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EDITORIAL COMMENTARY

Bioprosthetic valve thrombosis: The eyes will not see what the mind does not know

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See related article on pages e83-6.

Bioprosthetic valve thrombosis (BPVT) is thought to be a rare, but potentially life-threatening complication, with reported incidence varying from 0.1 per 100 valve-years¹ to as high as 6%.² In this issue of the *Journal*, Dohi and colleagues³ describe their experience with a case of thrombosed aortic bioprosthesis and review existing literature. Their case has the hallmarks of BPVT: a substantial increase in transvalvular gradient, identified 11 months postimplantation; it occurred despite appropriate use of antithrombotic therapy. Furthermore, typical layered thrombus was identified on pathologic review of the explanted BPV. The patient did not have a history of thrombotic events, but whether a full coagulation workup was performed is unknown. The rationale for performing redo valve surgery rather than attempting anticoagulation or thrombolytic therapy is similar to many other case reports, that is, the treating physicians could not exclude structural valve deterioration on the basis of the information provided in the transthoracic echocardiography (TTE) report. The logical questions are then

FIGURE 1. Proposed algorithm for systematic approach to BPVT diagnosis. BPVT, Bioprosthetic valve thrombosis; TTE, transthoracic echocardiography; VKA, vitamin K antagonist.

(1) Is TTE adequate for the diagnosis of BPVT? and (2) How many patients with subclinical BPVT remain undiagnosed?

When reviewing our own experience,⁴ we thought that 2 major misconceptions led to systematic underreporting of BPVT by TTE. First, the misconception that TTE diagnosis of BPVT is easy; in our series, all TTE studies reported abnormal valve appearance and function (mostly increased gradients and thickened cusps), but only 6 of 32 reports listed BPVT in the differential. Transesophageal echocardiography (TEE) was excellent for evaluation of mitral and tricuspid BPVT, but equivocal in 3 of 12 patients with aortic BPVT. The second misconception was that BPVT occurs mostly within 3 months postimplantation; in our series, peak incidence

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occurred in the second year postimplantation, and the longest interval was 6.5 years.

How do we answer our first question? Is echocardiography woefully inadequate for assessment of BPVT? The answer is an unequivocal “No,” but a systematic approach to diagnosis must be implemented (Figure 1). We recommend the following:

1. At TTE, the possibility of BPVT should be considered and mentioned in all patients in whom the transvalvular gradient has increased more than 50% over postimplantation values or in those in whom suspected layered thrombus is seen in the prosthetic cusps on the downstream side (ventricular side for mitral and tricuspid prostheses, arterial side for aortic and pulmonary prostheses). Of note, prosthetic regurgitation also may occur because of reduced cusp mobility and impaired coaptation; this also typically resolves with anticoagulant therapy. Obviously, other causes for high gradients need to be considered (early prosthetic degeneration, pannus formation, patient–prosthesis mismatch, high cardiac output state).
2. TEE is excellent for diagnosing BPVT and should be recommended for most patients with abnormal TTE findings. One must keep in mind that imaging aortic bioprostheses may be challenging; when TEE is equivocal, cardiac computed tomography may be considered, although its role is not well defined for this entity.
3. Consider a diagnostic and therapeutic trial of anticoagulation with vitamin K antagonists in patients with suspected BPVT who are hemodynamically stable and have no contraindications. It is important to acknowledge that some patients will not respond to this strategy because gradients were not due to BPVT or thrombi are resistant. Those patients will need to be considered for alternative therapies (redo surgery or thrombolytic therapy in selected cases).

The second question on how to establish the true incidence of BPVT is significantly more difficult to answer. First and foremost, we need to share with the cardiology and cardiac surgery communities that BPVT occurrence may be higher than originally suspected and establish active surveillance strategies. Current American College of Cardiology/American Heart Association⁵ and European Society of Cardiology⁶ guidelines on valvular heart disease recom-

mend TTE yearly beginning 5 years postimplantation or when patients become symptomatic or valve dysfunction is suspected. The recommendation is based on the assumption that BPVT is a rare occurrence. However, patients with mild to moderately increased gradients due to BPVT (who are presumably asymptomatic) will be missed and may present at later stages with completely degenerated bioprostheses or calcified thrombi resistant to anticoagulants and thrombolytics. We suggest that surveillance TTE should be performed yearly during the first 2 years of implantation.

Over the year that passed from our report on BPVT, and with proactive sharing of our findings with the local cardiology and cardiac surgery communities, we have seen a steady increase in the number of BPVT cases at our institution. It is our impression that increased awareness was critical in detecting BPVT in a number of patients in whom otherwise high gradients would be attributed to other conditions. The prerequisite for making a diagnosis is to think of it in the first place; indeed, the eyes will not see what the mind does not know. It is up to us to share our information with our colleagues. Our patients deserve it.

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