Journal of Cardiothoracic and Vascular Anesthesia 32 (2018) 796–800

Contents lists available at ScienceDirect

Journal of Cardiothoracic and Vascular Anesthesia

journal homepage: www.jcvaonline.com

Case Report

Intraoperative Transesophageal Echocardiographic Findings in Surgical Resection of a Giant Right Atrial Diverticulum That Severely Compressed the Right Ventricle

Shihoko Iwata, MD, Minoru Nomura, MD, Makoto Ozaki, MD[1]

Department of Anesthesiology, Tokyo Women's Medical University Hospital, Tokyo, Japan

Key Words: transesophageal echoardiography; right atrial diverticulum; congenital heart disease; cardiac surgery

A RIGHT ATRIAL (RA) diverticulum is a rare congenital malformation characterized by extraordinary cardiac enlargement that is often incidentally diagnosed by cardiac imaging.[1–5] The etiology and optimal treatment of an RA diverticulum remain unclear because patients cases are asymptomatic. Although surgical resection is indicated for symptomatic patients, there have been no reports of intraoperative transesophageal echocardiography (TEE) of an RA diverticulum.

A case is presented to highlight the intraoperative TEE findings and potential risks of surgical resection of a giant RA diverticulum. Furthermore, details regarding the differentiation of RA enlargement from a giant RA diverticulum according to TEE features are discussed.

Case Report

A 35-year-old woman with an abnormal cardiac silhouette that was discovered on a chest radiograph when she was 6 year old was diagnosed with an RA diverticulum by angiography. Although the patient remained asymptomatic for almost 3 decades, she experienced paroxysmal atrial fibrillation about 2 months before presentation to the authors' department.

Preoperative computed tomography showed a giant RA diverticulum (6.3 × 10.8 × 12.2 cm) originating from the free wall of the RA and communicating through a wide neck. The right ventricle (RV) and tricuspid valve (TV) complex were severely compressed by the giant RA diverticulum. There was no evidence of thrombus within the RA diverticulum.

The patient was scheduled for resection of the RA diverticulum and the maze procedure.

In the operating room, standard monitoring was conducted for general anesthesia with invasive monitoring of arterial and central venous catheters. Intraoperative electrocardiography showed a regular sinus rhythm. After induction of general anesthesia and uneventful intubation, intraoperative TEE was performed using a Philips iE33 Ultrasound System (Philips Healthcare, Bothell, WA), which revealed a giant RA diverticulum with a broad neck derived from the free wall of the right atrium with normal positioning of the TV complex (Fig 1). Spontaneous echo contrast was observed in the giant RA diverticulum, while three-dimensional (3D) and contrast-enhanced TEE showed no evidence of a thrombus. In addition, no congenital structural defect of the atrial wall was observed by contrast-enhanced TEE.

The giant RA diverticulum severely compressed the RV and TV, whereas tricuspid regurgitation (TR) was trivial. The right ventricular systolic pressure derived from the peak velocity of

The authors declare that there are no statements of funding and no conflicts of interest.

The patient gave written consent for publication of clinical reports and echo images.

[1]*Address reprint requests to* Shihoko Iwata, MD, Tokyo Women's Medical University Hospital, Department of Anesthesiology, 8-1 Kawada-cho, Shinjuku-ku, Tokyo, Japan 162-8666.

E-mail address: shk_wt_0204@ybb.ne.jp (M. Ozaki).

http://dx.doi.org/10.1053/j.jvca.2017.07.025

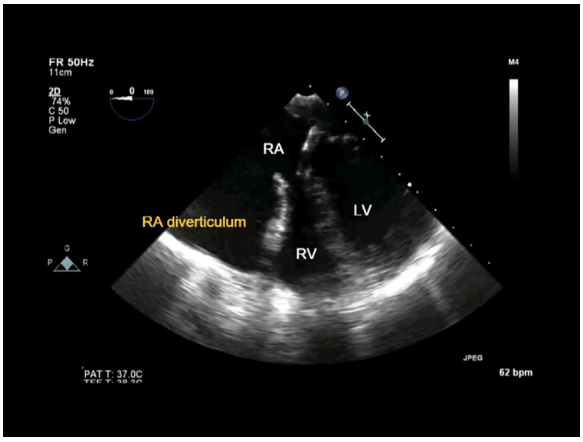

Fig 1. A midesophageal 4-chamber view showing a giant RA diverticulum with a broad neck communicating with the RA and compressing the small RV and TV (RA, right atrium; RV, right ventricle; TV, tricuspid valve; LV, left ventricle).

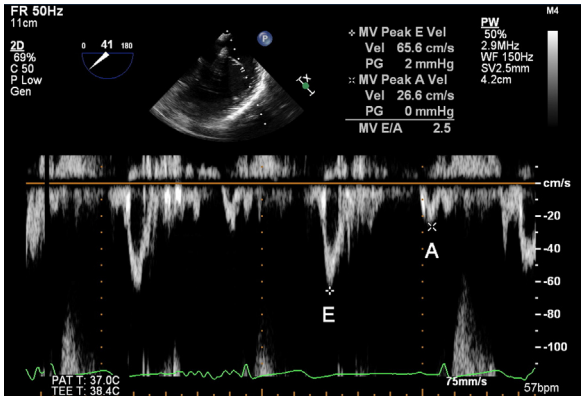

Fig 3. Mitral inflow demonstrating E-wave velocity and A-wave velocity in sinus rhythm with pulsed-wave Doppler from a midesophageal 4-chamber view. The mitral E-wave velocity was 65.6 cm/s and the A-wave velocity was 26.6 cm/s (E, early diastolic rapid filling velocity; A, late diastolic filling velocity).

TR was 19 mmHg. Pulsed-wave Doppler interrogation of tricuspid inflow patterns was consistent and not subject to respiratory cycles. The tricuspid inflow peak velocity was 70.7 cm/s, but it was difficult to distinguish clearly between the peak early filling velocity (E wave) and late diastolic filling velocity (A wave) despite the presence of a normal sinus rhythm (Fig 2). On the other hand, the mitral inflow profile clearly showed the E and A waves (Fig 3). A transgastric short-axis view showed preservation of left ventricular wall motion and compression of the RV by a giant RA diverticulum (Fig 4). Two-dimensional (2D) and 3D TEE (Figs 5 and 6, respectively) showed that the right coronary artery (RCA) was located near the sinotubular junction and passed between the RA diverticulum and RV.

Surgical exploration confirmed the absence of a thrombus and that the thin wall of the diverticulum was connected to the RA, although the RCA could not be visualized. The RA diverticulum was adhered to the RA and thus difficult to separate; therefore, only partial resection of the RA diverticulum was performed. After the patient was weaned from cardiopulmonary bypass (CPB), TEE showed mild TR, a residual RA diverticulum, and good ventricular motion. However, no definite A-wave was detected during sinus rhythm.

The patient had an uneventful postoperative course and was discharged on postoperative day 7. After discharge, she remained asymptomatic with no tachyarrhythmia. A postoperative pathological examination showed that the thin wall of the RA diverticulum primarily consisted of connective tissue and a few muscular elements, although all 3 layers of the RA wall were partially preserved. According to a pathologist, this pathological finding probably demonstrated that the wall of the RA diverticulum degenerated and gradually lost myocardium, as the RA diverticulum increased in size.

Discussion

An RA diverticulum is a rare congenital malformation characterized by extraordinary cardiac enlargement that is often diagnosed incidentally by cardiac imaging. Most cases

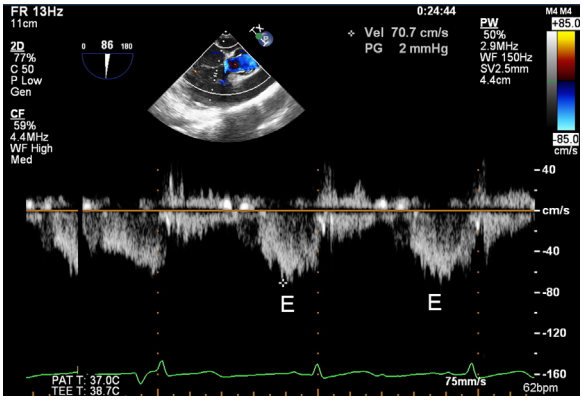

Fig 2. Tricuspid inflow velocity in the inflow-outflow view. Pulsed-wave Doppler spectral velocity of TV inflow depicting a peak velocity 70.7 cm/s. The TV inflow velocity was not accelerated despite severe compression by the giant RA diverticulum. There was no clear evidence of a late diastolic A wave (E, early diastolic rapid filling velocity; TV, tricuspid valve; RA, right atrium).

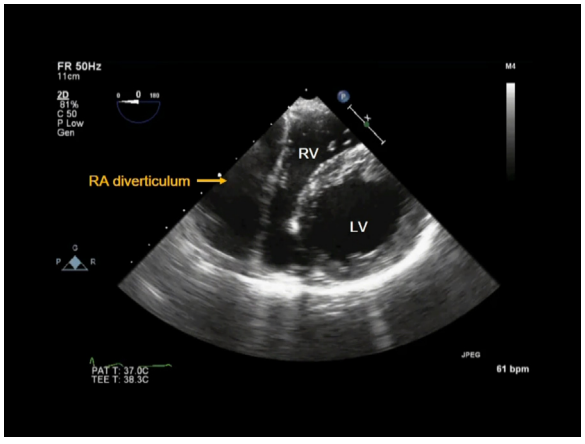

Fig 4. A transgastric short-axis view showing that the RV was severely compressed by the giant RA diverticulum (LV, left ventricle; RV, right ventricle; RA, right atrium).