



Undesirability of Replacing One Left-Sided Cardiac Valve with a Mechanical Prosthesis and Another with a Bioprosthesis

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Introduction

Described herein is a 59-year-old man who underwent replacement of both left-sided cardiac valves, one with a mechanical prosthesis and the other with a bioprosthesis, thus losing for the patient the advantageous features of both substitute cardiac valves and gaining the disadvantages of each?

Keywords

Valve Replacement; Aortic Valve; Mitral Valve; Bioprosthesis; Mechanical Prosthesis

Introduction

When both left-sided cardiac valves are replaced it is desirable to replace both valves with the same type of substitute valve, either both with a bioprosthesis or both with a mechanical prosthesis. We describe herein a patient in whom one left-sided valve was replaced with a bioprosthesis, and the other, with a mechanical prosthesis, and we discuss the logic, or lack thereof, of such a choice.

CaseReport

A 59-year-old man with severe (peak transvalvular gradient 77 mm Hg by echocardiogram and 58 mm Hg by catheterization) aortic valve stenosis and moderate mitral valve regurgitation (by echocardiography) underwent replacement of the heavily calcified congenitally bicuspid aortic valve with a bioprosthesis (21mm St. Jude Epic tissue valve) and the anatomically-normal (except for mild mitral annular calcium) mitral valve initially with a bioprosthesis (29 mm St. Jude Epic tissue valve). The patient was weaned from bypass and the transesophageal echocardiogram showed a 13 mm Hg mean transmitral gradient. The previously implanted tissue valve in the mitral valve was then replaced with a 31-mm St. Jude mechanical prosthesis. Four days postoperatively echocardiogram showed a 24 mm Hg mean transaortic valve gradient and a 3 mm Hg mean transmitral gradient when the ejection fraction was 33% (Figure 1). The patient returned home 9 days postoperatively and 12 months later was asymptomatic and working full-time as an auto-mechanic.

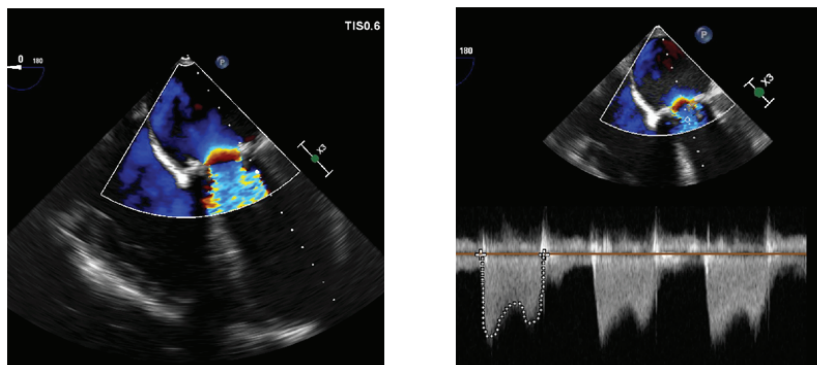


Figure 1: Post-cardiopulmonary by pass intraoperative TEE images of bioprosthetic mitral valve with turbulent inflow by colour Doppler (left panel) and a mean gradient of 12 mmHg by continuous wave Doppler (right panel). A second pump run was then undertaken to place a mechanical mitral valve with a mean gradient 3 mmHg.

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Discussion

In 1986 Roberts and Sullivan[1] described necropsy findings in 54 patients who had replacement of both left-sided cardiac valves, 12 of whom had replacement of one valve with a mechanical prosthesis and the other by a bioprosthesis. The virtue, of course, of the mechanical prosthesis is that it does not wear out. Its drawback is that it requires the patient to be on anticoagulants indefinitely. The virtue of the bioprosthesis, of course, is that chronic anticoagulation is avoided; its drawback is that it wears out. So, with the limitations for each of the 2 substitute cardiac valves, how could any patient today undergoing replacement of both left-sided valves have both a mechanical valve and a bioprosthesis implanted, thus acquiring the disadvantages of both types of substitute valves and losing the advantages of each. This report describes still another patient having double left-sided valve replacement utilizing one mechanical prosthesis and one bioprosthesis, an inappropriate combination. In 1988 Roberts[2] published an editorial entitled "The logic of using either two mechanical valves or two bioprosthetic valves for replacement of both mitral and aortic valves" and emphasized that "... the placing of 1 bioprosthetic valve and 1 mechanical valve in the same patient translates into the loss for the patient of each of the advantages of the mechanical and bioprosthetic valves, and, at the same time, the gain for the patient of the disadvantages of each of the two types of substitute cardiac valves".

Bortolotti and colleagues[3] in 1988 reported 91 patients who had undergone combined mitral and aortic valve replacement utilizing a porcine bioprosthesis in the mitral position and mechanical tilting-disc prosthesis in the aortic valve position. Of the 91 patients, 15 (17%) died in hospital. Of the 91 patients in whom the mitral valve was replaced with a bioprosthesis, 27 (30%) had dysfunction of the bioprosthesis and it was subsequently replaced in 23 patients (25%), whereas the mechanical valve in

the aortic valve position was subsequently replaced in 2 patients (2%). There were 13 anticoagulant-related hemorrhages, 2 (10%) of which were fatal. Thromboembolic complications occurred in 9 patients, 5 of which were fatal. Thus it is evident that in the long term the risk of reoperation for bioprosthetic failure is added to the risk of long-term anti-coagulation. Since 1988 (thirty years ago) we have not seen a publication discussing the inadvisability of replacing one cardiac valve with a mechanized prosthesis and another valve in the same patient with a bioprosthesis.

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Author Contributions

Dr. William C. Roberts and Yusuf M. Salam were the primary writers and researchers on this paper. Dr. Paul A. Grayburn provided figure 1 and the attached figure legend.

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