Case Report

Successful Replacement of Aortic Valve Using a Stentless Porcine Valve in a Patient with Myelodysplastic Syndrome

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Open heart surgery in patients with myelodysplastic syndrome (MDS) increases the risk of bleeding and infection. We document a 78-year-old female with severe aortic valve stenosis and MDS who underwent aortic valve replacement with stentless porcine prosthesis. Perioperatively, a transfusion of red blood cells (RBCs) and an infusion of granulocyte colony-stimulating factor (G-CSF) were needed for serious erythrocytopenia and leukocytopenia. We did not need a large amount of RBC transfusions in the postoperative course, and no infection was seen postoperatively. (Ann Thorac Cardiovasc Surg 2008; 14: 123–125)

Key words: aortic valve replacement, elderly (>70 years), heart valve stentless, hematology

Introduction

Surgical treatment of patients with hematologic disorders is frequently complicated by bleeding and infection. Especially, open-heart surgery requiring cardiopulmonary bypass is potentially hazardous because of the necessity for full heparinization and the destructive effects on all blood components. Myelodysplastic syndrome (MDS) is a set of oligoclonal disorders of hematopoietic stem cells characterized by ineffective hematopoiesis that manifests clinically as anemia, neutropenia, and/or thrombocytopenia of varying severity.[1,2] As a result, MDS is a transfusion-dependent anemia, which increases the risk of infection or hemorrhage, and has the potential to progress to acute myelogenous leukemia (AML). Here we document for the first time an MDS patient with severe aortic valve stenosis who underwent an aortic valve replacement that used a stentless porcine valve with extracorporeal circulation.

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Case Report

A 78-year-old female was admitted to our hospital because of paroxysmal orthopnea. The patient had been diagnosed with MDS with a subtype of refractory anemia by bone marrow examination. Her history had 3 years earlier included treatment for severe refractory anemia with frequent blood transfusions. Echocardiography revealed a reduced left ventricular function (EF = 46%), severe left ventricular hypertrophy, calcified aortic leaflets (Fig. 1), and severe aortic stenosis with an aortic valve area measuring 0.66 cm^2. After blood transfusions, an angiography and a right heart catheter showed a peak pressure gradient of 60 mmHg without high cardiac output (3.99 L/min). Coronary angiography was normal. Therefore aortic valve replacement was scheduled. On admission, laboratory tests exhibited leukocytopenia (2,000/μL) with a hemoglobin count of 5.6 g/dL. A differential blood count revealed 49% neutrophils, 28% lymphocytes, 15% monocytes, 5% eosinophils, and 3% basophils. To avoid perioperative anemia, the patient was transfused with six units of packed red blood cells (RBCs), resulting in a hemoglobin level of 11.2 g/dL preoperatively. On the day before surgery, a subcutaneous injection of granulocyte colony-stimulating factor (G-CSF) (Gran® 75 μg, Sankyo©) was performed. In the surgery, we performed the operation with moderate hypothermic cardiopulmo-

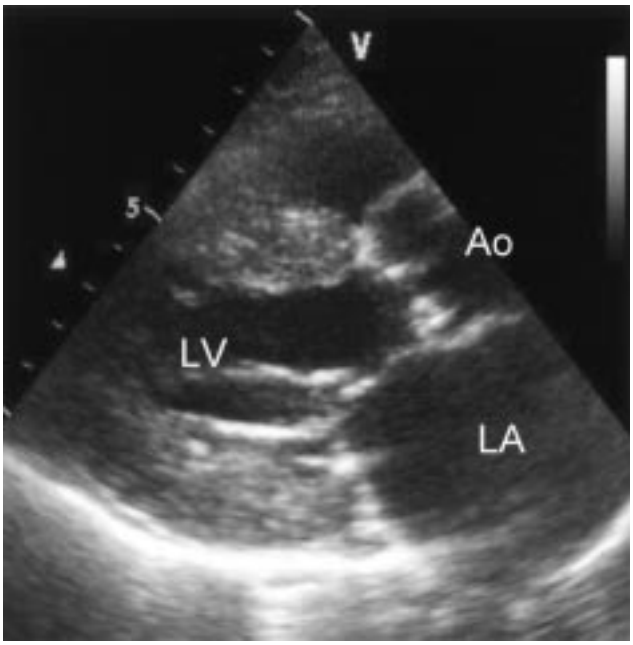

Fig. 1. Preoperative echocardiogram revealing aortic valve stenosis with severe calcification.
The size of the aortic annulus was 18 mm. Ao, aorta; LA, left atrium; LV, left ventricle.

nary bypass with antegrade and retrograde blood cardioplegia. The aortic valve was tricuspid with severely calcified cusps. It was completely excised, and a 21 mm porcine stentless prosthesis (PrimaPLUS®, Edwards Lifesciences©) was inserted by a modified subcoronary method. Extracorporeal circulation was discontinued after 164 min with an aortic cross-clamp time of 128 min. Despite adequate hemostasis, 8 units of packed RBC, 10 units of fresh frozen plasma, and 20 units of platelets were transfused because of constant bleeding. Antibiotic prophylaxis was performed using 2 g cefotiam (Pansporin®, Takeda©) intravenously over 5 days. The patient was transferred to the intensive care unit (ICU) with a hemoglobin count of 11.1 g/dL, 32.2% hematocrit, and 6,600/μL leukocytes. Thoracic drainage produced 928 mL. Extubation was performed after 13 h. On postoperative day 1, the patient was discharged from the ICU. Her postoperative course was uneventful, and she was discharged from the hospital with a leukocyte count of 3,600/μL, 9.7 g/dL hemoglobin, 28% hematocrit, and a platelet count of 14.9 $\times 10^4$/μL. The postoperative echocardiography showed that the mean transvalvular gradient of the stentless valve was 12 mmHg, and the effective orifice area was 1.60 cm^2. Further hematologic supervision was performed on an outpatient basis every 8 weeks.

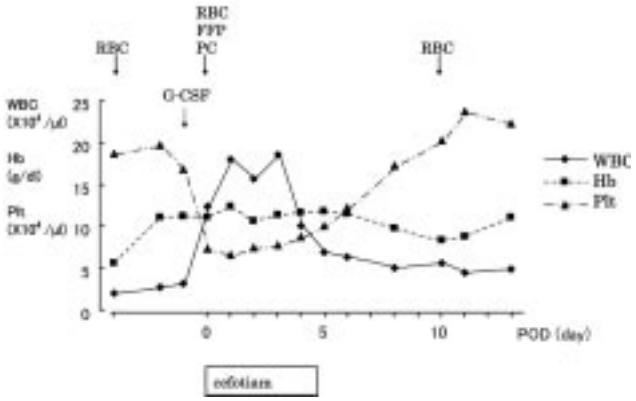

Fig. 2. Postoperative clinical course.
WBC, white blood cell counts; Hb, hemoglobin values; Plt, platelet counts; RBC, red blood cell; FFP, fresh frozen plasma; PC, platelet concentrate; G-CSF, granulocyte colony-stimulating factor; POD, postoperative day.

Discussion

MDS is a heterogeneous group of blood diseases usually presenting as refractory anemia or cytopenia with an approximately 25% risk of progression toward AML.[1,2] Literature on cardiac surgery in patients with MDS is extremely rare, and most of what is available reports coronary arterial bypass grafting.[3,4] Here, for the first time, we have documented an MDS patient who underwent an aortic valve replacement that used a stentless porcine valve with no complications.

Open-heart surgery in MDS patients is associated with several complications. For example, MDS-induced leukocytopenia increases the risk of postoperative infection; therefore, the prophylactic use of antibiotics is important. The use of G-CSF to stimulate neutrophil counts is also an option in this setting.[3,5] Moreover, hemolysis by complement activation from either the contact of blood with foreign materials during passage through the cardiopulmonary bypass circuit is another well known complication. Therefore we performed preoperative transfusion up to a normal hemoglobin level. Another complication in MDS is thrombocytopenia and the increased risk of bleeding with the use of extracorporeal circulation. Furthermore, platelet dysfunction in MDS is common and might cause bleeding complications instead of a normal platelet count.[6] Indeed, the perioperative bleeding was more severe than we had expected, though the preoperative platelet count was at normal lower limits. We therefore needed to administer the perioperative platelet substitution to reduce bleeding complications.

Aortic valve surgery in the elderly is becoming more common, with increasing numbers of septuagenarians and octogenarians being referred for surgery. Aortic stenosis is a unique pathological entity in the sense that surgery remains the only effective treatment. Evidence suggests that elderly patients have the potential to recover from and respond well to surgery, with improvements in their quality of life and survival.[7] The use of stentless valves in this age group might therefore be particularly beneficial.[8] Furthermore, in patients with reduced ventricular function (left ventricular ejection fraction <60%), a stentless valve may allow for greater improvement in left ventricular function.[9] Therefore we performed an aortic valve replacement with the stentless porcine valve on an elderly patient with left ventricular impairment.

Conclusion

We conclude that the implantation of a stentless porcine valve in the aortic position can be conducted in MDS patients even with the use of extracorporeal circulation. Special emphasis should be given to optimal preoperative patient preparation, including G-CSF administration and blood transfusions as well as antibiotic prophylaxis.

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