

On-Pump Coronary Artery Bypass Grafting in a Patient With Renal Transplant and Familial Hypercholesterolemia: Case Report (Paraphrased Version)

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1. Introduction

Coronary artery bypass grafting (CABG) remains one of the most commonly performed surgical procedures for advanced coronary artery disease. In the on-pump technique, the heart is temporarily arrested and circulation is maintained using a cardiopulmonary bypass machine. While this approach allows precise surgical control, it is associated with potential complications affecting multiple organ systems, including the heart, kidneys, brain, and lungs.

Familial hypercholesterolemia (FH) is an inherited lipid disorder characterized by lifelong elevation of low-density lipoprotein (LDL) cholesterol levels. This condition significantly accelerates atherosclerosis and predisposes individuals to premature coronary artery disease, often requiring early interventional or surgical management.

Patients who have undergone renal transplantation represent another high-risk group in cardiovascular surgery. Although transplantation restores kidney function, long-term immunosuppressive therapy is necessary to prevent graft rejection. These medications increase susceptibility to infections and may also complicate perioperative management, particularly during major cardiac operations.

This report presents the case of a young renal transplant recipient with severe familial hypercholesterolemia who successfully underwent on-pump CABG surgery for multivessel coronary artery disease.

2. Case Presentation

A 19-year-old male patient presented with complaints of chest pain on exertion persisting for approximately one month. His medical history was notable for kidney transplantation performed at the age of 12 due to end-stage renal failure. He had also been diagnosed

with familial hypercholesterolemia.

There was no history of diabetes mellitus, hypertension, smoking, or familial coronary artery disease. The patient was on chronic immunosuppressive therapy, including cyclosporine and mycophenolate mofetil, and was also receiving high-dose statin therapy for lipid control.

On physical examination, the patient was hemodynamically stable with normal vital signs. Cardiovascular and respiratory examinations did not reveal any abnormal findings. A visible scar from prior renal transplantation was present in the abdominal region.

Laboratory investigations demonstrated preserved renal graft function, with an estimated glomerular filtration rate within normal limits. However, lipid profile analysis revealed markedly elevated total cholesterol and LDL cholesterol levels, consistent with severe familial hypercholesterolemia.

Electrocardiography showed ST-segment depression and T-wave abnormalities suggestive of myocardial ischemia. Transthoracic echocardiography revealed normal left ventricular systolic function and no valvular pathology.

Coronary angiography identified severe triple-vessel coronary artery disease, with significant stenosis exceeding 75% in the proximal left anterior descending artery, circumflex artery, and right coronary artery.

Based on these findings, surgical revascularization was recommended.

3. Surgical Management and Postoperative Course

The patient underwent on-pump coronary artery bypass grafting. Revascularization included the left internal mammary artery to the left anterior descending artery, along with additional grafts to the diagonal branch, circumflex obtuse marginal branch, and posterior descending artery of the right coronary circulation.

Given the patient's history of renal transplantation, particular attention was paid to preserving renal function throughout the perioperative period. To minimize potential complications, the surgical team opted for a saphenous vein graft rather than radial artery harvesting.

At the conclusion of surgery, low-dose inotropic support with dopamine and nitroglycerin was initiated. The patient was transferred to the intensive care unit in stable condition. Due to a fast-track anesthesia protocol, early extubation was achieved without complications.

Postoperative recovery progressed smoothly. The patient was mobilized on the first postoperative day, and chest drains were removed on the second day. No significant complications were

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observed during hospitalization, and he was discharged on the eighth postoperative day in stable condition.

Follow-up evaluation at five months post-surgery demonstrated excellent recovery, with the patient remaining asymptomatic and showing no evidence of graft dysfunction or cardiac complications.

4. Discussion

Coronary artery bypass surgery is typically performed in older patients; however, younger individuals with severe genetic lipid disorders such as familial hypercholesterolemia may also require early surgical intervention due to accelerated atherosclerosis. FH is associated with significantly elevated LDL cholesterol levels from birth, leading to early-onset and aggressive coronary artery disease. Renal transplant recipients present additional challenges in cardiac surgery due to long-term immunosuppressive therapy, which increases the risk of infection and may affect wound healing and organ function. Therefore, perioperative management in such patients requires careful planning and close monitoring.

In this case, the coexistence of familial hypercholesterolemia and prior renal transplantation significantly increased the complexity of management. Severe multivessel coronary artery disease developed at an unusually young age, highlighting the aggressive nature of FH.

Despite these challenges, on-pump CABG was successfully performed with favorable outcomes. The patient tolerated the procedure well, and no perioperative renal complications were observed. This case demonstrates that even in high-risk patients with multiple comorbidities, successful surgical outcomes are achievable with careful operative planning and multidisciplinary care.

5. Conclusion

This case illustrates the successful use of on-pump coronary artery bypass grafting in a young patient with a history of renal transplantation and familial hypercholesterolemia. Although such patients carry increased perioperative risks due to immunosuppression and severe dyslipidemia, meticulous surgical technique and coordinated perioperative management can result in excellent outcomes.

The report emphasizes the importance of early detection and aggressive treatment of coronary artery disease in genetically predisposed and post-transplant patients. Individualized surgical strategies and close postoperative follow-up are essential to ensure long-term success and patient safety.

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