Case Report

Investigation of Coronary Artery Bypass Grafting for a Patient with Myelodysplastic Syndrome

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A 79-year-old male with unstable angina, who had myelodysplastic syndrome (MDS), underwent coronary artery bypass grafting (CABG). MDS causes refractory anemia accompanied by various degrees of granulocytopenia and thrombocytopenia. Pancytopenia caused by MDS may complicate patients with major infections and bleeding during cardiac surgery. There were very few patients with MDS who had undergone open-heart surgery. Three case studies, including this study, had reported successful cases of CABG in patients with MDS and the analogous diseases of MDS. We used granulocyte colony-stimulating factor (G-CSF), red blood cells (RBCs) and platelet transfusions in the peri-operative state. We did not need a large amount of transfusion of RBCs and platelets in intra-operative and post-operative states. We prevented major bleeding and severe wound infections in the acute post-operative state. (Ann Thorac Cardiovasc Surg 2001; 7: 250–3)

Key words: myelodysplastic syndrome, coronary artery bypass grafting, granulocyte colony-stimulating factor

Introduction

Patients with myelodysplastic syndrome (MDS) most commonly have refractory anemia accompanied by various degrees of granulocytopenia and thrombocytopenia. At the time of cardiac surgery, both major infections and bleeding are severe complications in patients with pancytopenia due to MDS. However, there were very few patients with MDS who had undergone open-heart surgery. In our investigation, 2 patients, excluding our experiences, were reported as successful cases of coronary artery bypass grafting (CABG) on patients with MDS and analogous diseases of MDS.[1,2] In those papers, they transfused a large amount of RBCs and platelets to prevent bleeding and used granulocyte colony-stimulating factor (G-CSF) to prevent infections. In this paper, we report the case of an elderly patient with pancytopenia caused by MDS, who underwent CABG. We used G-CSF and red blood cell (RBCs) and platelet transfusions in the peri-operative state. Also, it was unnecessary to transfuse a large amount of RBCs and platelets for bleeding in the intra-operative and post-operative states. We prevented major infection by using G-CSF and antibiotics in the early post-operative state.

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Case Report

The patient was a 79-year-old male with chest pain. It was determined that he had pancytopenia through blood examinations on admission. The coronary artery angiography showed 25-50% stenosis in the right coronary artery (RCA), 90% stenosis at the left main trunk (LMT), 75% stenosis at #7 in the left anterior descending branch (LAD), 75% stenosis at #9 in LAD and 75-90% stenosis at the intermediate (IM). The ejection fraction was calculated at 67%.

After admission, the pancytopenia developed day by day. Later, he received transfusions of red blood cells (RBCs), but the pancytopenia advanced and transfusions were necessary. After that, he was diagnosed with refractory anemia (RA)-type myelodysplastic syndrome

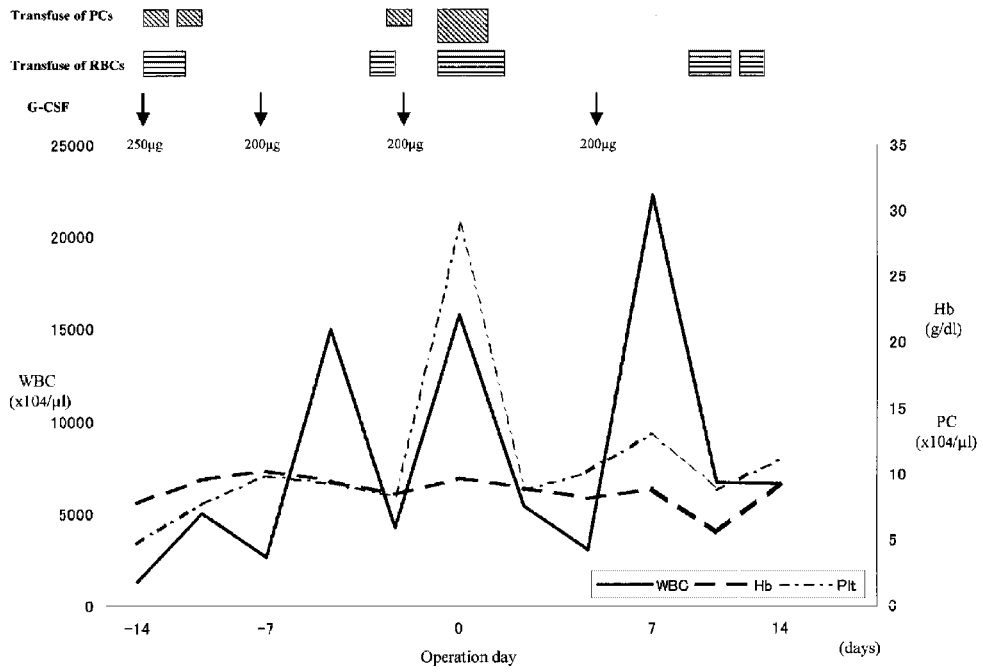

Fig. Perioperative hematological data and preoperative and postoperative transfusions. WBC: white blood cell counts, Hb: hemoglobin values, Plt: platelet counts, RBCs: red blood cells, PCs: platelets, G-CSF: granulocyte colony-stimulating factor.

(MDS) by bone marrow examination. Afterwards pancytopenia progressed and he complained of chest pain even at rest. At the beginning, transfusion provided him relief from symptoms. However, the pancytopenia advanced causing increased angina attacks. We could not relieve the chest pain through medication or transfusion. His symptom developed from effort angina pectoris to severe unstable angina pectoris (III B, Braunwald).

In the preoperative state, we had given RBC transfusions and injected granulocyte colony-stimulating factor (G-CSF) (Fig.). Fourteen days before the operation, the patient's whole white blood cell (WBC) count was 1850/μl, red blood cell (RBC) count was 245×104/μl ,Hb count was 8.4 g/dl and platelet count was 4.8×104/μl. Finally, on the day prior to the operation, almost all data showed improvements. The WBC count was 2770/μl, RBC count was 301×104/μl, Hb count was 9.6 g/μl and platelet count was 8.0×04/μl.

In the surgery, CABG was performed for the LAD and left circumflex branch (Cx). The left internal thoracic artery was anastomosed to the LAD, and a saphenous vein graft was implanted on the Cx. We had performed the operation with moderate hypothermic cardiopulmonary bypass and with antegrade and retrograde blood cardioplegia. The extracorporeal circulation time was 128 minutes and the aorta cross-clamp time was 106 minutes. In this operation, we used heparin as usual. We used 5 units of RBCs for extracorporeal circulation. After weaning from the cardiopulmonary bypass, we transfused 4 units of RBCs, 4 units of fresh frozen plasma (FFP) and 70 units of platelets during the operation. The major bleeding was obviated and we completed the operation. Finally, when the patient reached the intensive care unit (ICU), the WBC count was 15730/μl, RBC count was 300×104/μl, Hb count was 9.6 g/μl and platelet count was 28.9×104/μl. On the operative day, total bleeding from his drains was 705 ml in the ICU. His Hb decreased to less than 8.6 g/μl. We had to transfuse 4 units of RBCs on the first postoperative day. However, on the seventh postoperative day, it was not necessary to transfuse RBCs and platelets. His Hb stayed above 8.0 g/μl and the platelet count was above 8.8×104 /μl. The WBC had decreased gradually to 3040/μl for 6 days prior to operation. We injected G-CSF at a dose of 200 μg, which caused the neutrophil count to rise soon after. We prevented major bleeding and severe wound infections in the acute post-operative state.

Discussion

Recently, cardiac surgery for the aged has risen, and these elderly patients have various complications.

Table. The open-heart surgery in the patients with MDS and the analogue disease od MDS

Case No.	Author	Year of publication	Age / sex	Hematological disorder	Treatment
1	J. Shapiro et al.	1994	48 / female	Chronic neutropenia	CABG
2	T. Yamagishi et al.	1995	61 / male	MDS	CABG
3	Y. Miyagi et al.	2000	79 / male	MDS	CABG

CABG: coronary artery bypass grafting, MDS: myelodysplastic syndrome.

Myelodysplastic syndrome (MDS) is one of these complications. MDS patients mostly commonly have refractory anemia accompanied by various degrees of granulocytopenia and thrombocytopenia. It is recognized that MDS is caused by chronic and progressive blood dyscrasia. MDS often leads to an increased risk of infection and transfusional needs of RBCs and platelets.[3] The French-American-British Coopertive Group (FAB) has classified MDS into 5 categories.[4] The prognosis of this disease depends on these categories. Several types of MDS have a survival ratio of 40-60%. There are several treatments for those patients, but they are limited because of the refractory nature of this disorder to conventional cytoreductive chemotherapy and the relatively advanced age of patients with this disease. At present, we use allogeneic bone marrow transplantation for curative therapy; however, many elderly patients have not been treated with this therapy. Granulocyte colony-stimulating factors (G-CSF) have been used for the treatment of patients with MDS. G-CSF increases the neutrophil count in those patients, and may reduce the number and severity of infections. Of course, transfusion of RBCs and platelets is classical therapy for those patients.[3] A large amount of transfusion of RBCs may lead to multi-organ failure as a result of secondary hemochromatosis. Recently, recombinant human erythropoietin (r-HuEPO) has been widely studied for the treatment of the anemia associated with MDS.[4-6] In this case, the patient became anemic. We had to transfuse RBCs for the relief of chest pain. We had little time to the operation, and could not use r-HuEPO for anemia caused by MDS.

Patients with hematological disorders may be increased risk when they undergo open-heart surgery. The patients have some problems, such as immnological dysfunctions, disturbances of the coagulation system and so on.[7,8] In the previous literature, they had used extracorporeal circulation (ECC) in conventional open-heart surgery for those patients with hematological disorder. They also reported several complications accompanied by ECC.[7,8] However, with CABG; off-pump beating heart operations were performed at a lot of institutes. Nowadays, off-pump CABG is applied to patients with several other diseases in the recent reports.[9] In our case, his ischemic state developed from effort angina pectoris to severe unstable angina pectoris with severe stenosis of left main trunk. We selected conventional CABG because the patient's ischemic state was very instable and we thought that the operation was performed safely without taking into account the surgeon's skill and uncertainty of graft patency. There were very few patients with MDS who had undergone cardiac surgery. One of the reasons is that this disease is a comparatively recent category of hematological disorders. Moreover, another factor is that patients with MDS are relatively advanced in age. In our investigation, 2 patients with MDS and analogous diseases of MDS had undergone CABG outside our institute (Table). Yamagishi et al. had reported that the transfusion of HLA-matched platelets had prevented antiplatelet antibodies and severe bleeding.[2] Shapiro et al. had reported that colony-stimulating factors (G-CSF) have been shown to be effective in elevating the neutrophil count in patients with hematological disorders, and also in reducing the number and severity of infections.[1]

In this paper, we report a case of an elderly patient, who was a 79-year-old man, with pancytopenia caused by MDS. He had undergone CABG. We transfused RBCs and platelets and used G-CSF before the operation. Therefore, he had received CABG with almost normal counts of WBC, RBC and platelet levels. We had not needed a large amount of transfusion of RBCs and platelets in intra-operative and post-operative states. In addition, we had prevented major bleeding and infections by using G-CSF and antibiotics in the early post-operative state.

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