

CASE REPORT

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Iatrogenic Systemic Venous Return Abnormality

Osman Tiryakioglu¹, Hasan Ari², Selma Kenar Tiryakioglu³ and Ahmet Ozyazicioglu¹

¹Department of Cardiovascular Surgery, Bursa Yuksek İhtisas Training and Research Hospital, Bursa, Turkey.

²Department of Cardiology, Bursa Yuksek İhtisas Training and Research Hospital, Bursa, Turkey. ³Department of Cardiology, Acibadem Hospital, Bursa, Kadikoy, Turkey. Corresponding author email: osmantiryaki@gmail.com

Abstract: An iatrogenic systemic venous return abnormality was found in a female patient who had previously undergone surgery to correct a superiorly located atrial septal defect and then had increasing complaints. Here we consider the importance of contrast echocardiography in the diagnosis and discuss the patient's second operation as well as the possible mistakes in the first operation.

Keywords: congenital heart disease, atrial septal defect, systemic venous return abnormality, echocardiography

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Introduction

Atrial septal defect (ASD) is the most common congenital cardiac disease in adults.¹ It is usually located in the fossa ovalis of the septum and is a secundum-type atrial septal defect. It is generally asymptomatic. Serious morbidity and mortality may occur if the condition is not surgically corrected.² The most common causes of mortality are pulmonary hypertension, Eisenmenger syndrome, cardiac failure in the fourth or fifth decade and pulmonary or systemic embolism.³

Case Report

A 47-year-old female patient, who underwent surgery to repair a superiorly located ASD with a pericardial patch in another center eight months ago, complained of dyspnea that gradually increased after the surgery. Transthoracic echocardiography performed in the second month postoperative was normal, and the interatrial septum was intact. The second month after the operation, routine arterial blood samples were normal (pH: 7.41, PaO₂: 92 mmHg, PaCO₂: 37 mmHg). The patient was called for periodic testing after her medical treatment was arranged. Echocardiography was again performed on the patient upon findings of dyspnea, rapid exhaustion and bloody expectoration in her eight month postoperative. Arterial blood gas values were as follows: hemoglobin: 13.1 g/dl; hematocrit: 39%; and platelets: 367,000/mm³. The interatrial septum was found to be intact. Septal bands were thought to be congenital and were observed in the left atrium. Other anatomic structures were normal. It was decided to perform contrast echocardiography to rule out a systemic venous return abnormality by opening separate venous vessel routes from the upper and lower extremities.

From the contrast echocardiography, it was determined that contrast administered to the upper extremity flowed to the left atrium through the superior vena cava and that a very small portion flowed to the right atrium (Fig. 1). Echocardiography and clinical data were obtained for the patient.

The patient underwent elective surgery; a median sternotomy and arterial cannula placement in the aorta were performed. The superior vena cava and inferior vena cava were selectively cannulated. A right atriotomy was performed using a heart-lung pump. It was observed that the interatrial septum

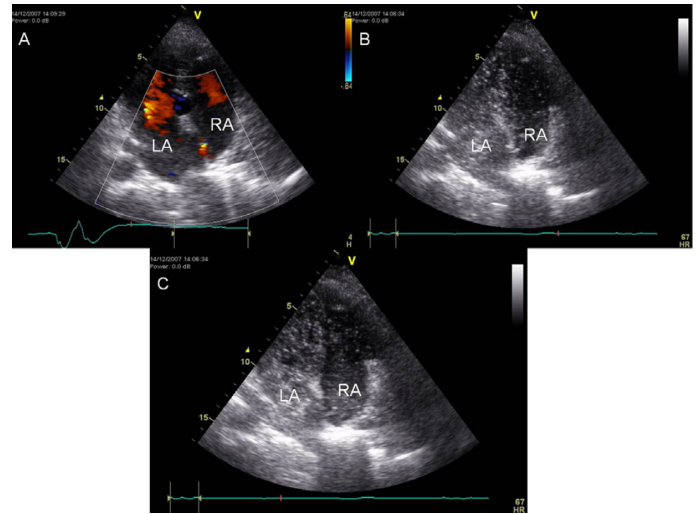


Figure 1. A) ECHO: LV: 2.5–4.5; EF: 65%; LA: 4.0; Ao: 3.1; MD: trace; TD: trace; PAP: 33 mmHg. Minimal passage from left to right was seen around the patch. B) During the ECHO performed by administering contrast from the right and left arms, the contrast filled the left atrium first. C) TEE was performed on the patient. Sinus venosus-type (VCS) ASD and the presence of a second (native) septal structure on the side of the right atrium were seen.

was intact and that the superior vena cava orifice did not open to the right atrium. The septum was longitudinally opened from the interatrial septum of the superior vena cava. Bands in the left atrium, superior vena cava orifice and mitral valve were found, and the bands were later excised. The atriotomy incision was extended to include the superior vena cava. The septum anatomy was re-formed keeping the superior vena cava in the right atrium using a pericardial patch fixed with glutaraldehyde (Fig. 2). The right atriotomy was closed by expanding the superior vena cava using a pericardial patch. The patient was discharged on the fifth day postoperative. Transthoracic, transesophageal and contrast echocardiography were performed after six months and were normal (Fig. 3).

Discussion

Except for the bicuspid aortic valve, ASD is the most common congenital cardiac disease seen in adults. Secundum ASDs comprise 75%–80% of atrial septal defects. Of these defects, 70% are located in the center of the atrial septum, 20% extend to the posterior atrial wall and to the inferior vena cava, and sinus venosus-type ASD near the VCS is seen in 6%. The remaining 3%–4% includes rare types, such as multiple defects or coronary sinus defect.^{1–3}

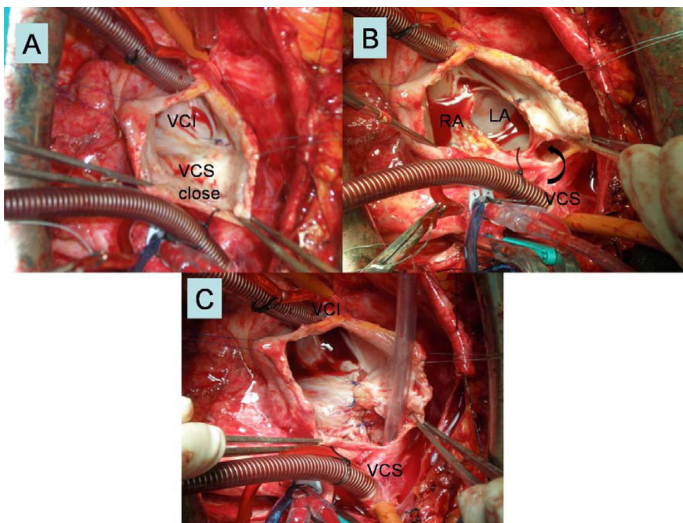


Figure 2. A) RA; VCS entrance cannot be seen while the VCI entrance can be seen. B) The LA and VCS extend to the left atrium through the tunnel formed by a fibrous structure after the septum was opened. C) The septum was closed with a pericardial patch leaving VCS on the side of the right atrium.

Closing ASDs is easy, and these surgeries are not usually problematic. Secundum ASDs with small diameters (<3 cm diameter) have recently begun being closed using non-invasive methods. Standard operating techniques are used for cases with complex abnormalities.⁴ Our patient's case requires discussion apart from all these.

Using the standard technique, aorta-bicaval cannulation is performed after a median sternotomy. Selective vena cava cannulation is not recommended in secundum defects close to the vena cava.⁵

Although the vena cava was not selectively cannulated during the patient's first surgery (as determined from the purse suture in the right atrium auricle and epicrisis), cannulation of the superior vena cava was performed. In fact, we believe that the ASD was closed correctly and that the superior vena cava had to stay in the right atrium due to this surgical method. In the surgery to place a venous cannula in the right atrium near the superior vena cava to close the ASD, it was not possible to leave the left atrium. Therefore during the first operation, the patient did not experience problems, but later small, left atrium suture lines from closing the mouth of the superior vena cava in the first operation may have led to the formation of granulation tissue.

In conclusion, ASD is the most frequently seen and most easily treatable adult congenital cardiac disease either surgically or non-invasively. However, as in all congenital abnormalities, thorough preoperative assessment and good surgical observation are mandatory. Transthoracic echocardiography, transesophageal echocardiography and even contrast echocardiography are useful for diagnosis. The

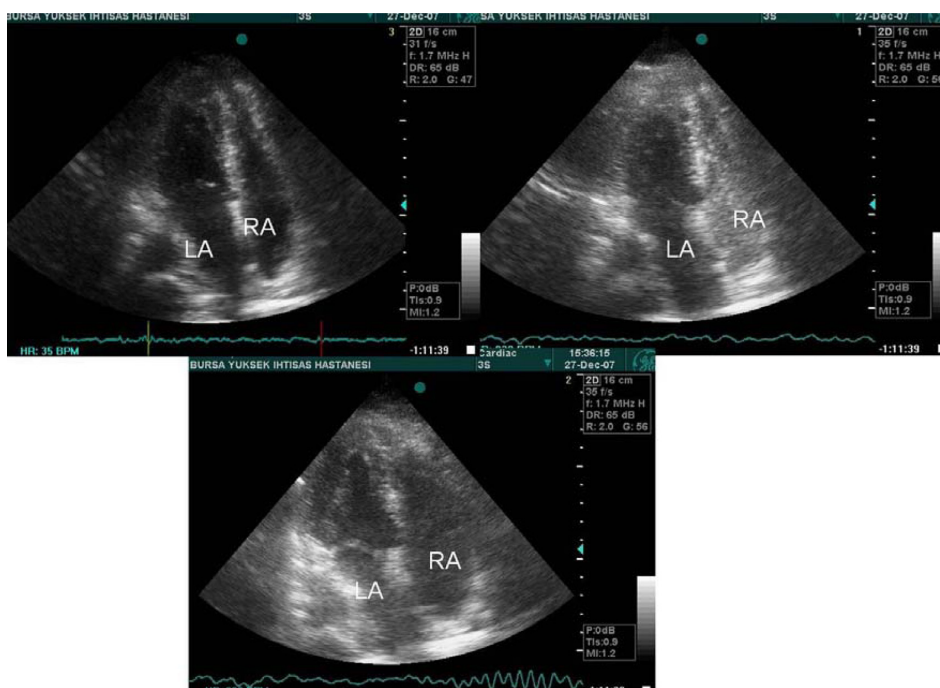


Figure 3. Contrast media administered to the arm and IAS is intact in ECHO.



left atrium should be meticulously assessed, and the mitral valve can be observed thoroughly.

Disclosures

This manuscript has been read and approved by all authors. This paper is unique and is not under consideration by any other publication and has not been published elsewhere. The authors and peer reviewers of this paper report no conflicts of interest. The authors confirm that they have permission to reproduce any copyrighted material. Written consent was obtained from the patient for publication for this study.

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