



Coronary Artery Bypass Grafting in Kidney and Pancreas Transplantation: First Case in Turkey and a Short Literature Review

Burçin Abud¹, Cengiz Özbek¹, Soysal Turhan¹, Kemal Karaarslan¹, Yücel Karaman²

¹ Tepecik Training and Research Hospital, Clinic of Cardiovascular Surgery, İzmir, Turkey

² Tepecik Training and Research Hospital, Clinic of Anesthesiology and Reanimation, İzmir, Turkey

ABSTRACT

A 37-year-old man with symptoms of cardiovascular disease applied to our hospital. Seven years ago, he had undergone combined kidney and pancreas transplantation. Afterwards, 4 years ago, his renal transplantation was repeated because of rejection. Coronary artery angiography revealed two-vessel coronary artery stenosis. We performed coronary artery bypass grafting to treat the coronary artery disease. The post-operative period was uneventful, and he was discharged from the hospital without any complications. Coronary artery diseases in recipients of combined kidney and pancreas transplantation can be safely treated using coronary artery bypass grafting.

Key Words: Combined kidney and pancreas transplantation; kidney transplantation; coronary artery disease; coronary artery bypass graft; cardiopulmonary bypass

Pankreas-Böbrek Nakili Hastalarda Koroner Arter Baypas Cerrahisi: Türkiye'deki İlk Olgu ve Literatürden Kısa Bir Derleme

ÖZET

Otuz yedi yaşında erkek hasta kardiyovasküler hastalık şikayetleri ile hastanemize başvurdu. Hasta 7 yıl önce kombine pankreas-böbrek nakli, 4 yıl öncede nakili böbreğin rejeksiyonundan dolayı ikinci kez böbrek nakli olmuş idi. Koroner anjiyografi ile iki damar koroner arter hastalığı tanısı konan hastaya koroner arter baypas cerrahisi uygulandı. Hastanın postoperatif dönemi stabil seyretti ve hasta sorunsuz bir şekilde taburcu edildi. Koroner arter hastalığı gelişen kombine pankreas-böbrek nakili hastalarda koroner arter baypas cerrahisi güvenli bir şekilde uygulanabilir.

Anahtar Kelimeler: Kombine pankreas-böbrek nakli; böbrek nakli; koroner arter hastalığı; koroner arter baypas cerrahisi; kardiyopulmoner baypas

INTRODUCTION

The advances in surgical techniques and immunosuppressive drugs, better recipient selection and better organ preservation have improved the survival of patients after abdominal solid organ transplantation. Thus, there has been an increase in transplant patients with a cardiovascular disease who are older. This has resulted in an increase in transplant patients who subsequently require cardiac surgical procedures. A strategy to protect the transplanted organs is important. In particular, cardiopulmonary bypass (CPB) is commonly performed during cardiac surgical procedures. CPB causes problems for the transplanted organs and can be a reason for rejection. We report coronary artery bypass grafting using CPB in a recipient of combined kidney and pancreas transplantation and a simple strategy to safely perform this procedure.

CASE REPORT

We report a 37-year-old man with a history of type 1 diabetes mellitus and end-stage renal disease who was submitted for combined kidney and pancreas transplantation in 2004. In 2007, he lost his kidney graft because of chronic rejection and underwent a second renal transplantation. Kidney and pancreas transplant rejection was being suppressed with micophenolate mofetil (1 g/day) and tacrolimus (2 mg/day). The patient was referred to our cardiothoracic surgery department following coronary artery angiography and a diagnosis of the two-vessel coronary artery disease. Angiography was performed because of mild angina

Correspondence

Burçin Abud

E-mail: burcinabud@hotmail.com

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symptoms that appeared approximately 2 months before the examination. In our pre-operative evaluation, the patient was found to have a normal blood pressure of 130/85 mmHg and a heart rate of 72 beats/min. Biochemical analysis revealed low fasting plasma glucose (FPG) levels, despite normal postprandial plasma glucose (PPG) levels. FPG and PPG levels were 48 and 111 mg/dL, respectively. His renal function results were almost normal. Creatinine and blood urea nitrogen levels were 1.0 and 52 mg/dL, respectively. We consulted our hospital endocrinology clinic for the evaluation of low FPG levels. They confirmed that it was because of the pancreas transplantation with a continuous autoimmune process in which hyperplasia of the beta cell of the pancreas cause low FPG levels. They advised pre-operative dextrose infusion and perioperative blood glucose monitoring. Our patient was scheduled for an elective on-pump coronary artery bypass graft (CABG) surgery. The indication for the surgical revascularisation of our patient was based on his two-vessel disease, which included a 95% stenosis of the proximal left anterior descending artery and a 100% stenosis of the proximal obtuse marginal artery. Both echocardiography and ventriculography revealed no additional pathologies, with a left ventricular ejection fraction of 55%.

We preoperatively administered dextrose infusion, and his FPG level increased to 91 mg/dL. We did not change the maintenance of immunosuppression before cardiac surgery. On the morning of the surgery, we administered a dose of oral immunosuppressive drugs. After the induction of anaesthesia, prophylactic stress doses of corticosteroid were intravenously administered (40 mg methylprednisolone). During surgery, anatomical conditions in the thorax appeared normal, and a double on-pump bypass surgery with one arterial (left internal mammary artery to left anterior descending artery) and one venous (vena saphena magna) graft (to the first obtuse marginal branch) was performed without any problems, with the aid of moderate hypothermia and cardioplegia with an isothermic blood solution. A high mean perfusion pressure was maintained to protect the transplanted kidney and pancreas (70 mmHg). The patient stayed in the intensive care unit for 3 days. During post-operative recovery, the patient resumed the immunosuppressive drugs without any change. A maintenance dose of steroid was orally administered. Prophylactic nephroprotective antibiotics were postoperatively administered for 5 days. Glucose monitoring was performed to maintain FPG and PPG levels within normal levels. The post-operative peak values of blood urea nitrogen and serum creatinine were 58 and 1.1 md/dL, respectively. The renal and pancreas functions had not deteriorated. He was discharged from the clinic on the post-operative day 11, without any complications. Follow-ups at 1 week, 1 month and 6 months after discharge revealed no pathologies, and our patient was well.

DISCUSSION

The incidence of diabetic nephropathy is rapidly increasing, and combined kidney and pancreas transplantation is the best

treatment option for patients with diabetes having advanced end-stage renal disease⁽¹⁻³⁾. A successful kidney and pancreas transplantation improves the quality of life of the recipient, ceases insulin administration and dialysis and inhibits and improves long-term diabetic complications^(1,4). The advances in surgical techniques and immunosuppressive drugs have improved the survival of recipients of combined kidney and pancreas transplantation. Thus, more transplant recipients are being referred for the evaluation and treatment of cardiovascular diseases, particularly coronary artery disease. Cardiovascular events are the most common cause of morbidity and mortality in these patients. Although several reports show that the presence of a functioning pancreas and kidney graft has positive effects on lipid profiles, reduces the progression of coronary atherosclerosis, improves cardiac function and reduces death rates from cardiovascular causes, a recipient kidney and pancreas transplantation is a high-risk candidate for a cardiac disease^(5,6). The long-term use of immunosuppressive drugs and steroids with their complications and the possibility of an inherent other end-organ dysfunctions are causes for this high risk. Eschertzhuber et al. reported a rate of 44.05% coronary artery disease, which was proven with coronary angiography in kidney and pancreas transplantation⁽⁷⁾. Similar results were reported by other studies^(8,9).

Medical therapy, percutaneous coronary interventions and coronary artery bypass grafting are all treatment options for these high-risk candidates. Coronary artery bypass grafting can improve the quality of life for these patients, but the use of CPB has several disadvantages. The damage to the host immune response is very high. This is particularly destructive for patients on immunosuppressive regimes and can cause severe infections and problems in healing wounds^(10,11). The other disadvantage is the low perfusion pressure that can cause allograft failure⁽¹¹⁾.

Despite the fact that the avoidance from CPB appears to be the best possible surgical strategy in these patients, via simple methods CPB becomes a minor issue. The most serious problem is graft rejection. There are three main principles to prevent this problem.

First, immunosuppressive treatment should not be preoperatively discontinued. The patient must receive medications on the operation day. The same administrations must continue postoperatively^(12,13). In case of nutrition difficulties, immunosuppressive drugs must be applied by nasogastric tubes⁽¹³⁾. We also continued our immunosuppressive drugs by these perioperative principles.

Second, the other option is pulse steroids (100 mg hydrocortisone or 25-30 mg methylprednisolone). There are different medical reports on this topic. Some authors advocate pulse steroid administrations with anaesthesia induction. On the other hand, other centres may have different praxis by pulse steroid indications. They solely use this strategy for cases with a suspicion of rejection. The latter group believes

that pulse steroids for regular cases without the signs of rejection are not required⁽¹²⁻¹⁴⁾. There is always a risk of an infection and a perioperative bleeding tendency with pulse steroid applications^(13,14).

In our case, we applied pulse steroids at the beginning of anaesthesia at the suggestions of organ transplantation and nephrology departments because there was a medical record of rejection of the first transplanted kidney. Immunosuppressive treatment was continued orally at the post-operative period. Later, we gradually ceased this medication. We did not experience any perioperative bleeding or infection.

Finally, the third important point is the adequate perfusion of transplanted allografts, intraoperatively. Thus, a higher perfusion pressure during CPB is essential^(12,13,15). By this principle, our perfusion pressure was 70 mmHg during this period to protect the transplanted kidney and pancreas.

There is no other means to avoid infections that arise from the usage of CPB. The routine intravenous antibiotic protocol in open heart surgery is applied^(12,13). The important point is to choose an antibiotic that is not toxic to the kidney.

On the other hand, it is possible to observe hypoglycaemia in a percentage of about 30%-50% among patients with pancreas transplantations⁽¹⁶⁾. This was the case in our patient. With the consultation from the endocrinology department, we administered dextrose infusion preoperatively. Therefore, we were able to reach a secure state with normal blood glucose levels before surgery. Afterwards, we followed the blood glucose levels closely. There was no need for glucose infusion during surgery because the blood glucose levels were within the normal limits. However, we postoperatively administered dextrose infusions when required.

Thus, because of the requirement of CPB, an open heart surgery may present a more severe organ and blood cells with a negative effect when compared to other surgeries. This is particularly very important for transplanted organs where there is always a high risk of rejection. Despite the fact that off-pump surgery may seem to be the best option by avoiding CPB, this surgical technique is not always practicable. For the cases with transplanted kidney and pancreas, it is possible to avoid and minimise the negative effects of CPB on these organs via the simple methods that we described above. In this manner, an open heart surgery by CPB can be safely performed in patients with organ transplantations.

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