

Long Eustachian valve interfering with the access to coronary sinus during biventricular pacemaker implantation

Biventriküler pacemaker implantasyonu sırasında koroner sinüse girilmesini engelleyen uzun Eustachian kapak

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Introduction

Early during embryonic life, the right valve of sinus venosus separates venous right atrium from the muscular right atrium and directs oxygenated blood preferentially from the inferior vena cava (IVC) through the foramen ovale into the left atrium. This structure begins to regress during the second trimester leaving four remnants: the Eustachian valve (EV), the Thebesian valve, Chiari network and the terminal crest. Depending on the degree of regression, EV may be totally absent or it may appear as a thin flap originating from the orifice of the IVC. Here we describe a long EV, which impeded access to the coronary sinus (CS) during biventricular pacemaker implantation.

Case Report

A 63-year-old woman with congestive heart failure presented with the complaints of dyspnea at rest, abdominal distention and swelling in the legs. She was on angiotensin receptor blocker, beta-blocker, diuretic, digoxin and spironolactone therapy. Although her medical therapy was optimized six months ago, she still had New York Heart Association class III symptoms. A twelve-lead electrocardiogram revealed sinus rhythm, first-degree atrioventricular block with a PR interval of 220 msec and left bundle branch block with a QRS width of 150 msec. On transthoracic echocardiogram (TTE), left heart chambers were dilated and left ventricle was diffusely hypokinetic with an ejection fraction of 20%. Color Doppler echocardiography revealed a moderate mitral regurgitation and a moderate-to-severe tricuspid regurgitation. Peak systolic pulmonary artery pressure, which was calculated from the tricuspid regurgitation velocity profile using the modified Bernoulli equation was 65 mmHg. There were both interventricular and intraventricular dyssynchrony. According to clinical, electrocardiographic and echocardiographic findings, our decision was to implant a biventricular pacemaker. However, the CS access could not be achieved because of an interfering structure within the right atrium and the procedure was cancelled. A repeat TTE was performed in order to evalu-

ate the right atrium. In the subcostal window, a long EV extended from the anterior rim of the IVC orifice into the right atrium (Fig. 1) was detected. In previous TTE, this structure did not attract our attention and therefore was not reported. Transesophageal echocardiography (TEE) further revealed a long EV of 32 mm (Fig. 2) and a patent foramen ovale.

Discussion

The average length of the EV is 3.6 mm with a range of 1.5-23 mm (1). A persisting EV without another structural heart disease is believed to have no clinical importance. However, a long EV can be mistaken for 'cor triatriatum dexter' (2). In patients with an atrial septal defect, a prominent EV can cause cyanosis by acting as a conduit, which transmits IVC blood flow to the left atrium (3). Tumors, cysts or vegetations can originate from the EV (4, 5). Venous thrombi migrating from the

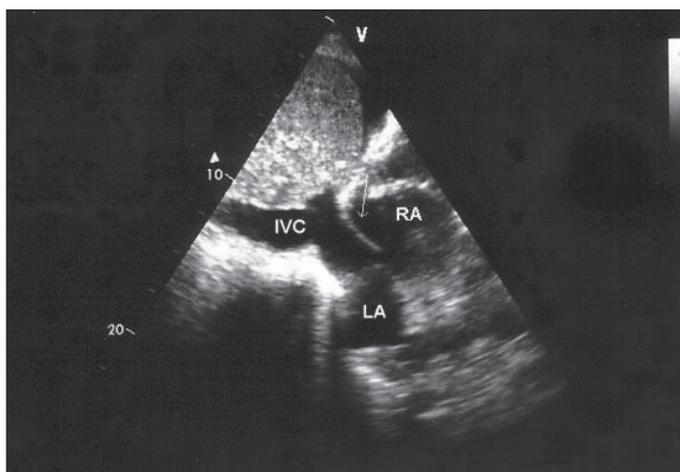


Figure 1. The arrow points a long Eustachian valve at the orifice of inferior vena cava in the transthoracic subcostal view

IVC - inferior vena cava, LA - left atrium, RA - right atrium

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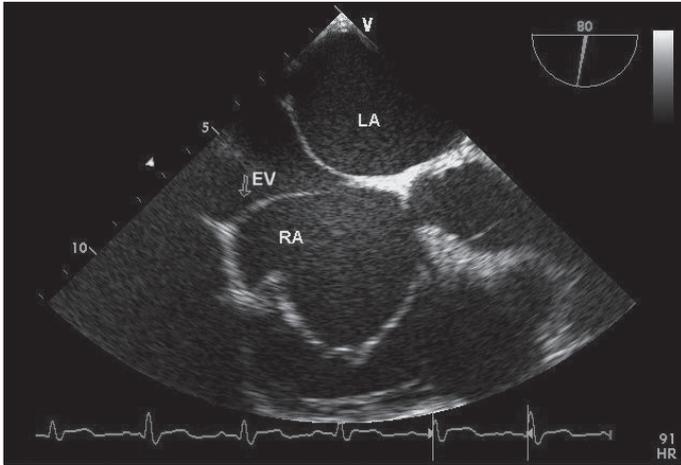


Figure 2. Transesophageal echocardiography reveals a long Eustachian valve

EV - Eustachian valve, LA - left atrium, RA - right atrium

upper or lower extremities can be entrapped by the EV, which further can result in pulmonary or paradoxical embolism (6). During percutaneous or surgical closure, a prominent EV can be mistaken for an atrial septal defect (7).

Coronary sinus interventions are being used with an increasing frequency in cardiology practice. Accessing the CS is a challenging procedure with success rates ranging between 53% and 98% (8). Failure to enter the CS is the most common reason for unsuccessful left ventricular pacing lead emplacement (9). In our case, a long EV impeded the insertion of a guide sheath into the CS during biventricular pacemaker implantation. Other anatomic barriers within the right atrium, which can hinder CS cannulation are the Thebesian and Vieussens valves and the Chiari network. Thebesian valve is the valve at the CS orifice and Vieussens valve is present at the orifice of the great cardiac vein where it drains into the CS (10).

The EV can be visualized either by TTE from the subcostal view or by TEE from the bicaval view as a thin flap extending from the anterior rim of the IVC orifice into the right atrial cavity. The EV can be mistaken for masses, thrombi and vegetations. In addition EV should be differen-

tiated from the Chiari network, a highly mobile serpiginous membrane, which is not attached to IVC.

In patients with difficult anatomies, CS pacing lead placement can be made under transesophageal or intracardiac echocardiographic guidance (8).

Conclusion

A long EV can interfere access to CS during biventricular pacemaker implantation. A detailed right atrial anatomy should be described before any relevant procedure in order to increase the success rate.

References

1. Limacher MC, Gutgesell HP, Vick GW, Cohen MH, Huhta JH. Echocardiographic anatomy of the Eustachian valve. *Am J Cardiol* 1986; 57: 363-5.
2. Yavuz T, Nazlı C, Kınay O, Kutsal A. Giant Eustachian valve with echocardiographic appearance of divided right atrium. *Tex Heart Inst J* 2002; 29: 36-8.
3. Morishita Y, Yamashita M, Yamada K, Arikawa K, Taira A. Cyanosis in atrial septal defect due to persistent Eustachian valve. *Ann Thorac Surg* 1985; 40: 614-6.
4. Bonde P, Sachithanandan A, Graham AN, Richardson SG, Gladstone DJ. Right atrial myxoma arising from the Eustachian valve in a patient with colonic polyposis. *J Heart Valve Dis* 2002; 11: 601-2.
5. Sawhney N, Palakodeti V, Raisinghani A, Rickman LS, Demaria AN, Blanchard DG. Eustachian valve endocarditis: a case series and analysis of the literature. *J Am Soc Echocardiogr* 2001; 14: 1139-42.
6. Munir A, Minderman D, D'Cruz I. Unusual superior vena cava thrombus (partly obstructive) extending through right atrium to Eustachian valve. *Echocardiography* 2007; 24: 77-8.
7. Becker A, Buss M, Sebening W, Meisner H, Döhlemann C. Acute inferior cardiac inflow obstruction resulting from inadvertent surgical closure of a prominent Eustachian valve mistaken for an atrial septal defect. *Pediatr Cardiol* 1999; 20: 155-7.
8. Artrip JH, Sukerman D, Dickstein ML, Spotnitz HM. Transesophageal echocardiography guided placement of a coronary sinus pacing lead. *Ann Thorac Surg* 2002; 74: 1254-6.
9. Karaca M, Bilge O, Dinçkal MH, Üçerler H. The anatomic barriers in the coronary sinus: implications for clinical procedures. *J Interv Card Electrophysiol* 2005; 14: 89-94.
10. Anderson SE, Hill AJ, Iuzzo PA. Venous valves: unseen obstructions to coronary access. *J Interv Card Electrophysiol* 2007; 19: 165-6.