Acute Type A Aortic Dissection Treated By Cardiac Transplantation

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1. Introduction

Successful management of an acute Stanford type A aortic dissection in a cardiac allograft recipient has previously been reported [1]. However, and according to our knowledge, cardiac transplantation as a necessary treatment of this life-threatening disease has never been proposed. We describe here the unusual case of a young male operated on emergency for a complicated type A aortic dissection and who finally underwent a successful heart transplantation.

2. Case Report

A 49-year-old male with no prior medical history was referred to our hospital for chest pain and suspicion of aortic dissection. A transthoracic echocardiography showed an intimal flap in the lumen of the dilated ascending aorta and a massive aortic regurgitation (grade 3). A CT scan showed an acute Stanford type A aortic dissection (DeBakey type I). No associated ischaemic syndrome was evident at that time. The right coronary seemed dissected, the diameter of the ascending aorta was measured at 76 mm and haemopericardium was observed. Operation was performed in emergency through a median sternotomy. After heparinization, the cardiopulmonary bypass was established between the femoral right artery and the right atrium and the patient was cooled down to an oesophageal temperature of 18°C. After aortic cross clamping, cardioplegic arrest and myocardial protection were induced by repeated cold crystalloid cardioplegia and general hypothermia. After opening the aorta, the aortic root was inspected carefully and no intimal tear was found in the horizontal thoracic aorta. Under deep circulatory arrest, repair involves removal of the aortic valve and interposition of a valved conduit (Saint Jude Medical Valved Graft n°25, Saint Paul, Minnesota, USA) sewn to the distal aorta and then to the aortic annulus proximally. The coronary ostial buttons were both found dissected but repaired and reimplanted to the graft as described in the Bentall procedure. The left coronary orifice was sewn to the graft after repair using biological glue and a running suture of polypropylene 6/0. The right coronary orifice was also carefully reimplanted in the prosthetic tube and an additional aorto-coronary bypass using a venous graft was performed in order to increase the right coronary flow. Hypothermic circulatory arrest was 22 mn and total aortic cross clamping time was 235 mn. Patient was hardly weaned from cardiopulmonary bypass after 330 mn despite maximal pharmacologic support including high doses of inotropic and vasoactive drugs. In the operative field, acute left ventricular infarct with heart failure was obvious. Circulatory mechanical support was established to provide ventricular assist and good haemodynamic conditions. A femoro-femoral non pulsatile centrifugal pump (Rota Flow RF-32, Jostra Medizintechnik AG, Hirrlingen, Germany) including in the system a hollow fibre membrane oxygenator (Quadrox D, Jostra Medizintechnik AG, Hirrlingen, Germany) was implanted. Intraoperative bleeding
was massive and haemostasis required the use of recombinant activated factor VII (Novo-Seven, Novo Nordisk Inc, Princeton, NJ, USA) before to transfer the patient in intensive care unit.

In the follow up the peak of serum troponin I measurement was 740 ng/ml. Early postoperative transthoracic echocardiography confirmed the diagnosis of massive ischaemic left ventricular failure with ejection fraction of less than 10%. Oliguria and renal failure required postoperative continuous venovenous hemofiltration. Sedation was shortly interrupted in order to evaluate possible neurologic complications as sequelae of the previous complex cardiac surgical procedure but the patient was found orientated and without any neurologic deficit. After three weeks under ECLS, no myocardial recovery was observed and the ventricular function seemed severely impaired. Preservation of end-organ function was obtained thanks to the ECLS and the patient was registered in emergency for cardiac transplantation.

On the 23th postoperative day an orthotopic heart transplantation was performed and the circulatory mechanical support provided by ECLS was simultaneously removed. The patient’s recovery was then uneventful. Dialysis was stopped seven days after transplantation without renal malperfusion on the post-operative scan. Cardiac graft left ventricular ejection fraction was found at least 65% in all echocardiography performed after the transplantation. Immunosuppression protocol was established and no acute rejection was found after endomyocardial biopsies (grade 1: perivascular lymphocytic infiltrate). The patient was discharged on the 36th postoperative day after his transplantation and was asymptomatic 12 months after his cardiac event.

3. Discussion

Successful management of an acute Stanford type A aortic dissection in a cardiac allograft recipient has previously been reported [1]. However, and according to our knowledge, cardiac transplantation as a treatment of this life-threatening disease has never been proposed. Myocardial protection during prolonged cardiopulmonary bypass remains a major problem especially for patients with previous but unknown severe coronary disease as it was finally found in our case after histological exam of the explanted native heart. In case of acute type A aortic dissection and because of the urgency of an operative procedure coronary arteriography is rarely performed. Furthermore, catheter manipulation in the proximal dilated ascending aorta is fraught with danger. In our case the patient was young without any previous symptoms or history of coronary disease. However after the Bentall procedure was performed it was obvious the left ventricle had not an efficient motion and was not available to support the haemodynamic. We decided not to add a left side coronary artery bypass graft after weaning of cardiopulmonary bypass for several reasons: no more venous graft were available, we were expecting myocardial recovery under mechanical circulatory support and intraoperative bleeding was massive (haemostasis required the use of recombinant activated factor VII).

It is well known that preservation of end-organ function is important to minimize the perioperative risk of transplantation. ECLS allowed improvement in organ system function and especially hepatic function. As reported before [2], ECLS can be used during several weeks, taking into account a regular change of the oxygenator membrane. After three weeks it was obvious that no myocardial recovery could be expected, so we decided to promptly register the patient on our transplant list. No septic disease had occurred at that time in intensive care and the pulmonary function was still good in spite of weeks of mechanical ventilation. One could have waited more but also exposed the patient to an infectious disease which would have increase the perioperative mortality in case of transplantation.

As far as we know we described here the first case ever reported of an acute complicated Stanford type A aortic dissection finally treated by orthotopic heart transplantation. Early survival was clearly obtained and maintained during several weeks using ECLS, which confirmed this device as first step in mechanical circulatory support in massive post cardiotomy heart failure.

4. References