

Diversion Of The Inferior Vena Cava Into The Left Atrium After Surgical Repair Of Atrial Septal Defect

Alaa Hijazi¹, Hulya Çiçekçiöğlü², Emir Erol³, Bayram Yılmazkaya¹, Ferit Çiçekçiöğlü⁴

1 Osm Ortadoğu Hospital, Department of Cardiovascular Surgery, Sanliurfa, Turkey

2 Ankara Numune Education and Research Hospital, Department of Cardiology, Ankara,turkey

3 Hitit Univeristy, Department of Cardiovascular Surgery, Çorum, Turkey

4 Bozok University, Department of Cardiovascular Surgery, Yozgat, Turkey

Diversion of inferior vena cava into the left atrium is one of the rare complications of the surgical repair of the atrial. A 30 year old male patient who had undergone surgical repair of the atrial septal defect 9 years before he was referred to our clinic because of diversion of the inferior vena cava into the left atrium. Surgical repair of this complication was performed by reconstructing the opening of the inferior vena cava 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 Inferiorun Açılımasının Cerrahi Onarımı

Alaa Hijazi¹, Hulya Çiçekçiöğlü², Emir Erol³, Bayram Yılmazkaya¹, Ferit Çiçekçiöğlü⁴

1 Osm Ortadoğu Hastanesi, Kalp ve Damar Cerrahisi Kliniği, Şanlıurfa, Türkiye

2 Ankara Numune Eğitim ve Araştırma Hastanesi, Kardiyoloji Kliniği, Ankara, Türkiye

3 Hitit Üniversitesi, Kalp ve Damar Cerrahisi Anabilim Dalı, Çorum, Türkiye

4 Bozok Üniversitesi, Kalp ve Damar Cerrahisi Anabilim Dalı, Yozgat, Türkiye

Vena cava inferiorun sol atriyuma dökülmesi 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 tesbiti ve cerrahi onarımı sunulmaktadır.

Anahtar Kelimeler: Atriyel septal defekt, Vena kava inferior

INTRODUCTION

Atrial septal defect (ASD) is the third most common congenital cardiac malformation (1). Although surgical repair of the ASD is fairly safe and a routine procedure, it may be very rarely complicated due to the diversion of inferior vena cava (IVC) into the left atrium. Diversion of the inferior vena cava into

the left atrium; although unusual; remains a cause of morbidity following repair of the ASD. This leads to dyspnea and hypoxemia which may arise immediately postoperative or several years later. In this report, we present a 30 year old male patient who started suffering from mild dyspnea and cyanosis on exertion one year after surgical repair of the ASD. He was brought to the emergency clinic when he underwent a trauma nine years after the closure of the ASD, and on performing complete blood count his hematocrit was %65 and hemoglobin 20 mg/dl. An echocardiogram was performed and revealed diversion of the inferior vena cava into the left atrium. Surgical repair of this complication was performed by reconstructing the opening of the IVC and redirecting it into the right atrium.

CASE

A 30 year old male had undergone surgical repair of the ASD in another hospital nine 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 nine years after the first surgery. He was brought to the emergency clinic of another hospital, and upon performing a complete blood count (CBC) his hematocrit was %65 and hemoglobin 20 mg/dl. An echocardiogram was performed and revealed diversion of the inferior vena cava into the left atrium. 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 heart rate was 87 beats/min. There was a 2/6 systolic ejection murmur with a fixed split S₂. Cardiac catheterization was performed as well and confirmed the diagnosis of diversion of the inferior vena cava into the left atrium. An arterial blood gaz sample showed that PaO₂: 91 mmHg and SO₂: %87. Surgical repair of this complication was performed by reconstruction of the opening of the IVC and redirecting it into the right atrium.

Surgical technique:

After re-median sternotomy and dissection of the adhesions, aortobicaaval cannulation was performed. The purse sutures were placed on the IVC and SVC allowing the two caval cannules to be inserted directly into the IVC and SVC. The Superior and inferior vena cava were snared by the tapes. Cardiopulmonary bypass started and the ascending aorta cross clamped. Ante grade blood cardioplegia was administered and moderate hypothermia established, 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 left atrium. 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 minutes. The right atriotomy was closed and the cross clamp removed. After recovering from hypothermia, weaning from CPB was uneventful and the sternotomy closed. Postoperative PO₂, SO₂, Hct, and Hb were 87, %98 %32 and 10mg/dl respectively. The patient was followed up and no complications were reported and the cyanosis disappeared. He was discharged on the fourth day postoperatively. He came to our outpatient clinic two months later for check up and had no complaints. Echocardiogram revealed no pathology. His Hct and Hb were %37 and 11.5mg/dl respectively.

DISCUSSION

Diversion of the inferior vena cava into the left atrium is a rare complication of the surgical repair of the ASD. As far as we know, few cases were published in recent years, yet it was more frequently seen before the use of cardiopulmonary bypass because time limitations were imposed by only hypothermia and no inflow occlusion (2). This is an unusual case that was discovered nine years after the first operation. Usually the symptoms of this complication 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 superior vena cava 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 left atrium especially in inferior vena caval type ASD. The inferior rim of the defect may not 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. So

selective cannulation of the IVC and SVC may reduce or avoid the occurrence of such rare complication. In our case we observed that the inferior rim of the defect was not included in the first surgical closure. In addition; there was a scar tissue covering the upper part of the IVC on the RA surface so we believe that there was partial diversion of the IVC initially and with healing process, complete diversion of the cava gradually occurred. So the openings which must drain to the right atrium should be controlled carefully before closing the right atrium.

Being aware of this complication is very important since such patients may be misdiagnosed as Eisenmenger's syndrome (5).

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.

References:

1. Murphy JG, Gersh BJ, McGoon, Mair, Porter CJ, Ilstrup. Long-term outcome after surgical repair of isolated atrial septal defect. Follow-up at 27 to 32 years. *N Engl J Med* 1990; 323:1645-50.
2. Staple TW, Ferguson TB, Parker BM. Diversion of the inferior vena cava into the left atrium following atrial septal defect closure. *Am J Roentgenol Radium Ther Nucl Med.* 1966;98:8518.
3. Muath Alanbaei, Luc Jutras, Judith Therrien, and Ariane Marelli, Iatrogenic cyanosis and clubbing: 25 years of chronic hypoxia after the repair of an atrial septal defect *Can J Cardiol.* 2007 September; 23(11): 901–903.
4. Ellen Thompson, Dennis Moritz, Romaine Perdue, and Silvestre Cansino. Diversion of the Inferior Vena Cava Following Repair of Atrial Septal Defect Causing Hypoxemia. *Echocardiography: A Jnl. of CV Ultrasound & Allied Tech.* Vol. 21, No. 4, 2004
5. Alanbaei M, Jutras L, Therrien J, Marelli A, ;Iatrogenic cyanosis and clubbing: 25 years of chronic hypoxia after the repair of an atrial septal defect. *Can J Cardiol.* 2007;23:901-3