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Case Report

Two-Dimensional Echocardiographic Detection of Pulmonic Valve Endocarditis

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Several large series of cases of infective endocarditis have mentioned the paucity of pulmonic valve involvement.[1-3] A recent study by Hubbell et al[4] found no cases of pulmonic valve endocarditis in a group of 79 drug addicts with 97 separate episodes of infective endocarditis. It is possible that the paucity of such reports may be due in part to the difficulty of assessing the pulmonic valve.

The purpose of this report is to describe a case of pulmonic valve endocarditis and to underscore the importance of two-dimensional echocardiography in defining the vegetations.

CASE REPORT

A 34-yr-old man known to be an intravenous drug abuser was admitted to another hospital with complaints of weakness, persistent fever, and right pleuritic chest pain of two weeks' duration. For a period of three to four weeks prior to admission, he had been injecting drugs into his right femoral vein and subsequently had noted swelling, induration, and erythema. He had numerous past admissions for treatment of abscesses and bacteremia but had never been treated for infective endocarditis. Prior to seeking medical attention on this occasion, he had tried a brief course of oral ampicillin on the street.

Initial physical examination revealed a blood pressure of 110/70, a heart rate of 115, a respiratory rate of 25, and a temperature of 100°F. There was dullness at the right lung base with bronchial breath sounds. Cardiac examination revealed normal heart sounds with a 2/6 systolic ejection murmur along the upper left sternal border and a 2/6 decrescendo diastolic murmur along the left sternal border. The chest x-ray revealed a right lower lobe infiltrate and multiple nodular densities throughout all lung fields. Blood cultures were all positive for *Staphylococcus aureus*. Vancomycin therapy was begun on admission. An M-mode echocardiographic examination showed normal mitral, aortic, and tricuspid valves, with the pulmonic valve not visualized. A supravalvular aortogram was performed to rule out aortic insufficiency and was normal.

Although blood cultures remained negative after the initiation of antibiotics, the patient's pulmonary status deteriorated sufficiently to require intubation and ventilatory support. A Swan-Ganz catheter was inserted on the 11th hospital day and showed a right ventricular pressure of 45/12, a pulmonary artery pressure of 50/9, and a pulmonary wedge pressure of 5 mmHg. A diagnosis of pulmonic valve endocarditis was made, and the patient was transferred to the University of Michigan Medical Center for further evaluation and consideration of surgery.

At the time of transfer, physical examination revealed a blood pressure of 120/70, a heart rate of 140, and a respiratory rate of 50. Chest examination revealed rales throughout all lung fields, and cardiac examination was essentially unchanged except that there was some inspiratory increase in the diastolic murmur.

A two-dimensional echocardiogram was performed at the bedside (Varian 3400R, Varian Associates, Palo Alto, California) (Fig 1). This view of the pulmonic valve was complemented by an M-mode examination using the cursor to obtain the optimal valve image (Fig 2). The presence of a mass of "shaggy" echoes associated with the pulmonic valve, in concert with the positive blood cultures and the new murmur of pulmonic regurgitation, confirmed the diagnosis of pulmonic valve endocarditis.

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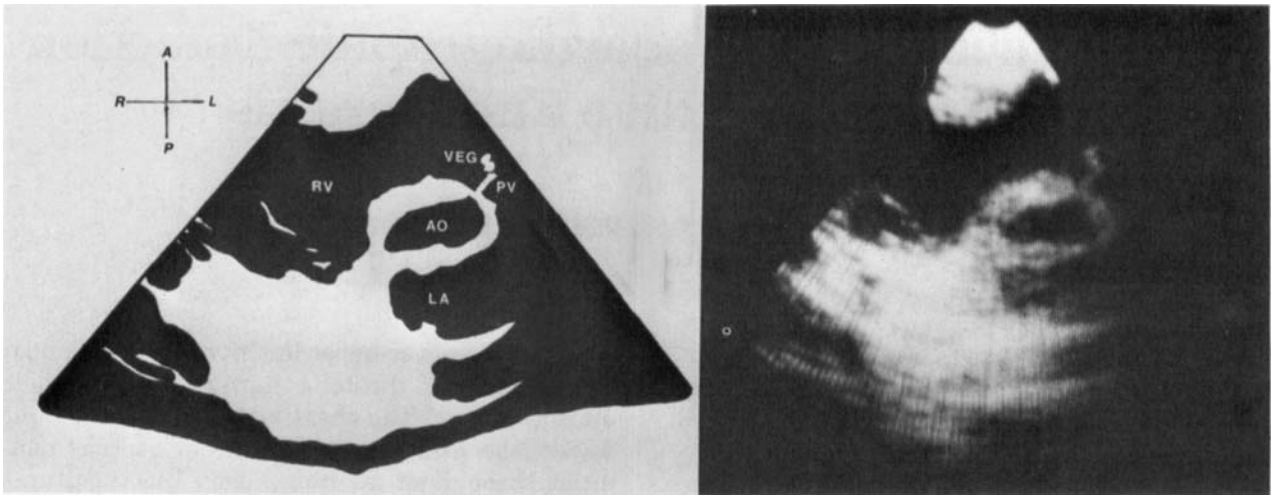

FIGURE 1. Two-dimensional stop-frame of parasternal short-axis view (right panel), with an accompanying schematic (*left panel*) demonstrating the pulmonic valve, aorta, and left atrium. A: anterior. AO: aorta. L: left. LA: left atrium. P: posterior. PV: pulmonic valve. R: right. RV: right ventricle. VEG: vegetation.

The patient did not require surgery, as his fever resolved and his blood cultures remained negative with and without therapy. His course was complicated by bronchopleural fistula, pericarditis, and immune complex glomerulonephritis with renal failure requiring peritoneal dialysis. This patient subsequently recovered fully and was discharged with normal renal and pulmonary function. There was no change in his cardiac auscultatory findings.

DISCUSSION

The development of M-mode and, more recently, two-dimensional echocardiography has provided a noninvasive approach to the detection and localization of endocarditic vegetations. However, M-mode echocardiography has been shown to detect vegetations in only approximately 35–55% of cases.[5,6] The problem of detection is compounded when one attempts to image the pulmonic valve. Although the diagnosis of pulmonic valve endocarditis has been made on occasion by M-mode echocardiography,[7-11] the pulmonic valve is the most difficult of the heart valves to visualize. Most authors do not state the percentage of cases in which the pulmonic valve could be seen, but in one study of right-sided endocarditis by M-mode echocardiography,[7] images of the pulmonic valve were unable to be obtained in 4 of 10 cases. This visualization is particularly difficult in the absence of right ventricular dilatation,[12] which is usually seen in conjunction with chronic volume overload states and not in acute right-sided infective endocarditis. In this regard, two-dimensional echocardiography, with its tomographic imaging capabilities, permits more reliable visualization of the pulmonic valve.

Several studies have compared the sensitivity of M-mode and two-dimensional echocardiography in the detection of valvular vegetations. Martin et al[13] suggested that two-dimensional echocardiography may be more sensitive in recognizing both right- and left-sided vegetations. In their study, two-dimensional echocardiography was diagnostic in 81% of patients, whereas M-mode echocardiography was diagnostic in only 14%. Wann et al[14] found no difference in sensitivity between the two techniques but noted that the two-dimensional study was more helpful in judging the size and mobility of the vegetation. Mintz et al[15] also found no difference in sensitivity. However, the two-dimensional technique was superior in diagnosing complications of the destructive process. In a study of right-sided endocarditis, Berger et al[10] found a sensitivity of 83% for detecting vegetations by the two-dimensional technique and of only 50% by M-mode.

One must be cognizant of the potential limita-

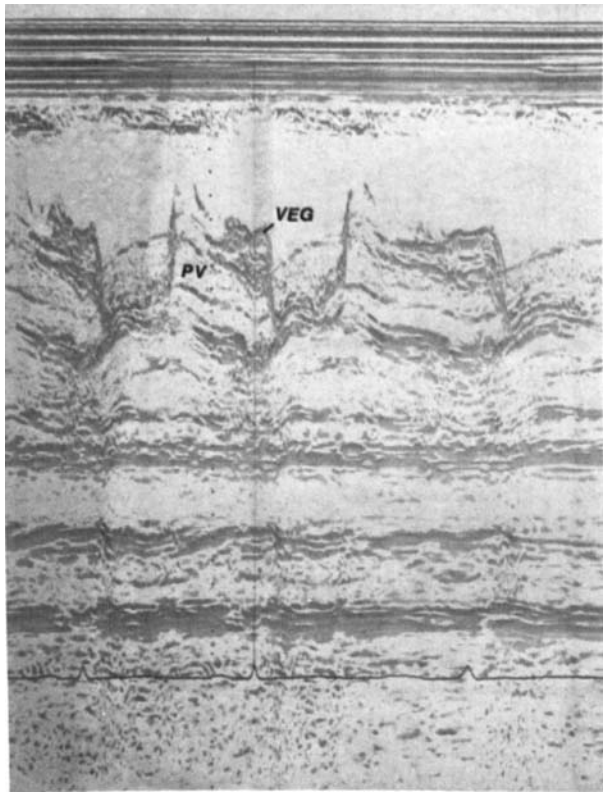

FIGURE 2. M-mode echocardiogram of the parasternal view showing marked thickening of the pulmonic valve leaflet with normal valve motion. PV: pulmonic valve. VEG: vegetation.

tions in using two-dimensional echocardiography to diagnose valvular vegetations. These include blurring or "blooming" of images, particularly of rapidly moving structures such as cardiac valves, from the use of improper gain settings and the persistence of images resulting from the videotape format. It has also been shown that vegetations smaller than 2–3 mm may not be detected by either M-mode or two-dimensional echocardiographic techniques because of the inherent limitations of resolution.[16] Other valvular lesions, such as calcifications or fibroses, may also be confused with vegetations.

However, two-dimensional echocardiography does provide a more anatomic and comprehensive representation of right-sided cardiac structures. In the present case, the two-dimensional study convincingly demonstrated a definite vegetative process involving the pulmonic valve. Thus, the increasingly widespread use of this technique should permit enhanced sensitivity and specificity in the diagnosis of pulmonic valve endocarditis.

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