Coronary Artery Bypass Grafting in the Acute Phase After Renal Transplantation
—— Report of a Case ——

Tomoe Katoh, MD; Yoshitaka Ikeda, MD; Hidenori Gohra, MD; Kimikazu Hamano, MD; Yoshihiko Fujimura, MD; Kensuke Esato, MD; Akihiko Aoki, MD*; Katsusuke Naito, MD*

To the best of our knowledge, only 3 cases of coronary artery bypass grafting (CABG) performed under cardiopulmonary bypass (CPB) on patients in the chronic phase after renal transplantation have been reported in Japan. The first case of a patient who underwent CABG in the acute phase after renal implantation in Japan is herein described. Perioperatively, oral immunosuppressive agents were discontinued and they were given intravenously. Cyclosporin A (Cy-A) was administered via a continuous intravenous infusion in the acute phase after renal transplantation and closely monitored, because the blood concentration of Cy-A can vary a great deal during the perioperative period. This case report serves to demonstrate that as long as appropriate immunosuppressive drugs are perioperatively administered, CABG under CPB can be safely performed on patients who have undergone renal transplantation without subsequent rejection, infection, or renal damage, even during the acute phase. (Jpn Circ J 1999; 63: 309–311)

Key Words: Coronary artery bypass grafting; Open heart surgery; Renal transplantation

Perioperative management is thought to be crucial in performing open-heart surgery on patients who have undergone renal transplantation. These patients are administered immunosuppressants, and are susceptible to infection or rejection. Moreover, the use of cardiopulmonary bypass (CPB) in open heart surgery causes renal function and levels of immunosuppressants to become unstable. Thus, the perioperative management of patients with a transplanted kidney during coronary artery bypass grafting (CABG) is very important. We report herein a case of patient who underwent CABG in the acute phase after renal transplantation. Particular attention is focused on the method used for administering immunosuppressants to this patient perioperatively.

Case

The patient was a 43-year-old man weighing 53.5 kg, who suffered angina pectoris and myocardial infarction in the posterior descending area after undergoing renal transplantation with a graft from his mother on June 4, 1996. He had undergone hemodialysis since the age of 41 year old. Emergency coronary angiography revealed 75% stenosis in the posterior descending artery (4PD), 75% stenosis in the midportion of the left anterior descending artery (mid-LAD), and 75% stenosis in the posterolateral branch (PL). Thus, 50 days after the renal transplantation, CABG of the 4PD, mid-LAD, and PL was performed under CPB. The CPB time was 206 min, and aortic cross-clamp time was 152 min. The single clamp method was used due to calcification of the ascending aorta. During CPB 440 ml of blood was transfused, and 640 ml of blood after CPB. We applied 1500 rad of irradiation to all blood in order to prevent graft versus host disease (GVHD). Preoperatively oral cyclosporin A (Cy-A), mizoribine, and methylprednisolone had been administered at 250 mg/day, 175 mg/day, and 20 mg/day, respectively. The trough level of Cy-A had been maintained at 100–300 ng/ml. The day before surgery, the oral Cy-A was changed over to a continuous intravenous infusion of 2.0 mg kg\(^{-1}\) day\(^{-1}\), or one third the oral dosage. The oral methylprednisolone was also changed to intravenously administered hydrocortisone Na at 200 mg/day. Mizoribine was discontinued. The blood concentration of Cy-A was 388.2 ng/ml just before CPB, 204.7 ng/ml during CPB.
CPB, and 264.8 ng/ml after CPB (Fig 1). As the blood concentration of Cy-A increased to 451 ng/ml on the 1st postoperative day, the dosage of intra-venous Cy-A was decreased to 1.0 mg kg\(^{-1}\) day\(^{-1}\). On the 3rd postoperative day the patient reverted to the preoperative oral dosage of Cy-A, and the intra-venous infusion was discontinued. The dosage of Cy-A was adjusted to maintain a trough level within a range of 100 ng/ml to 300 ng/ml (Fig 2).

The urine output remained at over 1500 ml/day. Although the serum creatinine level increased to 2.07 mg/dl on the 1st postoperative day, it decreased to 1.36 mg/dl, a level compatible with the preoperative value of 1.22 mg/dl. The creatinine clearance, which had been 31.8 L/day preoperatively, was also maintained at 35 L/day until the 13th postoperative day.

The ratio of CD4/CD8 lymphocytes, which had been 0.33 preoperatively, was 1.02 on the 3rd postoperative day, and 0.83 on the 7th postoperative day. There were no signs of rejection of the transplanted kidney.

The patient was transferred to the Department of Internal Medicine on the 14th postoperative day. Although he has no symptoms of angina 2 years after the operation, hemodialysis was commenced 22 months after CABG. Despite there being no signs of rejection, his renal function deteriorated due to recurrent pyelonephritis 10 months after CABG.

**Discussion**

The first case of open heart surgery performed in a patient who had undergone renal transplantation was documented in 1975.\(^1\,^2\) and since then several reports of open heart surgery after renal transplantation have been published throughout the world.\(^3\,^5\) Only 3 reports, however, have been published in Japan.\(^6\,^8\) All these patients were in the chronic phase and underwent open heart surgery 3 to 9 years after renal transplantation.

Immunosuppressive therapy for each of these 4 patients was different: one was administered 2 immunosuppressive agents, and the others were administered 3 immunosuppressive agents including Cy-A. The perioperative immunosuppressive therapy for the patient given 2 immunosuppressive agents involved the intravenous steroid administration for 2 days postoperatively. Then, from the 3rd postoperative day on ward, the patient reverted to the same drugs as given preoperatively. Although oral Cy-A was changed to intravenous Cy-A in the patients given 3 immunosuppressive agents, the methods and dosages differed among them. Plasmapheresis during CPB is possible, but this therapy has not been used in these patients because immunosuppressive drugs are considered effective.

In our case, as the patient was in the acute phase after renal transplantation, prevention of rejection was thought to be of the utmost importance. Blood levels of Cy-A were therefore maintained in the relatively high range of 200–300 ng/ml. In the earlier case reports, the blood level of Cy-A was maintained at 50–100 ng/ml, because protection against infection was thought to be more important. This difference in the Cy-A dosage is thought to depend on whether the post-transplant phase is acute or chronic. According to yet another report, the perioperative intravenous dosage of Cy-A was determined as one third of the oral dosage which was adjusted during and after CPB. However, in our case, the blood level of Cy-A increased to an unacceptable level. Thus, the dosage of Cy-A was reduced, and the method of administration was changed from intravenous to oral on the 3rd postoperative day. The blood level of Cy-A was also unstable with oral Cy-A for 1 week after open-heart surgery in this patient. Therefore, blood levels of Cy-A should be frequently determined for...
at least for 1 week after open-heart surgery, because of a tendency to become unstable in the perioperative period, and the dosage of Cy-A should be adjusted accordingly.

In conclusion, the appropriate perioperative use of immunosuppressive agents allows CABG to be performed under CPB even in the acute phase after renal transplantation without rejection, infection or deterioration of transplanted renal function.

References