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Case Report

Successful Surgical Intervention of a Complication that Occurred During Transcatheter Atrial Septal Defect Closure

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Abstract

Atrial septal defect (ASD) is the most common congenital heart disease diagnosed in adults, with an average life expectancy of 45–50 years in affected individuals. Surgical intervention is typically indicated when the pulmonary-to-systemic blood flow ratio (Qp/Qs) exceeds 1.5:1. A 44-year-old patient with a known diagnosis of Behçet's disease presented to the cardiology outpatient clinic 6 years ago with complaints of palpitations and was diagnosed with an ASD. Since then, the patient has been under regular follow-up by the cardiology department. A transesophageal echocardiogram revealed a Qp/Qs ratio of 1.8:1. Given the patient's ongoing symptoms of heart failure, percutaneous closure of the defect was planned. The patient was referred to the cardiac catheterization laboratory for endovascular ASD closure. During the procedure, a small fragment of the closure device broke off and became lodged beneath the aortic valve. Multiple attempts were made to retrieve the fragment using a trapping system, but they were unsuccessful. The patient was promptly transferred to the emergency cardiovascular surgery team. The foreign body was successfully removed via a transaortic approach, and the ASD was closed through a right atriotomy. While endovascular closure is generally recommended for patients at high surgical risk, it has increasingly been used in younger patients with stable clinical conditions. Although it is associated with lower complication rates compared to open-heart surgery, technical and device-related complications may still occur unpredictably.

Keywords: Device; echocardiography; pericardial patch; septal defect.

Transkateter Atriyal Septal Defekt Kapatılması Sırasında Oluşan Bir Komplikasyonun Başarılı Cerrahi Müdahalesi

Özet

Atriyal septal defekt (ASD), erişkinlerde en sık tanı konulan konjenital kalp hastalığı olup, etkilenen bireylerde ortalama yaşam süresi 45–50 yıl olarak bildirilmiştir. Cerrahi müdahale genellikle pulmoner sistemik kan akım oranının (Qp/Qs) 1.5:1'in üzerine çıkması durumunda endikedir. Bu olguda, 44 yaşında, bilinen Behçet hastalığı tanısı olan bir hasta, altı yıl önce çarpıntı şikâyetiyle başvurduğu kardiyoloji polikliniğinde ASD tanısı almıştır. O zamandan bu yana düzenli kardiyolojik takibi yapılan hastanın transözofageal ekokardiyografisinde Qp/Qs oranı 1.8:1 olarak saptanmıştır. Kalp yetmezliğine ait devam eden semptomları göz önünde bulundurularak defektin perkütan kapatılmasına karar verilmiş ve hasta endovasküler ASD kapatılması amacıyla kardiyak kateterizasyon laboratuvarına yönlendirilmiştir. Girişim sırasında, kapatma cihazının küçük bir parçası koparak aort kapağının altına yerleşmiştir. Parçanın bir tuzak sistemi yardımıyla geri alınmasına yönelik çok sayıda girişimde bulunulmuş, ancak başarılı olunamamıştır. Bunun üzerine hasta acil olarak kardiyovasküler cerrahi ekibine devredilmiştir. Yabancı cisim transaortik yaklaşımla başarıyla çıkarılmış, ASD ise sağ atriyotomi yoluyla cerrahi olarak kapatılmıştır. Endovasküler kapatma işlemi, genellikle cerrahi riski yüksek hastalarda tercih edilmekle birlikte, son yıllarda stabil klinik duruma sahip genç hastalarda da artan sıklıkla uygulanmaktadır. Açık kalp cerrahisine göre komplikasyon oranlarının daha düşük olması nedeniyle tercih edilse de, teknik zorluklar ve cihaza bağlı komplikasyonlar öngörülemeyen durumlar olarak karşımıza çıkabilmektedir.

Anahtar sözcükler: Cihaz; ekokardiyografi; perikardiyal yama; septal defekt.

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Introduction

Atrial septal defect (ASD) is the most common congenital heart disease diagnosed in adults. The rate of spontaneous detection of ASD in the general population varies between 20% and 40%.[1] The average life expectancy of affected individuals is approximately 45–50 years. However, ASD can remain asymptomatic in some patients, and these individuals may not present with clinical signs of heart failure. The primary indication for defect closure is a pulmonary-to-systemic blood flow ratio (Qp/Qs) greater than 1.5:1. When comparing outcomes of transcatheter versus surgical closure techniques, studies have shown that the transcatheter approach is associated with a lower incidence of complications.[2] Furthermore, some reports indicate that up to 95% of ASDs can be successfully closed using the transcatheter method.[3] Although the endovascular technique carries a relatively low risk and achieves high success rates in defect closure, device-related complications requiring surgical intervention, while rare, may still occur. In this study, we present a case of a device-related complication that developed during transcatheter ASD closure, which was successfully managed with surgical intervention.

Case Report

Informed consent was secured from the patient for the publication of this case and the accompanying images.

A 44-year-old patient with a known diagnosis of Behçet's disease presented to the cardiology outpatient clinic 6 years ago with complaints of palpitations and was subsequently diagnosed with an ASD. During follow-up, elective repair of the ASD was planned. The size and number of defects, as well as the magnitude of the left-to-right shunt, were evaluated using transthoracic and transesophageal echocardiography. The patient was admitted to the cardiology clinic for endovascular intervention. Transesophageal echocardiography revealed a Qp/Qs ratio of 1.8:1, and endovascular closure of the defect was scheduled due to the patient's ongoing symptoms (Fig. 1). The patient was transferred to the coronary angiography unit for transcatheter ASD closure. During the procedure, a fragment of the closure device became dislodged and migrated beneath the aortic valve. Multiple attempts were made to retrieve the fragment using a trapping system, but these were unsuccessful. The patient was urgently transferred to the cardiovascular surgery team for emergency surgical intervention. A median sternotomy was performed, and the patient was placed on total cardiopulmonary bypass. Cardiac arrest was achieved using 30°C hypothermia, aortic cross-clamping, and antegrade blood cardioplegia. An aortotomy was carried out at the supracoronary level, and the dislodged device was visualized beneath the aortic valve. The device was successfully removed (Fig. 2). Following closure of the aortotomy, a right atriotomy was performed. The ASD was closed using a pericardial patch (Fig. 3). The post-operative course was uneventful. The patient exhibited no significant blood gas abnormalities, remained hemodynamically stable, and was monitored in the ward. He was successfully discharged a few days later in good clinical condition.

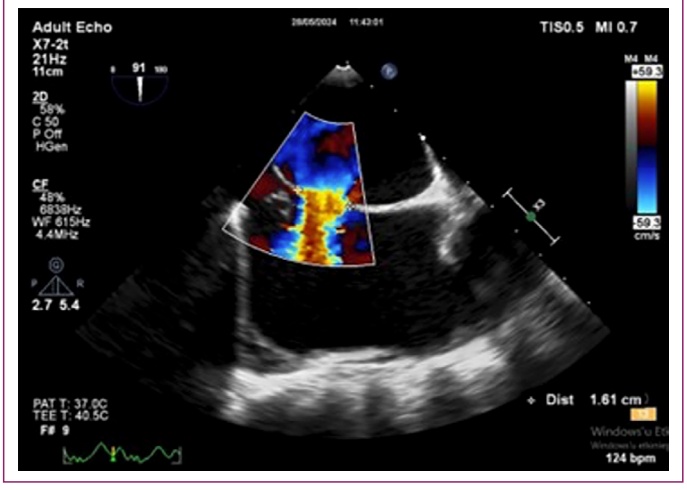

Figure 1. A pathological left-to-right shunt was identified between the left and right atria.

Figure 2. Post-operative image of the removed device, Amplatz.

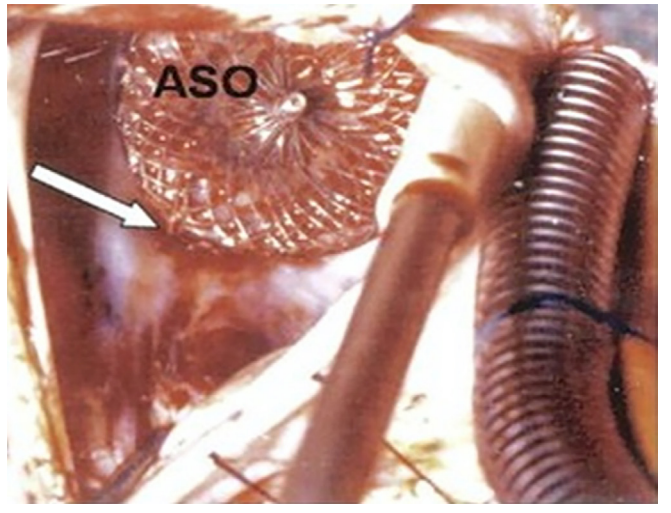

Figure 3. Amplatz device in the subaortic position as seen on intraoperative imaging, atrial septal occlusion device aso.

Discussion

Isolated ASD is one of the most common congenital heart defects in adults. According to several studies, including that of Attie (2001), newly diagnosed ASDs should be closed regardless of the patient's age. However, in elderly patients, it remains unclear whether intervention is necessary when symptoms are mild and well-tolerated.

Transcatheter closure of ASD offers several advantages. Most notably, it is associated with better outcomes in the early post-operative period, as it reduces anesthesia-related complications, is less invasive, and shortens the length of hospital stay. Despite its technical simplicity and favorable long-term results, endovascular interventions may be complicated by factors related to both the procedure itself and the patient's overall condition.[4]

In general, transcatheter ASD closure is recommended for patients considered high-risk for conventional surgery. However, the technique is not without drawbacks. Dislocation of the occluder or its components is a known complication. In addition, damage to adjacent anatomical structures may occur during the procedure, potentially increasing the risk of hemorrhage. These types of complications necessitate urgent surgical intervention. In our case, the transcatheter procedure was complicated by occluder dislocation. Intraoperatively, transesophageal echocardiography revealed the occluder in a subaortic position, which made access via the interatrial septal defect challenging. This finding dictated the surgical strategy, and a transaortic approach was employed to retrieve the device.

Conclusion

Although transcatheter closure is generally considered lower risk than open-heart surgery, device-related and technical complications may arise at any time. To minimize the mortality associated with such complications, close and coordinated collaboration between cardiovascular surgery and cardiology departments is essential.

Disclosures

Ethics Committee Approval: This is a single case report, and therefore ethics committee approval was not required in accordance with institutional policies.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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