Images in Cardiovascular Medicine

Novel Treatment of an Infiltrating Cardiac Fibrosarcoma

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A 38-year-old man was diagnosed with primary cardiac sarcoma involving the central cardiac structures. Echocardiography revealed that a pendular portion of the tumor intermittently obstructed the mitral orifice. Magnetic resonance imaging verified infiltration into the interventricular septum and the posterior wall of the left ventricle. A biopsy report showed moderate- to high-grade fibrosarcoma, and a positron emission tomographic–computed tomographic (PET-CT) scan ruled out metastasis. The patient consented to cardiectomy and to the placement of 2 HeartMate® II (Thoratec Corporation; Pleasanton, Calif) continuous-flow ventricular assist devices (VADs).

After the heart was excised (Fig. 1), only the posterior walls of both atria remained. A right neoatrium was created with a 38-mm reinforced graft that was attached to a sewing ring, as reported previously.[1] Another sewing ring was attached to the left atrial tissue; both VAD inflow conduits were secured within the sewing rings (Fig. 2). Left and right outflow grafts were anastomosed end-to-end to the aorta and the pulmonary artery, respectively. In this patient, there was no dilated pericardial cavity because of the specific reason for his surgery. We were aware that retaining appropriate pericardial bulk was crucial to the patient's eligibility for future heart transplantation. To meet this goal, we did not use a technique described in 2012[2]; instead, we positioned the pumps to accommodate the whole left part of the remaining pericardial cavity and used longer outflow grafts (in bend reliefs) to fill the whole pericardial cavity (Fig. 3). Postoperative computed tomography showed the configuration of the artificial heart (Figs. 4 and 5).

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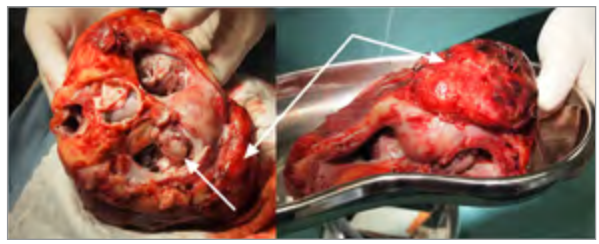

Fig. 1 *Perioperative photograph shows the solid extramural part of the sarcoma (double arrow) and the pendular infiltrating part within the mitral orifice (single arrow).*

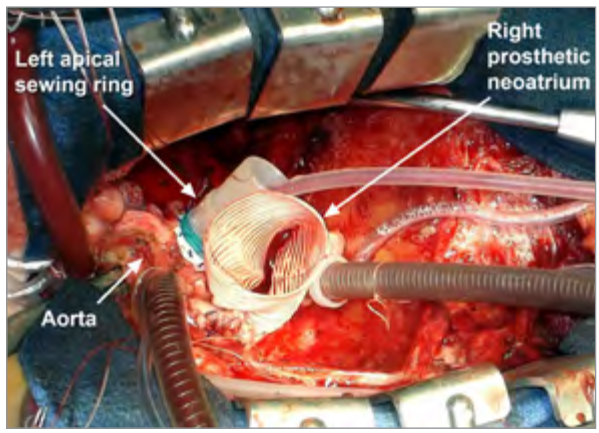

Fig. 2 *Intraoperative photograph shows preparation of the inflow attachments after cardiectomy.*

Comment

In this instance, we did not consider the SynCardia temporary Total Artificial Heart (SynCardia Systems, Inc.; Tucson, Ariz) to be an appropriate solution, because long-term bridge-to-transplantation or even permanent therapy might have been needed. Not only does the SynCardia use quite a large external console, but its pulsatile system requires saving the central heart structures for atrial cuff attachment. The tumor's location assured that adequate cardiac tissue would not have been available after cardiectomy.

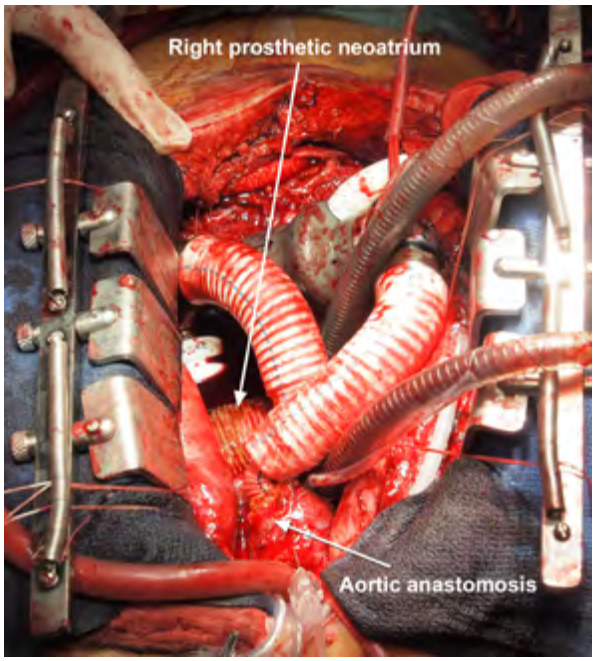

Fig. 3 *Intraoperative photograph shows final positioning of the total artificial heart.*

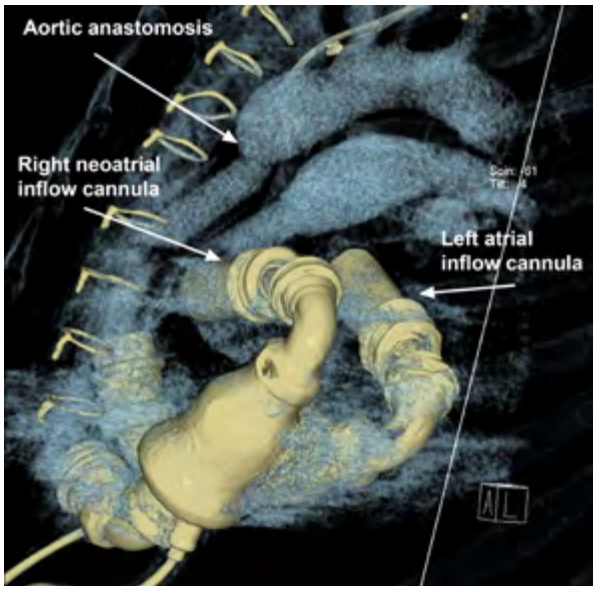

Fig. 4 *Postoperative 3-dimensional computed tomographic reconstruction image shows positioning of the pumps and inflow cannulas.*

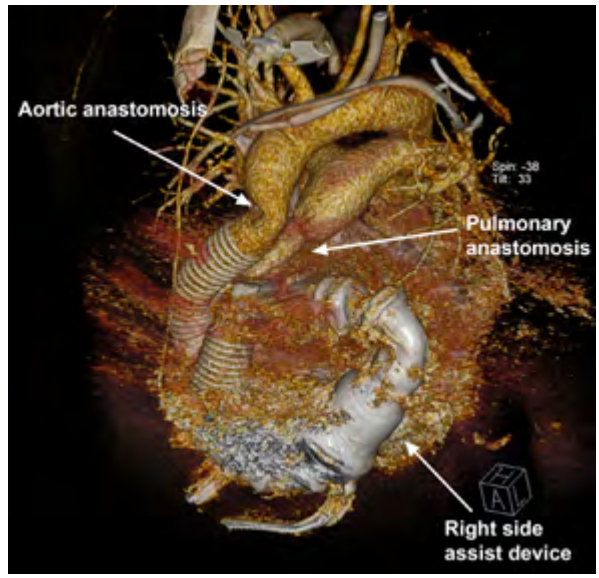

Fig. 5 *Postoperative 3-dimensional computed tomographic reconstruction shows end-to-end anastomosis of the outflow grafts.*

Despite postoperative complications, our patient achieved full mobility. At 6 postoperative months, a follow-up PET-CT scan was negative for malignancy; nevertheless, he died of fulminant *Aspergillus* sepsis 194 days after placement of the 2 HeartMate® II continuous-flow VADs.

This challenging circulatory support approach has been previously reported,[1,2] but without the clinical recovery outcome. The prevalence of primary cardiac sarcoma is low, and the prognosis is poor with conventional therapy. This case shows that the placement of dual VADs is a technically and clinically feasible means of total artificial heart support.

References

1. Loebe M, Bruckner B, Reardon MJ, van Doorn E, Estep J, Gregoric I, et al. Initial clinical experience of total cardiac replacement with dual HeartMate-II axial flow pumps for severe biventricular heart failure. Methodist DeBakey Cardiovasc J 2011;7(1):40-4.
2. Frazier OH, Cohn WE. Continuous-flow total heart replacement device implanted in a 55-year-old man with end-stage heart failure and severe amyloidosis. Tex Heart Inst J 2012;39(4):542-6.