Diversion of the Inferior Vena Cava Into the Left Atrium After Surgical Repair of Atrial Septal Defect

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ABSTRACT

Diversion of inferior vena cava (IVC) into left atrium (LA) is one of the rare complications of the surgical repair of the atrial septal defect (ASD). A 30-year-old male patient who had undergone surgical repair of the ASD 9 years ago was referred to our clinic because of diversion of the IVC into the LA. Surgical repair was performed by reconstructing the opening of the IVC and redirecting it into the right atrium.

Key Words: Atrial septal defect; inferior vena cava

Atrial Septal Defekt Cerrahi Onarım Sonrasında Sol Atriyuma Vena Kava İnferiorun Açılmasının Cerrahi Onarımı

ÖZET

Vena kava inferiorun sol atriyuma dükülmesi atriyel septal defektin cerrahi kapatılmasının nadir görülen cerrahi komplikasyonlardan biridir. Bu olguda 30 yaşındaki erkek hastanın geçirmiş olduğu atrial septal defektin cerrahi onarımından 9 yıl sonra vena kava inferiorun sol atriyuma dökülmesinin tespiti ve cerrahi onarımı sunulmuştur.

Anahtar Kelimeler: Atriyal septal defekt; inferior vena kava

INTRODUCTION

Atrial septal defect (ASD) is the third-most common congenital cardiac malformation[(1)]. Although surgical repair of the ASD is fairly safe and is a routine procedure, complications arising due to the diversion of inferior vena cava (IVC) into the left atrium (LA) are very rare. Diversion of the IVC into the LA, although unusual, it remains a cause of morbidity following repair of the ASD. This leads to dyspnea and hypoxemia, which may arise immediately after operation or after several years. In this report, we present a 30-year-old male patient who started suffering from mild dyspnea and cyanosis on exertion 1 year after the surgical repair of the ASD. He was brought to the emergency clinic when he underwent a trauma 9 years after the closure of the ASD, and on performing complete blood count (CBC) we observed his hematocrit to be 65% and hemoglobin to be 20 mg/dL. An echocardiogram was performed which revealed diversion of the IVC into the LA. Surgical repair of this complication was performed by reconstructing the opening of the IVC and redirecting it into the right atrium.

CASE REPORT

A 30-year-old male had undergone surgical repair of the ASD in another hospital 9 years ago before he was admitted to our outpatient clinic. One year after the first surgical repair of his ASD, he began suffering from perioral cyanosis and dyspnea on exertion. The patient neglected these complaints until he fell down from a tree 9 years after the first surgery. He was brought to the emergency clinic of another hospital, and upon performing a CBC his hematocrit was noted to be 65% and hemoglobin to be 20 mg/dL. An echocardiogram was performed which revealed diversion of the IVC into the LA. He was then referred to our outpatient clinic. Physical examination of the patient indicated mild central cyanosis and clubbing of the fingers of his hands. His blood pressure was 110/70 mmHg and his heart rate was 87 beats/min. We also observed a 2/6 systolic ejection murmur with a fixed split S_2. We performed cardiac

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catheterization, which confirmed the diagnosis of diversion of the IVC into the LA. An arterial blood gas sample showed that PaO_2: 91 mmHg and SO_2: 87%. Surgical repair was performed by reconstructing the opening of the IVC and redirecting it into the right atrium.

Surgical Technique

After re-median sternotomy and dissection of the adhesions, aortobicaval cannulation was performed. The purse sutures were placed on the IVC and the superior vena cava (SVC), allowing the 2 caval cannules to be inserted directly into the IVC and SVC. The SVC and IVC were snared by the tapes. Cardiopulmonary bypass (CPB) started and the ascending aorta cross clamped. We administered ante-grade blood cardioplagia and established moderate hypothermia; thus, physiological cardiac arrest was performed. We stained the inferior and superior vena caval snares. Upon opening the right atrium, we found that the orifice of the IVC had completely occluded with a scar tissue which we thought had been formed by the healing process. On making an incision over the scar tissue, we observed the diversion of the IVC into the LA and there was a residual ASD which was closed by primary sutures. We dissected the upper part of the IVC and found its opening into the LA. The cannules of the IVC were removed and total circulatory arrest established. The upper part of the IVC was reconstructed by a Dacron graft patch and redirected into the right atrium. The cannule was re-inserted into the IVC and total circulatory arrest was finished. The period of total circulatory arrest was 8 min. The right atriotomy was closed and the cross clamp removed. After the patient recovered from hypothermia, weaning from CPB was uneventful and the sterontomy closed. Postoperative PO_2, SO_2, Hct, and Hb were 87%, 98%, 32%, and 10 mg/dL, respectively. We followed up on the patient and report that there were complications, and the cyanosis disappeared. He was discharged on the fourth day postoperatively. He came to our outpatient clinic 2 months later for check-up and had no complaints. Echocardiogram revealed no pathology. His Hct and Hb were 37% and 11.5 mg/dL, respectively.

DISCUSSION

Diversion of the IVC into the LA is a rare complication of the surgical repair of the ASD. As far as we know, few cases have been published in recent years, yet it was more frequently seen before the use of CPB because time limitations were imposed by only hypothermia and no inflow occlusion[2]. This is an unusual case discovered 9 years after the first operation. The symptoms of this complication generally appear soon after surgery when the patient becomes cyanotic and hypoxic; however, some factors such as the relief of pulmonary venous congestion and right ventricular strain by the correction of the left-to-right shunt, the occurrence of only partial diversion of the IVC flow to the LA, and the occurrence of stenosis of the IVC, with collaterals draining to the SVC through an azygos vein may contribute to the appearance of the symptoms of this complication later in life[3]. Reported factors associated with this complication include a large secundum defect or sinus venosus defect, and anomalous pulmonary return into the RA[4].

Cannulation of the IVC and SVC through the auricle of the right atrium may play a role in increasing the risk of diversion of the IVC into the LA, especially in IVC type ASD. The inferior rim of the defect may not be clearly observed, especially in inferior vena caval type ASD which may mislead the surgeon to direct the opening of the IVC into the LA during repair of the defect. Thus, selective cannulation of the IVC and SVC may reduce or avoid the occurrence of such a rare complication. In our case, we observed that the inferior rim of the defect was not included in the first surgical closure. In addition, we observed a scar tissue covering the upper part of the IVC on the RA surface which led us to believe that there was partial diversion of the IVC initially and with healing process, complete diversion of the cava gradually occurred. Therefore, the openings which must drain to the right atrium should be controlled carefully before closing the right atrium.

Awareness of this complication is very important since such patients may be misdiagnosed with Eisenmenger's syndrome[3].

In conclusion, although unusual, diversion of the IVC to the LA must be considered in cyanotic patients who underwent surgical repair of ASD. Even though surgical repair of the ASD seems to be one of the safe procedures, it must be performed by or under control of experienced hands.

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