



Case Report

Redo Tricuspid and Pulmonary Valve Replacement with On-X in Renal Transplant Patient: A Case Report

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Abstract

Surgical treatment is recommended in patients with symptomatic severe tricuspid regurgitation and pulmonary regurgitation. Although renal transplant patients are a high-risk patient group for cardiac surgery, heart valve surgeries can be performed successfully. There are a limited number of studies published on this subject in the literature. Therefore, we present a case who underwent tricuspid ring annuloplasty (TRA) before being followed up with renal transplantation and then successfully performed redo tricuspid valve replacement (TVR) and pulmonary valve replacement (PVR).

Keywords: On-X, pulmonary valve replacement, renal transplant, tricuspid valve replacement

Please cite this article as "Beyazal OF, Apaydin K, Yanartas M, Kayalar N. Redo Tricuspid and Pulmonary Valve Replacement with On-X in Renal Transplant Patient: A Case Report. Med Bull Sisli Etfal Hosp 2024;58(2):254–257".

Surgical treatment is recommended in patients with severe tricuspid regurgitation (TR) who are symptomatic.^[1] Similarly, surgical treatment is recommended in symptomatic patients with severe pulmonary regurgitation (PR).^[2] Kidney transplantation is the most important treatment for end-stage renal failure.^[3] Although renal transplant patients are a high-risk patient group due to the immunosuppressive drugs they have taken and comorbid diseases, heart valve surgeries can be performed with acceptable mortality and morbidity.^[4] We present a case who underwent tricuspid ring annuloplasty (TRA) before being followed up with renal transplantation and then successfully performed redo tricuspid valve replacement (TVR) and pulmonary valve replacement (PVR).

Case Report

A 47-year-old (59 kg) female patient presented with palpitations, shortness of breath, and pretibial edema. She had a history of TRA 9 years ago and a renal transplant 8 years ago. She also had active hepatitis B, hypothyroidism, and penicillin allergy. Patient characteristics, laboratory parameters, transthoracic echocardiography (TTE) findings, and right heart catheterization findings are shown in Table 1 and Figure 1. Liver and renal functions were normal. TTE revealed severe TR and severe PR. No pathology was detected in coronary angiography. She was using prednisolone, tacrolimus (2 mg/day), mycophenolic acid, and tenofovir for renal transplant and hepatitis B. His immunosuppressive drugs were stopped and he was operated on under methylprednisolone.

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Submitted Date: September 19, 2023 **Revised Date:** October 21, 2023 **Accepted Date:** November 01, 2023 **Available Online Date:** June 28, 2024

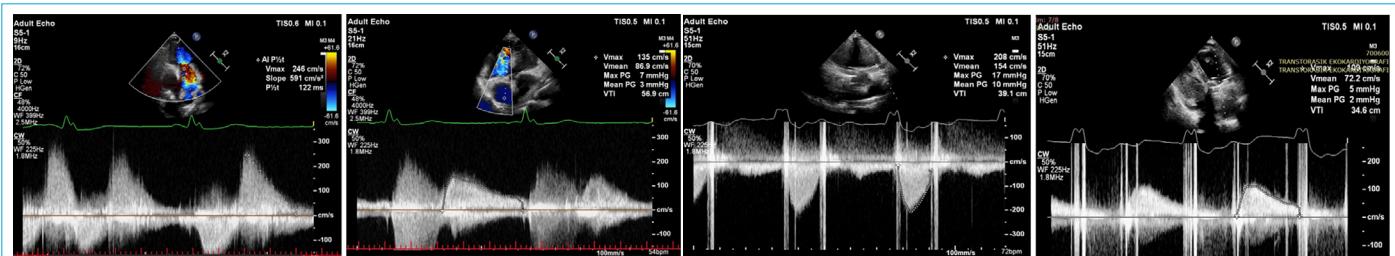
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Table 1. Patient characteristics, laboratory parameters, echocardiographic findings, and preoperative right heart catheterization findings

Demographic data	Preoperative	Postoperative 1st week
Height (cm)	160	
Weight (kg)	59	
Body mass index (kg/m ²)	23.05	
Body surface area (m ²)	1.61	
Laboratory parameters	Preoperative	Postoperative 1st week
White blood cells (x10 ⁹ /L)	6	4.47
Hemoglobin (g/dL)	11.9	8.2
Platelet (x10 ⁹ /L)	245	208
International normalized ratio	1	3.4
Urea (mg/dL)	39.1	42
Creatinine (mg/dL)	0.73	1.09
Glomerular filtration rate (ml/dk/m ²)	98	61
Aspartate aminotransferase (U/L)	23	14
Alanine aminotransferase (U/L)	32	19
C-reactive protein (mg/L)	3.5	37.2
Thyroid-stimulating hormone (mIU/L)	4.23	
Hepatitis B surface antigen (COI)	870	
Tacrolimus level (ng/mL)	7.26	4.24
Echocardiographic findings		
Ejection fraction (%)	55	60
Tricuspid regurgitation	Severe	None
Pulmonary regurgitation	Severe	None
Tricuspid annulus diameter (mm)	42	
Systolic pulmonary artery pressure (mmHg)	55	20
Left ventricular end-diastolic diameter (mm)	55	40
Left ventricular end-systolic diameter (mm)	31	
Tricuspid annular plane systolic excursion (mm)	18	12
Right heart catheterization parameters		
Mean pulmonary artery pressure (mmHg)	26	
Pulmonary vascular resistance (Wood U)	1	
Pulmonary capillary wedge pressure (mmHg)	21	

**Figure 1.** Transthoracic echocardiography images. The top figures show preoperative severe pulmonary and tricuspid valve regurgitation, Bottom figures show pulmonary and tricuspid valves with normal function postoperatively.

After redo sternotomy, aorto-bicaval venous cannulation was performed. After right atriotomy, it was seen that the tricuspid valve was repaired with a pericardial patch, and ring annuloplasty was performed. The ring was removed and the tricuspid valve was resected. TVR was performed with a 27/29 mm On-X (On-X Life Technologies, Austin, TX, USA) mechanical valve. A pulmonary arteriotomy was then

performed. Leaflet loss was observed in the valves and the valve was resected. PVR was performed using a 23 mm On-X mechanical valve with a pericardial patch. The pulmonary artery was closed primarily with a pericardial patch. Cross-clamp (XCL) time was 114 min, and cardiopulmonary bypass (CPB) time was 147 min. After the operation, there was a total drainage of 300 ml, and no blood products were

used. In the control TTE performed one week later, the tricuspid and pulmonary mechanical valves were functioning normally. Renal and liver functions were normal at follow-up. After the operation, treatment with methylprednisolone was continued, and after the 2nd day, the preoperative drugs were started again by adjusting the appropriate dose. However, during the follow-up period, aphthous ulcers began to develop in his mouth, which later decreased with the local drugs given. The patient was taken to the service on the 2nd postoperative day and was discharged on the 12th day after being prescribed warfarin without any complications. No cardiac or renal complications were detected during the 4-month follow-up period.

Discussion

Today, as a result of the developments in immunosuppressive treatments and surgical techniques, more complex patient groups have started to be operated on. Complications may develop in many organs and systems because patients waiting on the transplant list can survive longer, both due to their comorbid conditions and the immunosuppressive drugs they take.^[5] It has been reported that altered calcium metabolism, hemodialysis access infections and consequent endocarditis may contribute to the development of heart valve disease in patients with renal failure.^[4] In addition, increased fragility of the leaflet tissue is observed due to long-term steroid use in renal transplant recipients.^[6] While cardiac surgery can be performed with low morbidity and mortality in patients with renal transplantation and stable allografts, the risk of infectious complications may increase. In addition, if there is graft failure requiring dialysis, cardiac operations are associated with high mortality.^[7] In this report, we present a patient who had active hepatitis B, had a previous history of TRA, and required a redo operation due to severe TR and PR, in addition to the fact that the renal transplant itself and the immunosuppressives he received increased the risk of operation. Since the patient was severely symptomatic despite medical treatment, it was decided to perform TVR and PVR. The operation was completed successfully and TTE findings in the 1st week postoperatively showed no TR and PR, a decrease in systolic pulmonary artery pressure (sPAP), and left ventricular end-diastolic diameter (LVEDD). In the literature, many cases of renal transplants with a history of cardiac surgery or valve replacement have been reported.^[8] However, to the best of our knowledge, there is no published study with a renal transplant patient with redo TVR and PVR.

Since our patient had a renal transplant, we did not use a bioprosthetic valve due to the risk of degeneration. It has been shown that when On-X mechanical valves are used in the aortic position, they can be used safely in the Interna-

tional Normalized Ratio (INR) of 1.5-2.0.^[9] However, to the best of our knowledge, there is no study in the literature for the use of the On-X valve in the tricuspid and pulmonary positions with lower INR. In our case, we performed TVR and PVR with an On-X mechanical valve and followed the INR value between 2.5-3.0. There were no complications during the follow-up period.

Acute kidney injury is a common and important cause of morbidity and mortality after cardiac surgery.^[10] CPB use, nephrotoxic drugs used, hemodynamic instability, and blood products used are also important risk factors. Our patient had a high risk of renal failure because she was a renal transplant patient and had undergone redo surgery. However, as in our case, the risk of renal failure can be reduced with the duration of XCL and CPB, which can be considered short, especially for redo surgery. This risk can be reduced by meticulous bleeding control and not using blood products, as in our case. Additionally, by ensuring hemodynamic stability, closely monitoring fluid balance, avoiding nephrotoxic agents, carefully adjusting immunosuppressive medication, and without the need for inotropes, we did not experience any renal complications during the entire follow-up period.

Long-term steroid administration has been reported to increase the risk of perioperative bleeding.^[6] However, in our case, despite receiving immunosuppressive therapy for 8 years and performing redo TVR and PVR, no major bleeding was observed and no blood products were used in the postoperative period. We think that the duration of XCL and CPB is not long, as in our case, and that meticulous surgery is very important in this regard.

Infection is one of the most common complications after solid organ transplantation.^[7] Since our patient was allergic to penicillin, vancomycin was given with the suggestion of infectious diseases. Afterward, aphthous ulcers developed in the mouth then healed with local drugs, and no other major infectious complications were experienced. Therefore, caution should be exercised in terms of postoperative infection in patients receiving immunosuppressive therapy.

Cardiac surgery and CPB can cause postoperative allograft loss. In our case, there was no deterioration in renal function after the operation. The fact that CPB duration is not long, meticulous surgery, and stable allograft functions in the preoperative period are effective in this.

Conclusion

In renal transplant patients, redo TVR and PVR operations can be performed effectively and safely with the On-X valve. Postoperative results are better in patients with stable preoperative graft functions. Care should be taken

against infections that may occur in the postoperative period, and the doses of immunosuppressive drugs should be carefully adjusted.

Disclosures

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – O.F.B., K.A., M.Y., N.K.; Design – O.F.B., K.A., M.Y., N.K.; Supervision – M.Y., N.K.; Materials – O.F.B., K.A.; Data collection &/ or processing – O.F.B., K.A.; Analysis and/or interpretation – O.F.B., K.A., M.Y., N.K.; Literature search – O.F.B., K.A.; Writing – O.F.B., K.A., M.Y., N.K.; Critical review – O.F.B., K.A., M.Y., N.K.

Use of AI for Writing Assistance: None declared.

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