OLGU SUNUMU CASE REPORT

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Emergency Care Intervention for Embolization of Atrial Septal Defect Device Implanted by Transcathater Method: Case Report

Transkatater Yöntem ile Yerleştirilen Atriyal Septal Defekt Cihazının Embolizasyonu Sonrası Acil Cerrahi Yaklaşım

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ABSTRACT Atrial septal defect (ASD) is a common congenital cardiac disorder in children, while it is the most frequently seen cardiac disorder in adults. During closure of ASD by an amplatzer septal occluder of 28 mm in a female patient aged 40 years old, embolization of ASD closure device was seen toward the left subclavian artery exit at arcus aorta. In this report, we present a successful emergency intervention following the embolization of ASD closure device to arcus aorta during percutaneous ASD closing procedure.

Keywords: Septal occluder device; atrial septal defect 2; heart defects, congenital

ÖZET Atriyal septal defekt(ASD) çocuklarda yaygın görülen bir doğuştan kalp hastalığı iken, yetişkinlerde görülen en sık doğuştan kalp hastalığıdır. Kırk yaşında kadın hastaya 28 mm amplatzer septal oklüder ile ASD kapama işlemi esnasında ASD kapama cihazının arkus aortada sol subklavian arter çıkışına embolize olduğu görüldü. Bu yazıda perkütan ASD kapatma işlemi esnasında ASD kapama cihazının arkus aortaya embolizasyonu sonrası gerçekleştirilen başarılı cerrahi tedavisi sunuldu.

Anahtar Kelimeler: Septal okluder cihaz; atrial septal defekt 2; kalp kusurları, doğumsal

Atrial septal defect is the third in frequency of congenital cardiac disorder in adults following bicuspid aortic valve and mitral valve prolapsed.[1] Serious and large ASDs are repaired by open surgery at operating room, while ASDs with small and medium diameter are closed by occluder through percutaneous transvenous way under scopy in catheter room and with echocardiographic imaging. ASD closing by interventional cardiac catheterization is preferred in patients with suitable defect anatomy due to requirement of shorter hospital stay, its administration under sedation and lack of need for sternotomy and cardiopulmonary bypass (CPB). However percutaneous closing procedure has certain complications such as inappropriate placement of occluder, embolization and perforation which require emergency surgery.[2,3] In this report, we present a case of defect repair following embolization of septal occluder to arcus aorta and its surgical removal during closing intervention of an ASD of 28 mm.

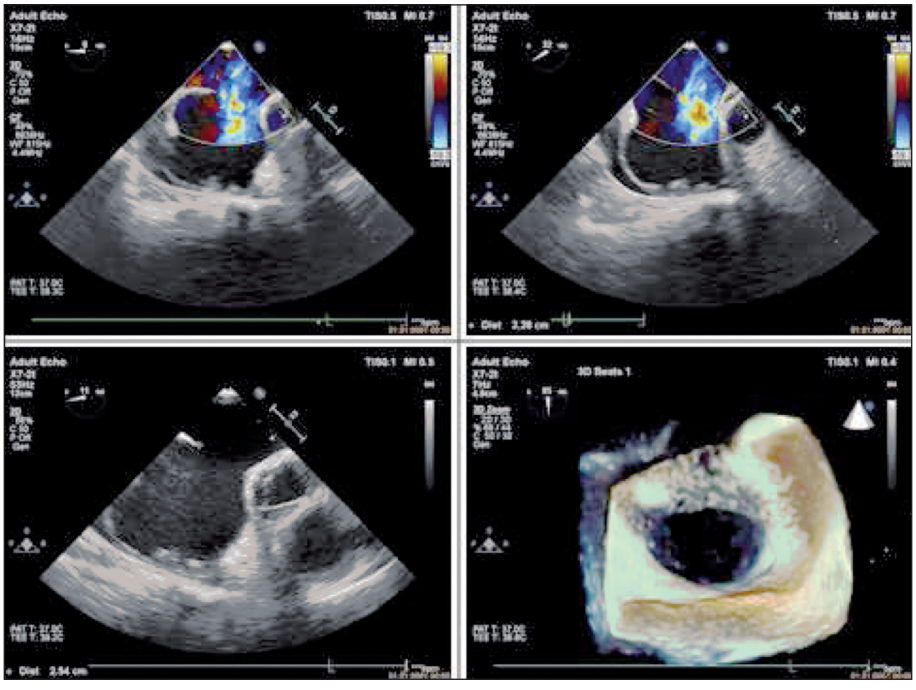

FIGURE 1: Transesophageal echocardiography.

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A 40-year-old female patient, who admitted to our cardiology department because of palpitation and dyspnea on exertion, was diagnosed with ASD after the physical examination and other investigations. ASD treatment with a transcatheter closure device was decided. Transesophageal echocardiography, which was performed before the procedure, revealed following findings that were incompatible with ASD: in 4- chamber view, the diameter of the defect was 26 mm, atrioventricular rim was 4 mm, superior rim was 3 mm; in aortic view, the diameter of the defect was 27 mm, aortic rim was 2 mm, posterior rim was 3 mm; in bicaval view, the diameter of the defect was 26 mm, superior rim was 3 mm, inferior rim was 4 mm. The patient was taken to the procedure after the preparati ons (Figure 1).

The defect size was measured as 25 mm during the procedure with balloon sizing technique. During closing intervention by an ASD Amplatzer 28 mm septal occluder, embolization of the occluder toward left subclavian artery exit at arcus aorta was observed (Figure 2). Patient was operated under emergency conditions due to development of bradycardia and hypotension.

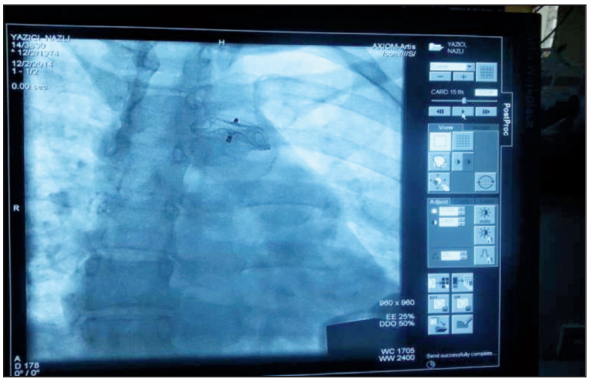

FIGURE 2: Image of occluder at left subclavian artery exit under scopy.

Hemodynamic parameters of patient transferred to operating room were as following: systemic arterial blood pressure, 80/40 mmHg; heart rate, 40 beat/min; SpO2, 95%. Arterial cannulation was performed from right axillary artery. CPB was initiated by bicaval venous cannulation following median sternotomy. Patient was cooled up to 18°C to reach deep hypothermia and membranousoxygenator was used. Cross-clamp was placed and cold antegrade-cardiyoplegia was used. Following administration of cardiopleagia, CPB was quitted, total circulatory arrest was instituted and a longitudinal aortotomy of 3 cm was applied on arcus aorta. Occluder placed to

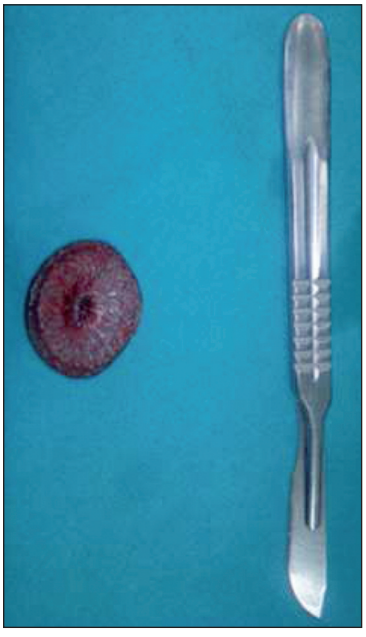

FIGURE 3: Intraopertaive image following bicaval cannulation and cross clamp.

close the ASD was seen at left subclavian artery and removed with the help of forceps and aortotomy was repaired by 4/0 prolene sutures (Figure 3). CPB was re-instituted and right atriotomy was performed. Atrial septal defect was primarily repaired. Following normothermia and getting sufficient hemodynamic data, extracorporealcirculation was ended. Aortic cross clamp time was 50 minutes, total circulatory arrest was for 8 minutes and total pomp duration was 70 minutes. During the operation, patient received 1 unit of erythrocyte suspension and 1 unit of freshly frozen plasma. Patient was monitored at intensive care unit for two days and at clinic room for 4 days and then she was discharged without complication on postoperative day 6.

DISCUSSION

Although surgical treatment was, in the past, the main treatment method in closing atrial septal defect, recently percutaneous closing method is developed as an alternative to surgical treatment.[4] Percutaneous closing method has significant advantages over surgical treatment such as less morbidity, lower rate of complications, shorter hospital stay and less invasive method.[5] However it should be noted that percutaneous closing method has complications, as in our case, requiring earlier surgical intervention such as embolization and migration or serious valve insufficiency by prevention of mitral and tricuspid valve functions. In addition during early phase, cardiac erosion, perforation, arrhythmia, thrombosis and sepsis can be developed in patients.[6] During late phase, perforation and occluder displacement were rarely reported.[6,7] Complications are mainly due to size discrepancy between device and defect. Furthermore, circular defects facilitate the device implantation, while oval defects increase the risk of occluder embolization.[8]

The embolized devices can be removed surgically or percutaneously. This rare but potentially fatal complication was mostly treated surgically in previous studies. Pala et al. reported the successful removal of a device, which was embolized to aortic arch during the procedure, percutaneously.[9] Hamur et al., in a case report, extracted a device (the authors did not know when the device has been embolized after the procedure) similar to our case with longitudinal aortic incision also from aortic arch in elective conditions.[10] But, Hamur et al. performed ASD repair before removing the device. In our case, we extracted the device first, then performed ASD repair because of the unstable hemodynamic status of our patient and the risk of embolization of the device to a new site. We think that removal of the device should be the first priority if device embolization occurs during the procedure.

In conclusion, although percutaneous closing is a safe and effective method in small and medium ASDs, there are complications requiring emergency surgery as it was in our case. During and following percutaneous intervention, earlier and appropriate surgical intervention may save the life of patient developing serious complications.

Conflict of Interest

Authors declared no conflict of interest or financial support.

Authorship Contributions

Concept: *Ali İhsan Tekin,* ***Design:*** *Ali İhsan Tekin, Bayram Yağmur,* ***Supervision:*** *Ali İhsan Tekin,* ***Data collection and/or processin:*** *Bayram Yağmur,* ***Analysis and/or interpretation;*** *Ali İhsan Tekin, Bayram Yağmur,* ***Literature research:*** *Ali İhsan Tekin, Bayram Yağmur,* ***Writing;*** *Ali İhsan Tekin,* ***Critical review:*** *Bayram Yağmur.*

REFERENCES

1. Webb G, Williams R, Alpert J. 32nd Bethesda Conference: care of the adult with congenital heart disease. J Am Coll Cardiol 2001;(37): 1161-98.
2. Deanfield J, Thaulow E, Warnes C, Webb G, Kolbel F, Hoffman A, et al; ESC Committee for Practice Guidelines. Management of grown up congenital heart disease. Eur Heart J 2003;24(11):1035-84.
3. Chessa M, Carminati M, Butera G, Bini RM, Drago M, Rosti L, et al. Early and late complications associated with transcatheter occlusion of secundum atrial septal defect. J Am Coll Cardiol 2002;39(6):1061-5.
4. Misra M, Sadiq A, Namboodiri N, Karunakaran J. The 'Aortic rim' recount: embolization of interatrial septal occluder into the main pulmonary artery bifurcation after atrial septal defect closure. Interact CardiovascThorac Surg 2007;6(3):384-6.
5. Butera G, Carminati M, Chessa M, Youssef R, Drago M, Giamberti A, et al. Percutaneous versus surgical closure of secundum atrial septal defect: comparison of early results and complications. Am Heart J 2006;151(1):228-34.
6. Fernando RR, Koranne KP, Barker CM, AMPLATZER Septal Occluder failure resulting in paradoxical cerebral embolism.Tex Heart Inst J 2012;(39):647-52.
7. Dhaliwal RS, Singh H, Swami N, Srivastava V. Removal of displaced and impacted ASD device after 4 years. Thorac Cardiovasc Surg 2009;57(4):233-5.
8. Butera G, Biondi-Zoccai G, Sangiorgi G, Abella R, Giamberti A, Bussadori C, et al. Percutaneous versus surgical closure of secundum atrial septal defects: a systematic review and meta-analysis of currently available clinical evidence. EuroIntervention 2011;7(3):377-85.
9. Pala S, Açar G, Tigen K, Kırma C. Percutanous retrieval of an interatrial septal occluder device embolized into the aortic arch. Turk Kardiyol Dern Ars 2010;38(7): 502-4.
10. Hamur H, Onk OA, Degirmenci H, Kahraman U, Bakirci EM, Tuncer ON. The retrieval of atrial septal defect closure device embolized into aortic arch. Intractable Rare Dis Res 2016;5(2):114-6.