Long Term Successful Biventricular Assist Device (BIVAD) Use in a Post-Transplant Patient: Lessons Learned

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Introduction: BiVAD support for coronary artery vasculopathy (CAV) is rare and difficult. We describe a pediatric cardiac transplant patient requiring longterm BiVAD support.

Case Report: Patient was first transplanted in 2006 for idiopathic dilated cardiomyopathy and developed coronary artery vasculopathy 6 years post-transplant. Sirolimus and Rituximab were used, but the CAV progressed. She underwent repeated stenting and balloon angioplasties but progression contuned. She was listed for re-transplant 4/13. In 10/13, she required pacer/ICD for severe bradycardia from sinus node dysfunction after a cath. Her CAV advanced to complete occlusion of the RCA. In 10/14, she developed decompensated CHF requiring mechanical support. She underwent Berlin LVAD implantation and 4 days later, Berlin RVAD due to continued poor output. She developed dialysis dependent renal failure immediately post-VAD which continued throughout her pre-transplant course. Managing anticoagulation with dialysis and BIVADs was challenging and included Coumadin to maintain INR 3.5-4.5 as clotted when <3.5, with Aspirin and Persantine for first 6 mo. Her RVAD was replaced 3 times and LVAD twice. She had 4 strokes but near full recovery by re-transplant. She had numerous pulmonary hemorrhages that temporally correlated with the 3x weekly dialysis. These improved with tight control of INR and minimizing heparin during dialysis. This heparin resistance resulted in the use of Argatroban.
After 345 days on BiVAD, believed to be 3rd longest run in a child, she had her re-transplant 9/15. Long wait time was due to blood type O and high PRA. The transplant was successful. However, the operative course was complicated by extensive adhesions and a diminutive mediastinal space. We hypothesize that long-term decompression of the heart with BiVADs reduced the mediastinal space resulting in a moderate size mismatch, despite the donor weight being only 9% greater. Two re-explorations allowed sequential closure of the chest. Her surgical course was also complicated by serratia sepsis and a sternal wound infection that has been treated with VAC therapy. Soon after transplant, she underwent tracheostomy, but was able to sufficiently eliminate trache use in April, with plans for decannulation in the next few weeks. After 600 days in the hospital, she was discharged POD #246. Remains on dialysis depended ESRD.

Summary: Many lessons were learned throughout this patient's course of treatment. BiVAD decompression of the heart resulted in a size mismatch. As with total artificial heart, careful use of tissue expanders may ameliorate this concern. Second, tight control of INR and minimization of extra anticoagulation is essential when VAD patients require hemodialysis. Finally, argatroban can replace heparin in BiVADs when heparin resistance occurs.