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Total Artificial Heart Implantation Blood Pressure Management as Resolving Treatment for Massive Hemolysis following Total Artificial Heart Implantation

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INTRODUCTION

The SynCardia Total Artificial Heart (TAH) has been used for patients with biventricular failure, who cannot be managed with implantation of a left ventricular (LV) assist device. Following TAH implantation, our patient developed severe hemolysis, which could only be managed successfully by aggressive blood pressure control [Ohashi 2003; Nakata 1998].

CASE REPORT

We report on a 47-year-old female with nonischemic dilated cardiomyopathy who presented to our center with advanced cardiogenic shock on maximal inotropic support. She underwent a 70 CCs SynCardia Total Artificial Heart implantation, which was performed without any complications. Her postoperative hospital course was complicated by late tamponade on postoperative day 10, requiring mediastinal washout and evacuation of a hematoma. Postoperatively, she developed renal failure, which required continuous venovenous hemodialysis and transition to intermittent hemodialysis. The postoperative course was complicated by hypertension (systolic blood pressure >140 mmHg) on high daily doses of hydralazine i.v., clonidin i.v., and carvedilol i.v. Beginning with the third postoperative week, the patient was noted to have extensive anemia. A more than 3-fold increase of free plasma hemoglobin levels and LDH could be observed, with plasma hemoglobin up to 194 mg/dL with extensive anemia (Hb <7/HKT <20). Other causes of hemolysis were excluded with hematologic studies including Coombs test.

A CT chest angiography was done, which did not show any evidence of clots and/or possible obstructions inside the cannula. The antithrombotic regimen included PO 325 mg aspirin/daily and Coumadin PO with an INR goal of 2-3.

PO pentoxifylline was added to the patient's antithrombotic oral medication following hemolysis and thrombocytosis platelet count >400,000. Additional antihypertensive i.v. and PO medication (i.v. hydraziline, PO beta blocker, and i.v. calcium channel blocker were added for more effective blood pressure control with a systolic blood pressure goal <120 mmHg. A clear decrease in hemolysis was observed with effective blood pressure control. The hypertensive episodes were presenting with low fill alarms and extensive hemolysis. After nearly 5 months of dialysis treatment she showed a complete recovery of her renal function. She was readmitted for GI bleeding, which was managed without any further complications. The GI bleeding was managed with upper and lower endoscopy and all anticoagulation was stopped for less than 2 hours before the procedure.

DISCUSSION

Management of hemolysis in TAH patients is a crucial element of care and can be a difficult challenge after SynCardia management. Excessive hemolysis was ameliorated by adequate blood pressure in our patient. To support end organ recovery and prevent end organ damage, aggressive blood pressure control in this patient population is very important. Extensive monitoring of blood pressure medication in TAH patients is clearly needed. The presence of mechanical shear stress, caused by 4 working mechanical valves in a Total Artificial Heart with two pulsatile chambers, is a major factor contributing to hemolysis. Attempts to increase the hemoglobin value over approximately 8 in TAH patients usually cause hemolysis. Being aware of the fact that an extensive blood pressure increase can cause extensive hemolysis in TAH patients can be very helpful for establishment of the clinical diagnosis and to treat the clinical disease.

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