CARDIOVASCULAR TECHNIQUES

Experience with Retrograde Left Heart Catheterization through the Bjork-Shiley Aortic Valve Prosthesis: A Preliminary Report*

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Transseptal and transthoracic left heart catheterizations have been performed in patients with aortic valve prosthesis for assessment of hemodynamics in our laboratory and elsewhere.¹ ¹ Left heart catheterization may also become necessary in such patients, should they develop mitral, myocardial, or coronary disease. However, transseptal and transthoracic catheterizations carry a higher risk.² The simpler and safer retrograde left heart catheterization through the prosthesis itself is not a familiar procedure, although it has been previously performed through the ball-valve prosthesis.³

We are here presenting the feasibility of such a technique through the Bjork-Shiley Pyrolite aortic valve prosthesis, previously not reported.

METHOD

Thirteen patients are the subjects of the present studies. In each patient the Bjork-Shiley pyrolite aortic valve position and its struts are carefully inspected in different views by chest x-ray films and fluoroscopy. The procedure is carried out in the usual manner for a retrograde left heart catheterization by right brachial approach. A No 7 Sones catheter is introduced into the aortic root. The catheter is then carefully advanced into the left ventricle with the patient in the anteroposterior position. If the ventricular chamber is not readily entered, turning the patient into the left anterior oblique position may be rewarding. This projection allows us to visualize better the large and small struts of the prosthetic Bjork-Shiley valve (Fig 1). Care should be taken to enter the left ventricle through the larger ventricular strut of the prosthesis in systole; and, if at all possible, the smaller aortic strut and the space between the two struts of the prosthesis should be avoided. Fluoroscopic visualization of the Bjork-Shiley Pyrolite valve in the AP and left anterior oblique projection is helpful in confirming which strut the catheter did go through (Fig 2 and 3).

In two of our thirteen patients, the catheter entered the left ventricle through a small strut; this should be avoided. Subsequent withdrawal of the entrapped catheter was somewhat difficult, requiring rotational and to and fro movements. Once the left ventricle is entered, pressures and ventriculography can be performed. We elect to carry out left ventriculography with less than the usual amount of contrast material, about 30 ml for an average sized left ventricle under a pressure of around 180 psi (Fig 4). This precaution may prevent further advancement of the shaft of the Sones catheter through the prosthesis and possible catheter entrapment.

Following ventriculography, pressure gradient across the aortic valve is measured. Aortography and, if necessary, coronary arteriography are performed subsequently in the usual manner employing the Sones technique. In one patient, a woman with a very small prosthetic Bjork-Shiley valve, the catheter was unable to transverse the Pyrolite disc. Severe arterial spasm developed in this patient and this could have hampered the usual maneuvers. Hyperextension of the patient's head greatly facilitates this passage of the catheter through a normal and/or a prosthetic Bjork-Shiley Pyrolite disc valve.

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Figure 1. The Bjork-Shiley aortic valve prosthesis.
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We found this procedure safe in a limited number of 13 patients. The procedure does not require more time than a regular left heart catheterization. The smallest Bjork-Shiley valve has an orifice diameter of 14 mm. We prefer a Sones catheter for its tapered tip. Moreover, its endhole permits the use of a Teflon coated J-guide wire, if desired. The quick and swift manipulation of the Teflon coated J-guide wire in experienced hands is a tremendous asset in bypassing tortuous vessels and kinks at the junction between the subclavian and innominate arteries with the ascending aorta. We have been using this maneuver for four years without any complications.

DISCUSSION

In addition, the J-guide wire bypasses plaques which could be dislodged otherwise. Once the guide wire is removed, the catheter should be sucked and flushed with 10 ml of dextrose in water followed by 20 mm of heparin.

The merit of transversing the Bjork-Shiley Pyrolite aortic valve lies in the avoidance of transseptal and transthoracic techniques and in one's ability to combine left ventriculography, aortography, and coronary arteriography in the same procedure, when indicated. It should be mentioned, however, that the major disadvantage of this approach is catheter induced aortic regurgitation which alters the left ventricular function in the majority of the patients.

REFERENCES