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Echo-Doppler Features of Pulmonary Valve Endocarditis

Jihad Bitar, MD,* and Mohsin Alam, MD*

Three patients with fever and pneumonitis were found to have pulmonary valve vegetations by echocardiography. Pulsed and color flow Doppler studies demonstrated mild to moderate pulmonary valve insufficiency in these patients. All patients responded to the appropriate antibiotics without requiring valve surgery. Echocardiography is of value in diagnosing pulmonary valve endocarditis and should be considered in every patient with recurrent pneumonitis. (Henry Ford Hosp Med J 1989;37:41-2)

Infective endocarditis involving the pulmonary valve is a rare entity constituting less than 2% of the autopsies performed for endocarditis. Since 1960, 47 cases of isolated pulmonary valve endocarditis have been reported (1-4). With the advent of M-mode and two-dimensional echocardiography, early diagnosis of pulmonary valve endocarditis has been made with increasing frequency.

We report three patients with infective endocarditis who had pulmonary valve vegetations diagnosed by echocardiography and pulmonary valve insufficiency diagnosed by pulsed and color flow Doppler studies.

Case Reports

Case 1

A 55-year-old white female underwent gastrointestinal bypass surgery for morbid obesity. Her postoperative course was complicated by adult respiratory distress syndrome with bilateral pulmonary infiltrates on chest x-rays, acute tubular necrosis of the kidney, and gastric perforation. This required exploratory laparotomy, gastrostomy, and a prolonged stay in the intensive care unit. She was on a mechanical ventilator with central venous lines for hyperalimentation feedings and hemodynamic monitoring. She improved gradually and was discharged two months later.

She was readmitted three days later with fever and wound infection. Blood cultures grew *Staphylococcus aureus*. She was treated with intravenous antibiotics for six weeks and sent home in stable condition. Over the subsequent two years, she was admitted seven times with recurrent fever, cough with sputum production, and recurrent pulmonary infiltrates evident on chest x-rays. These infiltrates had different lobar distribution on each admission. She also had hemoptysis on the last two admissions. Diagnostic workup including fiberoptic bronchoscopy and computed tomography of the chest did not clarify the etiology of recurrent pneumonitis. On her last admission, a new diastolic blowing murmur was heard in the lower left sternal border. Echocardiography revealed a mass on the pulmonary valve consistent with vegetations (Fig 1) and evidence of mild right ventricular dilatation. Pulsed Doppler study demonstrated moderate pulmonary valve insufficiency but no aor-

tic insufficiency. She was treated with antibiotics and has since had no further admissions for recurrent pneumonitis.

Case 2

A 68-year-old white female presented elsewhere one year prior to admission with fever, chills, and congestive heart failure. She was found to have a new murmur of mitral insufficiency. Blood cultures showed *Streptococcus viridans* bacteria. She was treated with appropriate intravenous antibiotics. Echocardiography revealed no vegetations on any cardiac valves. One year later she was referred to us with increasing shortness of breath and mitral insufficiency. She did not have recent fever or chills.

Physical examination revealed a systolic thrill and a grade IV/VI holosystolic murmur of mitral insufficiency at the apex. Echocardiography revealed mass echoes on the mitral and pulmonary valve compatible with vegetations (Fig 2). Color flow Doppler studies demonstrated severe mitral and mild pulmonary valve insufficiencies. Serial blood cultures showed no bacterial or fungal growth. Cardiac catheterization confirmed the presence of severe mitral insufficiency. In view of symptomatic mitral insufficiency, she underwent annuloplasty. The pulmonary valve examined at surgery was found to be thickened. Cultures from the mitral valve and scraping of the pulmonary valve thickening revealed no organism.

Case 3

A 30-year-old black female with a history of intravenous drug abuse presented with fever, productive cough, and right pleuritic chest pain. Blood cultures grew group D *Streptococcus*. Echocardiography demonstrated a pulmonary valve mass compatible with vegetations. Pulsed Doppler studies confirmed the presence of mild pulmonary valve insufficiency. She was treated with intravenous antibiotics and discharged home in good condition.

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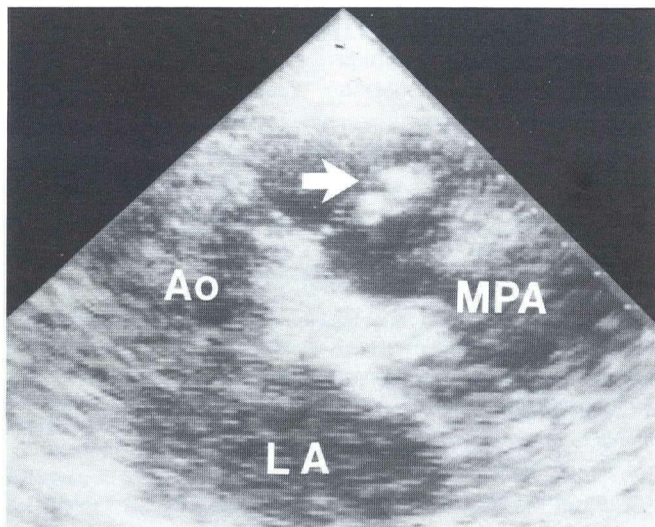


Fig 1—Two-dimensional echocardiogram (parasternal short axis view) demonstrating thickened pulmonary cusps (arrow) compatible with vegetations. (AO = aorta, LA = left atrium, MPA = main pulmonary artery.)

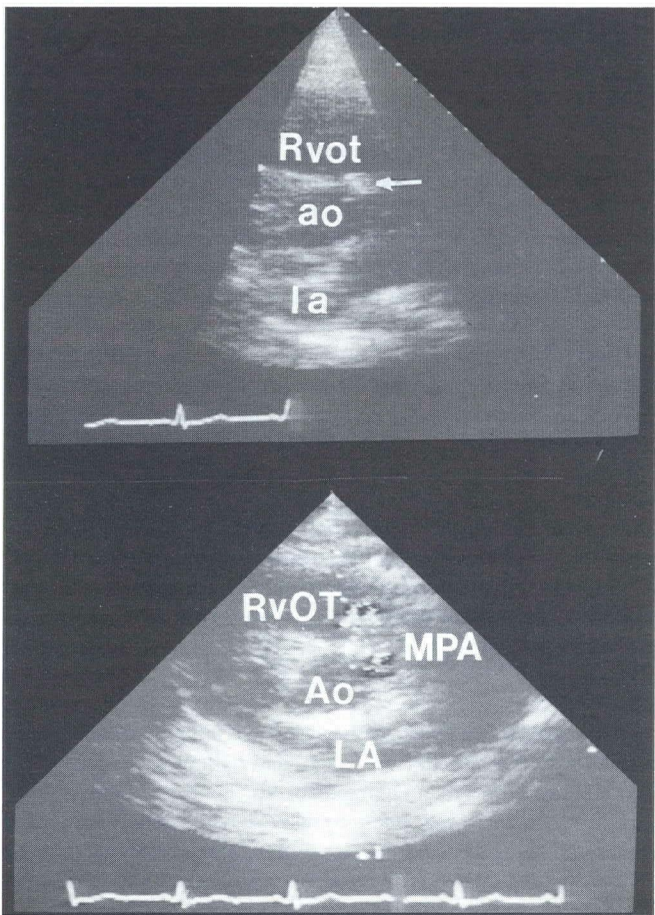


Fig 2—Upper panel: two-dimensional echocardiogram (short axis view) demonstrating pulmonary valve vegetations. Lower panel: color flow Doppler demonstrating mild pulmonic insufficiency (arrow). (AO = aorta, LA = left atrium, MPA = main pulmonary artery, RVOT = right ventricular outflow tract.)

Discussion

Pulmonary valve involvement in infective endocarditis is rare. This condition may occur because of different endothelial lining and vascularity of the valve, or because of a lower blood oxygen content and hemodynamic pressures as compared to the left-sided valves (5,6).

Predisposing factors for pulmonary valve endocarditis in our patients included prolonged indwelling central venous catheters and intravenous drug abuse. The patient in Case 2 had a history of bacterial endocarditis in the year preceding admission but had no clinical evidence of active endocarditis on presentation. The mass noted on her mitral and pulmonary valves probably represented a "healed" vegetation. Congenital heart disease which predisposes pulmonary valve infections such as bicuspid pulmonary valve (with or without stenosis), ventricular septal defects, patent ductus arteriosus, and tetralogy of Fallot (7) were not present in any of our patients. The patient with intravenous drug abuse had no evidence of tricuspid valve endocarditis. Isolated pulmonary valve endocarditis in intravenous drug abusers has been reported to be ten times less common than tricuspid valve involvement (8).

Although more patients with pulmonary valve endocarditis are being diagnosed by echocardiography, this procedure has some drawbacks. The pulmonary valve is technically more difficult to demonstrate by ultrasound, and vegetations may be missed due to incomplete or inadequate visualization of the cusps.

Antibiotic therapy is usually satisfactory in patients with pulmonary valve endocarditis without left-sided involvement or congenital heart disease. Surgery is advised when antibiotics fail to treat the bacterial infection or when patients have right-sided heart failure (4).

All of our patients responded to medical therapy without the need for surgery. The surgery in Case 2 was done primarily for severe mitral valve insufficiency.

While pulmonary valve endocarditis is rare, it should be suspected in patients with unexplained recurrent pneumonitis. An early diagnosis can be made by echocardiography and by Doppler studies. Such patients usually respond to appropriate antibiotic therapy without requiring valve replacement surgery.

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