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Case report / Olgu Sunumu

Surgical treatment of a left atrial rupture during transcatheter atrial septal defect closure: a case study

Transkateter atriyal septal defekt kapatılması esnasında gelişen sol atriyal rüptürün cerrahi tedavisi: Olgu sunumu

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In this article, we report a 37-year-old male case who underwent an emergency surgery of injured left atrium by transcatheteral closure of atrial septal defect (ASD). The patient underwent an urgent surgery when he developed tamponade during the transcatheteral closure of the secundum ASD at the coronary angiography laboratory. After median sternotomy, pericardium was opened. The exploration revealed ruptured left atrial roof and active bleeding at this region. One centimeter diameter ruptured left atrial ceiling was primarily closed by 4/0 prolene, followed by the primary closure of the secundum ASD. Postoperative period was uneventful and the patient was discharged on the fifth postoperative day.

Key words: Atrial rupture; atrial septal defect; emergency surgery; percutaneous atrial septal defect closure.

Bu yazıda atriyal septal defektin (ASD) perkütan kapatılması sırasında sol atriyum yaralanması gelişen ve acil cerrahi girişimde bulunulan 37 yaşında erkek bir olgu sunuldu. Hasta koroner anjiyografi laboratuvarında sekundum tip ASD'nin transkateter kapatılması esnasında tamponad gelişmesi üzerine acil ameliyata alındı. Medyan sternotomiyi takiben perikard açıldı. Yapılan eksplorasyonda sol atrium tavanında rüptür olduğu ve bu bölgeden aktif kanama olduğu görüldü. Bir santimetrelik rüptüre sol atriyum tavanı 4/0 prolen ile primer kapatıldıktan sonra, sekundum tip ASD primer olarak kapatıldı. Ameliyat sonrası takipleri sorunsuz seyreden hasta 5. günde taburcu edildi.

Anahtar sözcükler: Atriyal rüptür; atriyal septal defekt; acil cerrahi; perkütan atriyal septal defekt kapatılması.

Atrial septal defect (ASD) is the most common congenital heart disease seen in adults, and comprises 5-10% of all congenital heart diseases.[1-4] A great proportion of the patients are asymptomatic up to adulthood, but early diagnosis and treatment is crucial because of the complications seen in patients in their 30s and 40s, such as right heart failure, pulmonary hypertension, and arrhythmia, if left untreated.

Though surgical closure of the ASD is a preferred and a low-risk method of treatment, it also carries the risks of post-pericardiotomy syndrome, arrhythmia, pleuro-pericardial effusions, the need for blood transfusion during surgery and scar formation after healing.[5] In our era, transcatheter closure of the defect in secundum- type ASDs is a frequent method of treatment.[5,6] Though results after transcatheter closure resemble those after surgical closure, low mortality rates, scar-free healing, and low hospitalization time are reasons why transcatheter treatment is a good alternative to surgery.

Cardiac perforation is a rare complication seen during percutaneous closure, with an incidence ranging from 0.1-0.4% depending on the instruments used.[7,8] The mortality rate associated with this complication is very high.

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CASE REPORT

A 37-year-old male patient was admitted to the cardiology outpatient department with dyspnea and palpitation. His physical examination revealed a grade 1/4 systolic murmur and a grade 2/4 systolic murmur in the tricuspid zone. His electrocardiogram was sinusal, but there was right bundle branch block. Transthoracic echocardiography (TTE) revealed an ostium secundum defect on the interatrial septum and a mild dilatation of the cardiac chambers. The patient's pulmonary artery pressure was 40 mmHg. Transesophageal echocardiography (TEE) revealed the secundum-type ASD with a diameter of 31 mm. Percutaneous closure was planned.

The patient was admitted to the angiography unit, and the procedure was performed under general anesthesia with TEE support. A 34 mm Amplatzer (AGA Medical Corporation, Amplatzer Septal Occluder, USA) septal occluder (ASO) device was prepared to be used in the procedure. A 14F sheath was inserted through the right femoral vein, and a pig tail catheter was placed in the left upper pulmonary vein under scopy and TEE assistance. A long ASO loader was then inserted into the pulmonary vein through the pigtail, and the ASO was placed at the end of the loader, but it was not opened. At the same time, bradycardia developed, and in a short time, pericardial effusion was inspected. After observing cardiac tamponade, pericardiosynthesis was performed, and approximately 200 cc of hemorrhagic effusion was drained. The patient was then taken to emergency surgery.

A median sternotomy was performed under general anesthesia. After performing a pericardiotomy, 500 cc of blood was aspirated. A 1 cm bleeding lesion on the left atrial roof was observed. After aortobicaval cannulation and establishing cardiopulmonary bypass (CPB), a mild hypothermia was obtained (32-34 °C). The lesion was sutured primarily with 4/0 polypropylene sutures, and a cross-clamp was applied. Diastolic arrest was obtained by cold blood cardioplegia. A secundum-type ASD 35 mm in diameter was visualized after a right atriotomy (Figure 1). The ASD was then closed primarily with 3/0 polypropylene sutures. Next, the cross-clamp was removed after the incisions were sutured. With the termination of CPB and routine chest closure, the operation was completed. The patient was discharged on the fifth day after an postoperative period with no complications.

DISCUSSION

Cardiac catheterization has been used in treatment as well as in diagnostic evaluation in the last three decades. Transcatheter ASD closure has been commonly used in the last few years as an alternative treatment to the customary surgical treatment.

Though major complications due to percutaneous closure are rare, they can cause severe clinical results. Perforation is the first of all major complications. Cardiac rupture might be seen because of this percutaneous closure technique and could be treated surgically in the hospitalization time. Although transcatheter closure of ASD has been remarkably successful, cardiac perforation could develope in term discharged from the hospital and it could be commonly fatal.[7]

The mechanism of the perforation is not clearly known. The round and flexible construction of Amplatzer septal occluders is designed to diminish the risk of perforation;[9] however the places the ASOs contact run the risk of deformation. Recent reports have underlined the fact that perforations are almost always adjacent to the device on the anterosuperior atrial and aortic walls because it is believed that these locations are sensitive to trauma.

Rupture due to a pigtail catheter, the balloon sizing procedure, and utilizing the device are the reasons for perforation in different case studies found in literature.[9,10] In our case, the reason for the perforation of the left atrium was probably the pigtail catheter or the long loader sheath.[10,11]

In conclusion, life-threatening complications can occur during percutaneous treatment, but emergency pericardiosynthesis before surgery can reduce mortality and morbidity. Even in the most experienced clinics, the cardiovascular surgery team should be waiting on standby to handle and manage any complications.

Figure 1. Secundum atrial septal defect closed after repairing the roof of the left atria.

Therefore, these procedures should preferably be carried out in hybrid operating rooms in order to be ready for any abnormal situation.

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