agreement. It would seem wise, however, to adhere to a scientific rationale for instrument performance and not impose arbitrary criteria which would limit the design of new and perhaps more practical and hopefully less expensive devices for spirometric testing. This is of crucial importance now that we recognize the value of spirometry in the assessment and management of both early and late stages of common chronic lung diseases.

Thomas L. Petty, M.D., F.C.C.P.
Professor of Medicine and Head,
Division of Pulmonary Medicine,
University of Colorado Health Sciences Center, Denver

Reprint requests: Dr. Petty, 4300 East Ninth Avenue, Denver, 80206

REFERENCES


Calcification of Porcine Heterografts Implanted in Children

To the Editor:

Severe calcific degeneration in porcine heterografts implanted in children is being reported in increasing num-

Figure 1. View of the open right atrium showing a giant ball thrombus filling the cavity. Note the severely stenotic porcine bioprosthesis in tricuspid position due to calcification of the cusps and fibrous tissue overgrowth.

bers.1-4 We have experienced this complication in three children (two girls and one boy aged 8, 10, and 11 years respectively at the time of operation). A brief description of one of these cases, which, to the best of our knowledge, is the first of its kind to be reported, might help to better understand the pathogenesis of this complication in young subjects.

CASE REPORT

In 1973, a ten-year-old girl underwent successful total correction of complete atrioventricular canal (with normal pulmonary vascular resistances) with patch closure of the septal defects and mitral tricuspid Hancock prosthetic valve replacement (27mm and 28mm respectively); after surgery, a complete atrioventricular block ensued requiring implantation of a permanent epicardial pacemaker. Three years and four months later, she developed the clinical signs of severe mitral stenosis confirmed at cardiac catheterization. The stenotic mitral device was subsequently replaced with another porcine valve (29mm). Gross examination of the mitral bioprosthesis revealed severe intrinsic calcification of the leaflets and commissures; the tricuspid xenograft, however, at surgical inspection appeared to function normally and its cusps were pliable.

Three years and six months later the patient died because of progressive congestive heart failure. At necropsy, a giant ball thrombus, obstructing the right atrioventricular orifice, was found in the right atrium (Fig 1). Both the tricuspid and mitral devices were severely stenotic because of calcific degeneration of the cusp tissue and fibrous tissue overgrowth. Throughout the whole postoperative course, the only noteworthy laboratory finding was a persistently elevated alkaline phosphatase value; moreover, evidence of infection was never obtained, and cultures of all explants were sterile.

DISCUSSION

We believe this case underlines the importance of two factors in the pathogenesis of calcific degeneration of porcine valves implanted in children. The first, at present in general agreement, is the increased turn-over of calcium during growth;1,2 however, high values of alkaline phosphatase, as in the present case, are normal for children and approximate those observed in patients with chronic renal failure, who seem to have an increased tendency of calcification of these valves.

The second factor is, in our opinion, the excessive mechanical fatigue to which a three-leaflet valve, such as the porcine aortic valve, is submitted when implanted in the
left atrioventricular position. This hypothesis seems to be supported by the observation that in a six-year-period two implanted Hancock mitral prostheses have degenerated and calcified, and during the same time and in the same patient calcific degeneration caused malfunction of only one tricuspid porcine valve. This might be explained considering that when facing a high pressure ventricle, as the left one, the porcine valve must bear great mechanical stress; accordingly, the fatigue-induced lesions appear earlier than when the same device is implanted in the tricuspid position, where both level and rise of pressure are usually considerably lower.

Uberto Bortolotti, M.D., Department of Cardiovascular Surgery and Gaetano Thiene, M.D., Department of Pathology, University of Padova Medical School, Padova, Italy.

Reprint requests: Dr. Bortolotti, Clinica Chirurgica Generale Centro di Cardiochirurgia, Via Giustianini 2, 35100 Padova, Italy

REFERENCES

2 Thadroyen FT, Whitton IN, Firie D, Rogers MA, Mitha AS. Severe calcification of glutaraldehyde-preserved porcine xenografts in children. Am J Cardiol 1980; 45:690

2-D Echo for Left Ventricular Thrombi

To the Editor:

Cabin and Roberts,1 in a special commentary, recently suggested that the low prevalence of systemic embolism in patients with left ventricular aneurysms may be related to the morphology of the intra-aneurysmal thrombus. They state that "distinguishing patients with ischemic cardiomyopathy...from those with true left ventricular aneurysm after healing of acute myocardial infarction is extremely difficult in the absence of left ventricular angiography...The difficulty in diagnosing aneurysm in the absence of angiography leads us to suggest anticoagulation in most patients with severe congestive heart failure after healing of acute myocardial infarction."

In their discussion the authors do not mention the potential of two-dimensional echocardiography to diagnose true1 and pseudo-2 aneurysm, as well as left ventricular thrombi.1,3,4 Two-dimensional echocardiography may be as sensitive as angiography in detecting left ventricular aneurysms, and more sensitive in detecting left ventricular thrombi since ultrasound imaging can detect the blood/thrombus and thrombus/myocardial interfaces with a tomographic display, whereas conventional angiography only displays the former interface. Two-dimensional echocardiography is therefore unique since it can directly visualize the anatomic abnormalities in vivo that were described by Cabin and Roberts at autopsy, and is thus well suited for studies of the presence and natural history of left ventricular thrombi. Though early studies have suggested an acceptable sensitivity and specificity for the two-dimensional echocardiographic diagnosis of left ventricular thrombi—data from reference 6 would give a sensitivity of 83 percent and specificity of 75 percent—we and others have seen both false negative and false positive diagnoses.4,5

We would suggest amending Cabin and Roberts' excellent article to include the recommendation of two-dimensional echocardiography to search for left ventricular aneurysm and/or thrombi in all patients suspected of having these diseases. Two-dimensional echocardiography is also well suited for prospective study of their hypothesis that systemic embolization is more likely to come from left ventricular thrombi projecting into the lumen. In fact, a fine example of a pedunculated thrombus diagnosed by two-dimensional echocardiography is contained in the same issue of Chest.6

Richard Melzler, M.D.
Jos Roelandt, M.D.
Division of Clinical Echocardiography, Thoraxcenter, Erasmus University, Rotterdam, the Netherlands

REFERENCES

5 Ports TA, Cogan J, Schiller NB, Rapaport E. Echocardiography of left ventricular masses. Circulation 1979; 59:528-36
6 Melzler BS, Guthner A, Rakowski H, Popp RL, Martin RP. Diagnosis of left ventricular thrombi by two-dimensional echocardiography. Br Heart J 1979; 42:261-65
8 Lewin RF, Vitine B, Sclarovski S, Agmon J. Two-dimensional realtime echocardiographic detection of a left ventricular aneurysm associated with mobile pedunculated thrombi. Chest 1980; 77:704-06

Marantic Endocarditis

Diagnosis by 2-D Echocardiography

To the Editor:

Marantic endocarditis is relatively frequently found at necropsy, but its presence is rarely suspected or diagnosed clinically. As a rule, the noninfected vegetations of marantic endocarditis are usually not large enough to be detected by angiography and, furthermore, invasive procedures of this type are infrequently utilized or justified in the extremely sick patient who is the usual candidate for this type of endocarditis. Because pulmonary or systemic emboli are fairly common among patients with marantic endocarditis, a noninvasive procedure to detect the source

118 COMMUNICATIONS TO THE EDITOR

CHEST, 80: 1, JULY, 1981