Eustachian valve endocarditis: Is it worth searching for?

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Background Only a few cases of eustachian valve endocarditis have been reported. Whether the eustachian valve is an uncommon site for a vegetation to be attached or whether the disease is missed because a systematic approach to this valve is not routinely performed in the search for vegetations is not known.

Methods Every patient suspected of having endocarditis undergoes a specific approach, which includes a systematic study of the eustachian valve. In 10 patients with large valves but without signs and symptoms of endocarditis, we identified 2 specific findings: width <3 mm and a regular oscillating movement. A blinded evaluation in the 10 control subjects and 30 patients with right-sided endocarditis, including the 5 with eustachian valve endocarditis, showed an agreement of 97% (39/40).

Results Five of 152 patients with right-sided endocarditis were found to have eustachian valve vegetations (3.3%). Patients were young (age range 22-34 years) and all had predisposing factors (3 intravenous drug abusers, 2 central venous lines), fever, and septic pulmonary embolism. Staphylococcus aureus was cultured in all cases. Tricuspid involvement was found in 4 patients, and only 1 patient had isolated eustachian valve endocarditis. All patients did well with culture-guided antibiotics.

Conclusions Our results suggest that eustachian valve endocarditis may be more frequent than is believed. Thus a systematic interrogation of the eustachian valve should be included in the echocardiographic examination of a patient suspected of having endocarditis. (Am Heart J 2001;142:1037-40.)

Eustachian valve endocarditis has been classically considered a rare entity and only scant cases have been reported.1-8 It must be recognized, however, that a systematic searching of eustachian valve vegetations during the echocardiographic examination is not routinely performed in a patient suspected of having endocarditis. Although tricuspid, mitral, aortic, and pulmonary valves are carefully interrogated to rule out vegetations, not even a rapid view of the eustachian valve or the area where it should be located is usually included in the examination. Since we first saw a vegetation in the eustachian valve with transthoracic echocardiography in 1990,2 we have specifically interrogated the eustachian valve in patients suspected of having endocarditis. The purpose of this study was to describe the clinical characteristics and echocardiographic appearance of eustachian valve endocarditis in a series of 5 patients, which includes 2 patients reported elsewhere.2,9

Methods

Since 1990, every patient suspected of having endocarditis who comes to the echocardiography laboratory undergoes a specific transthoracic approach with a 2.5-MHz probe to visualize the right heart. Transducer positions of great help in showing the eustachian valve, when present, and the joining of the inferior vena cava with the right atrium in every case were the right ventricular inflow tract view and the parasternal short-axis view. Different transducer positions in the subcostal window were also essential to adequately see the eustachian valve. When done, useful transesophageal projections by use of a 5-MHz probe included the transversal coronary sinus view, the longitudinal short-axis view, and the longitudinal atrial septal view with slight advancement of the probe to see the entrance of the inferior vena cava in the right atrium. Echocardiographically, a vegetation was defined as the presence of a thrombus-like thick mass with erratic motion independent of that of the valve.9

We were concerned about how to differentiate large eustachian valves present in some patients and vegetations. Thus we analyzed the echocardiographic characteristics of a control group of 10 patients with large eustachian valves and no symptoms of endocarditis or congenital heart disease and found 2 specific findings. First, normal large eustachian valves were thin thread-like structures with a width <3 mm. Second,
they have a regular oscillating movement, which recurred cyclically, seen with bidimensional and M-mode examinations; it can be seen in Figure 1 and consists of wide excursions toward the tricuspid valve in ventricular systole and early diastole, which corresponds to blood entering the atrial chamber during atrial relaxation (x descent of the venous pulse) and when the tricuspid valve reopens (y descent). This pattern thus closely resembles that of the venous pulse.

To assess the possibility of misdiagnosing a eustachian valve vegetation, we conducted a blinded evaluation in the 10 control subjects and 30 patients with right-sided endocarditis, including the 5 patients with eustachian valve endocarditis. Two experienced observers correctly classified 39 of the 40 patients (agreement 97%). One reader misdiagnosed a patient from the control group of having a vegetation attached to the eustachian valve; this patient had a large 3-mm-wide eustachian valve and was in atrial fibrillation.

Results

From 1990 to 1999, 1455 patients suspected of having infective endocarditis were studied at our laboratory.
Right-sided vegetations were seen by means of echocardiography in 152 patients; 5 of them had eustachian valve vegetations (3.3%). All these 5 patients had definite endocarditis according to well-defined criteria. Clinical characteristics are shown in Table I. It is remarkable that our patients were young (age range 22-34 years). All 5 had predisposing factors (3 intravenous drug abuse and 2 had Hodgkin’s lymphoma and central venous lines), fever, and septic pulmonary embolism. Four of them had a holosystolic murmur. Transthoracic echocardiography was diagnostic in all cases. An erratic thrombus-like mass was seen in the junction of the inferior vena cava and the right atrium (Figure 2). M-mode imaging was useful to demonstrate the erratic movement and fluttering in all cases. Vegetations were thicker than 5 mm in all cases, and their motion was erratic without the 2-wave pattern mentioned above. Tricuspid valve vegetations were found in 4 patients (1 had also mitral valve involvement). One patient had isolated eustachian valve endocarditis. Vegetations attached to a central line were seen in one patient. Tranesophageal echocardiography was performed on 4 patients (2 monoplanar, 1 biplanar, and 1 multiplanar) and confirmed the transthoracic findings but did not add any new information. Staphylococcus aureus was cultured in all cases. All patients did well with culture-guided antibiotics and medical support and no patient went to surgery. Only 2 patients could be followed up. One of them had initially vegetations on the eustachian, tricuspid, and mitral valves. After 6 months, only the tricuspid vegetation persisted and it disappeared after 1 year. The other was the patient with isolated eustachian valve endocarditis. No vegetation was seen in the 1-year echocardiogram.

### Discussion

In 1986, Edwards et al reported on the first postmortem case of eustachian valve endocarditis. Later, our group described for the first time the echocardiographic findings of the disease in an intravenous drug abuser. Scant cases have been reported ever since. To our knowledge, this is the first series of patients with eustachian valve endocarditis.

The eustachian valve is a remnant of the embryonic right valve of the sinus venosus. It is seen in the majority of newborn infants but much less frequently in adults. Irrespective of whether a structure compatible with the eustachian valve is shown by echocardiography, we specifically seek vegetations around the entrance of the inferior vena cava in the right atrium because, theoretically, a small eustachian valve missed by echocardiography can have a vegetation attached.

The eustachian valve is an unusual site of vegetation attachment and has been explained by its different hemodynamic situation compared with that of the...
other cardiac valves. Given that the joining of the superior vena cava with the right atrial chamber does not support high-velocity jets nor pressure gradients, the endothelium at the level of the eustachian valve is usually intact; thus thrombogenesis, which is the first stage in the formation of infected vegetations, does not occur. When endocarditis at that level presents, its clinical characteristics mirror those of tricuspid endocarditis. Patients reported to have eustachian valve endocarditis were intravenous drug addicts or had a pacemaker, were predominantly infected by staphylococci, and did well with culture-guided medical treatment (Table II).

It is interesting to note that the 2 vegetations on the eustachian valve that could be followed up completely resolved with time. Other authors have observed a reduction in size. It may be the result of healing or embolism. This evolution has been already described for left-sided vegetations and has been related to a good outcome. From a clinical perspective, all our 5 patients and those reported in the literature, except one, had a favorable outcome with antibiotic treatment; thus eustachian valve endocarditis can be considered a benign form of infective endocarditis.

In our study, transesophageal echocardiography did not add any new information to that obtained by the transthoracic approach; rather, it confirmed the transthoracic findings. Our results support that both techniques offer similar information in eustachian valve endocarditis. This has already been demonstrated for tricuspid endocarditis. As stated previously, factors that contribute to explain these results include the following: (1) our group of patients are young and have excellent acoustic windows and (2) right-sided vegetations are large and easily visualized by transthoracic examinations. This is not applicable for pacemaker endocarditis.

Our data suggest that eustachian valve endocarditis, although uncommon, might be more frequent than previously thought and is usually associated to infection at other cardiac valves. Therefore the eustachian valve should be systematically interrogated when echocardiography is performed in a patient suspected of having endocarditis, irrespective of whether a vegetation in another valve is found.

References