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Commentary

Surgical Considerations of LVAD Implantation in Patients with Prosthetic Valves

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The case report by Rajagopalan and Booth demonstrates successful long-term LVAD support of a patient with a mechanical mitral valve. The continuous flow from the left atrium to the left ventricle and into the inflow of the LVAD appears to provide sufficient washing of the Bjork-Shiley mechanical valve surfaces and avoid thrombosis. The higher level of anticoagulation used in this case may not have been needed, and in some patients this may have complicated gastrointestinal bleeding.

Heart valve abnormalities are common in patients with advanced stage heart failure who are candidates for left ventricular assist device (LVAD) support. Valve abnormalities during LVAD support can alter both filling and emptying of the device, resulting in a reduced level of cardiac support. Concurrent valvular procedures are now performed in approximately 20% of patients undergoing LVAD implantation (1, 2). Many of these patients have had prior placement of a prosthetic valve and are usually more ill than the average LVAD recipient at the time of implant, with a higher risk for postoperative complications and mortality. Careful consideration for handling preexisting prosthetic valves at the time of LVAD implant is vital for good outcome.

Aortic Valve Considerations

Continuous-flow LVADs unload the left ventricle and eject blood via an outflow graft attached to the ascending aorta throughout the entire cardiac cycle. This left ventricular bypass causes the aortic valve to be either closed or to have

shortened opening time. Mechanical aortic valves are highly susceptible to thrombosis in this environment, and intermittent opening of the valve increases the risk of thromboembolism. Patients with preexisting mechanical aortic valves should have the valve oversewn or replaced with a bioprosthetic at time of LVAD implantation. The disadvantages of bioprosthetic valve use are the additional cardiopulmonary bypass time for placement and the possibility of leaflet fusion. A patch sewn to the annulus prevents the valve from functioning and there is a risk of subvalvular thrombus formation and embolization (3). Another potential disadvantage of the oversewn aortic outlet is in the case of pump stoppage; the depressed left ventricle would need to generate sufficient force to pump blood through the LVAD and its conduits, which may not be possible in some patients. The current recommendation by the 2013 International Society of Heart Lung Transplantation Guidelines for Mechanical Circulatory Support is to oversew the aortic valve in patients supported for bridge to transplant, and replacement of the mechanical valve with a bioprosthetic for those supported for destination therapy or those who are likely to have myocardial recovery (4). Patients presenting for LVAD implant with a properly functioning bioprosthetic aortic valve do not require surgical intervention. However, there are reports that thrombosis, pannus development, and complete fusion of the leaflets have occurred during LVAD support (5, 6).

Mitral Valve Consideration

The mitral valve will normally remain open due to the high flow rate into the LVAD. This high flow is believed to be adequate for washout and has a low risk of thrombosis for both mechanical and bioprosthetic valves (7). Due to the technical difficulty of replacing the mitral valve, and the low risk of thrombotic problems, current recommendations are to leave prosthetic mitral valve in place and consider increased anticoagulation. However, there is no evidence that increased anticoagulation is necessary, and some patients have done well without any anticoagulation with a mechanical valve in the mitral position during LVAD support (8).

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