

Unusual Eustachian Valve Function

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The eustachian valve directs oxygen-rich blood from the inferior vena cava toward the foramen ovale and away from the tricuspid valve during fetal development. Ordinarily, it does not prevent reflux of right atrial blood back into the inferior vena cava because

it does not function as a true valve. Here we describe an unusual adult patient with severe tricuspid valve regurgitation in whom the eustachian valve did function as a true, albeit regurgitant, valve. (J Am Soc Echocardiogr 2000;13:316-8.)

INTRODUCTION

The valve of the inferior vena cava—also referred to as the eustachian valve—is a remnant of the right sinus venosus valve. The eustachian valve does not ordinarily function as a true valve in either fetal or postnatal life.

In utero, blood returning via the umbilical veins enters the inferior vena cava through the ductus venosus. The eustachian valve is a flap situated between the inferior vena cava and the right atrium. It directs this oxygen-rich blood from the inferior vena cava toward the foramen ovale and away from the tricuspid valve. As a rule, it does not prevent refluxing of right atrial blood back into the inferior vena cava, a function to be expected from a true venous valve.

Here we describe an unusual patient with severe tricuspid valve regurgitation in whom the eustachian valve worked as a true, albeit regurgitant, valve.

CASE REPORT

A 76-year-old woman was referred for transthoracic echocardiography as a routine follow-up after her mitral valve repair. More than a decade ago, she complained of dyspnea. Physical and echocardiographic evaluation revealed mitral and tricuspid valve prolapse with severe regurgitation of both valves. She underwent a Carpentier-

Edwards (Baxter Healthcare Corp, Edwards Division, Santa Ana, Calif) ring mitral valve annuloplasty. No attempt was made to repair the tricuspid valve.

Five years ago, because of atrial fibrillation with a slow ventricular response, a permanent VVI pacemaker was inserted via the superior vena cava.

The patient is currently asymptomatic. A recent examination demonstrated normal vital signs except for an irregular pulse. The neck veins were moderately distended at 45° but without clear *c-v* waves. The lungs were clear, and heart sounds were normal. A 3/6 holosystolic murmur was heard at the left lower sternal border. No hepatomegaly or edema was present.

A transthoracic echocardiographic study revealed biatrial enlargement, normal left ventricular function, minimal mitral valve regurgitation, and mild to moderate aortic and pulmonic valve regurgitation. The tricuspid valve regurgitation was severe, and the inferior vena cava was markedly dilated (maximum diameter 4.3 cm). The pulmonary artery systolic pressure was estimated to be 25 mm Hg above the right atrial pressure. These findings were not significantly different from prior studies of the patient.

The subxiphoid view afforded most interesting findings. A very prominent eustachian valve was visualized (Figures 1 and 2). During ventricular systole, the eccentric jet of tricuspid regurgitation traveled along the right atrial side of the interatrial septum. Upon turning inferiorly, it pushed the eustachian valve shut over the orifice of the inferior vena cava.

Only a small amount of the tricuspid regurgitant jet leaked across the eustachian valve and into the inferior vena cava. An accelerated flow through the orifice could be seen during ventricular systole (Figure 1, *B*), implying a small regurgitant orifice of the eustachian valve.

During ventricular diastole, the eustachian valve swung away from the inferior vena cava orifice. No obstruction at the level of the eustachian valve could be demonstrated because only laminar diastolic flow was observed across this valve (Figure 2, *B*).

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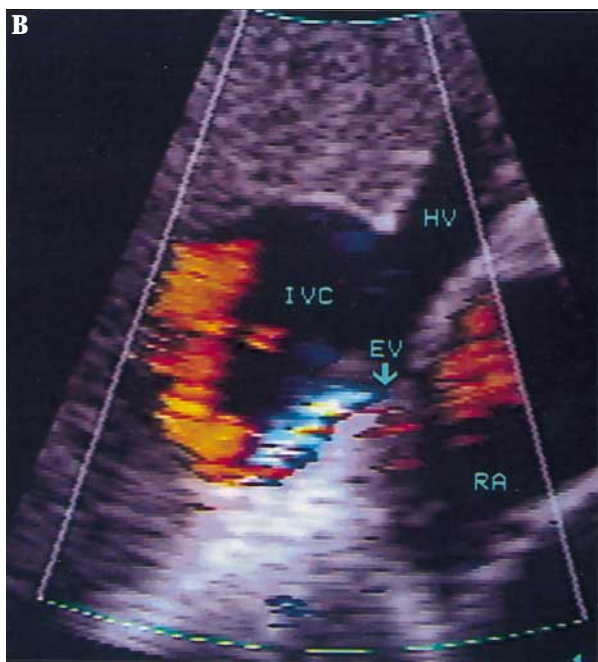
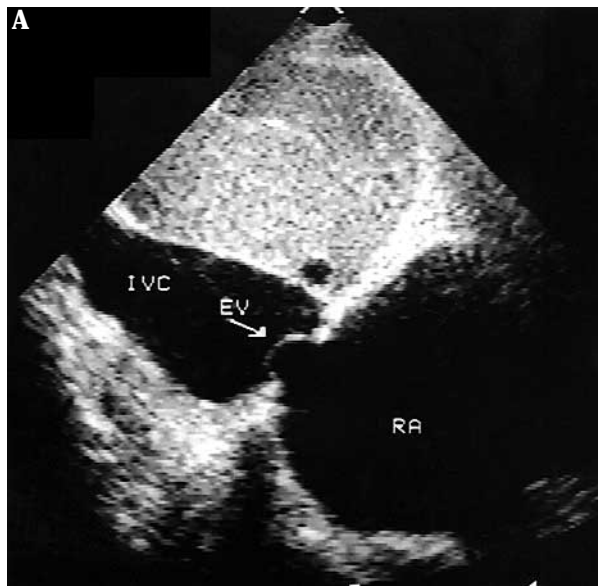


Figure 1 Subxiphoid view of eustachian valve in systole. **A**, On the 2-dimensional image, the unusually large eustachian valve (*EV*) appears as a true valve separating the right atrium (*RA*) from the inferior vena cava (*IVC*). **B**, A small degree of regurgitation is seen across the eustachian valve with flow acceleration at the level of the valve. *HV*, Hepatic vein.

DISCUSSION

The eustachian valve is well developed in the fetus and helps channel the oxygen-rich blood from the inferior vena cava across the foramen ovale and into the systemic circulation. Because the valve gradually

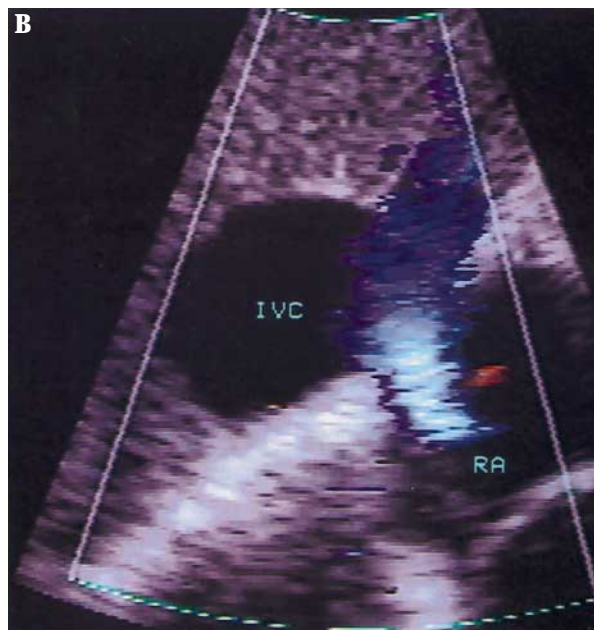
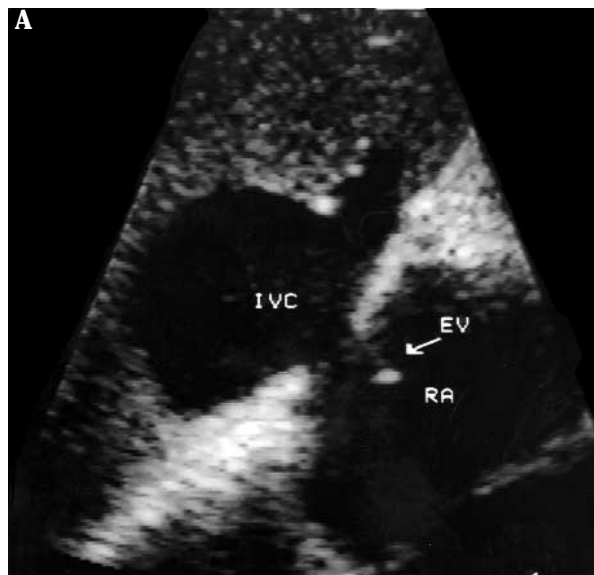


Figure 2 Subxiphoid view of eustachian valve in diastole. **A**, The 2-dimensional image reveals a widely open eustachian valve (*EV*) between the inferior vena cava (*IVC*) and the right atrium (*RA*). **B**, Laminar flow across the eustachian valve demonstrates that there is no transvalvular obstruction.

regresses postpartum, the echocardiographic prominence of the eustachian valve depends on the subject's age.

In one study, the valve could be visualized by transthoracic echocardiography in 85% of children younger than 1 month. In contrast, in a pediatric group whose mean age was 3.3 years (range 36 days to 14 years), the valve could be visualized by the

same technique in 62% of children.¹ In adults, the eustachian valve can be visualized in only a minority of persons undergoing transthoracic echocardiography.²

A variety of echocardiographic findings associated with the eustachian valve have been described. When prominent, the eustachian valve has been mistaken for a right atrial mass.³ It can also serve as a nidus for myxoma,⁴ fibroelastoma,⁵ thrombus⁶ or endocarditis.⁷ Furthermore, an association between unusually large eustachian valves and atrioventricular valvular prolapse has also been described.²

However, to the best of our knowledge, a eustachian valve functioning as a true valve of the inferior vena cava has not been described previously. In our patient, the eccentric jet of tricuspid regurgitation appears to have initiated the systolic closure of the prominent eustachian valve.

It could be speculated that the closure of the eustachian valve in systole could protect the patient from some of the systemic complications that can result from severe tricuspid regurgitation. The high inferior vena cava and hepatic vein pressures—often associated with marked flow reversal during ventric-

ular systole—may be somewhat ameliorated by this unusual degree of eustachian valve “competence.”

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