patients returned to their preoperative serum creatinine levels. Postoperative course was complicated with infections of the lower respiratory tract in two patients, pericardial tamponade, unstable sternum with bleeding from the wound, increased drainage from the chest demanded additional hemostasis, and in-stent restenosis in a previously placed stents in one patient each. All patients survived surgery, but two of them who required valve replacement died on the fourth and 24th postoperative day. One of them required aortic valve replacement and the other simultaneous replacement of aortic and mitral valve, and had associated severe dyspnea and angina preoperatively at NYHA (New York Heart Association) Class III.

## Discussion

In the pathogenesis of CVD, traditional and non-traditional risk factors play an important role. Risk factors for the development of CVD after renal transplantation include hypertension, anemia, dyslipidemia, smoking, obesity, hypoalbuminemia, new-onset diabetes mellitus, and immunosuppressive therapy.<sup>2</sup> Steroids may accelerate the development of atherosclerotic plaques on coronary arteries.<sup>3</sup> In our study,

better outcomes were recorded in patients incidentally detected to suffer from cardiac disease during the clinical examination, with initially less associated risk factors, while serious complications were reported in symptomatic patients with multiple co-morbidities. Lethal outcome occurred in patients with combined valvular surgery and CABG. Transient deterioration of graft function may develop, but rarely permanent continuation of dialysis treatment is required what is consistent with previously published data.<sup>4,5</sup>

The aggressive and timely therapy, with careful follow-up of allograft function, may increase graft and patient survival. Thus, an early identification of patients with high operational risk, recognition, and treatment of modifiable risk factors may prevent complications even in the most difficult cases.

## Conclusion

In patients with functional renal allograft cardiovascular surgery procedures are safe, but associated with increased incidence of perioperative complications. In order to improve survival of renal transplant patients, influence on modifiable risk factors and screening of patients at increased cardiovascular risk are mandatory.

## Declaration of interest

The authors report no conflicts of interest.

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