Case Report

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The retrieval of atrial septal defect closure device embolized into aortic arch

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Summary **Percutaneous atrial septal defect (ASD) closure has become an increasingly simplified procedure over the past decade. The device embolization is seen rarely but it can be fatal. Although percutaneous retrieval is feasible, surgical removal might be preferred when the endothelialization status of the device is unknown. We report a comlication of such closure in a 43-year-old woman: embolization of the ASD occluder device into aortic arch 12 months after implantation. We removed the device surgically and closed the ASD.**

Keywords: Atrial septal defect, septal closure device, migration, embolism, aortic arch

1. Introduction

Ostium secundum atrial septal defect (ASD) is one of the most common congenital heart defects in adults. As an alternative to surgery with a high rate of safe and success, the closure of ASD by percutaneous intervention has been the standard treatment approach. Device embolization is a complication which is rarely encountered and may be potentially resulted in death during or after the process, or in the late period. It is seen in about 0.3-0.6% of the cases (*1,2*).

2. Case Report

43-year-old female patient was admitted to our clinic with the complaint of chest pain and cyanosis of the lips occurring by the exercise. It was detected in the anamnesis that the patient underwent the percutaneous ASD closure operation approximately 12 months ago in another hospital. It was also found that the patient didn't go for routine checks. Chest x-ray revealed that the Amplatzer septal occluder was located into the aortic arch (Figure 1A). In the transthoracic echocardiography,the ASD was observed, but it was also detected that the device embolized into aortic arch (Figure 1B). In order to be able to identify the location of the device more clearly, she was examined by fluoroscopy and thorax computed tomography. It was confirmed by fluoroscopy and thorax computed tomography that the device was in aortic arch (Figure 1C and Figure 1D). As it was not known when the device embolized, it was decided to retrieve the device by a surgical operation considering the possibility of endothelialization into aortic arch and the thrombosis of the device.

Although the patient was stabile hemodynamically, she was taken to the operating room under emergency conditions. Axillary artery cannulation after median sternotomy, and unicaval two stage venous cannulation from right atrial appendage were performed. The patient was cooled to 24 degrees by entering the pump. The right atriotomy was made after potassium blood cardioplegia arrest. 2 × 3 cm size secundum ASD was detected. It was repaired primarily with 4/0 polypropylene suture.Then cross clamp was put to the innominate artery at 24 degrees hypothermia,and aortic arch was opened. Meanwhile, antegrade cerebral perfusion was continued with 500 mL of flow. It was observed that the embolized device was attached to the side wall of aortic arch, and it was almost completely endothelizedand largely buried in the aortic wall (Figure 2A and Figure 2B). After carefully excised, the defect

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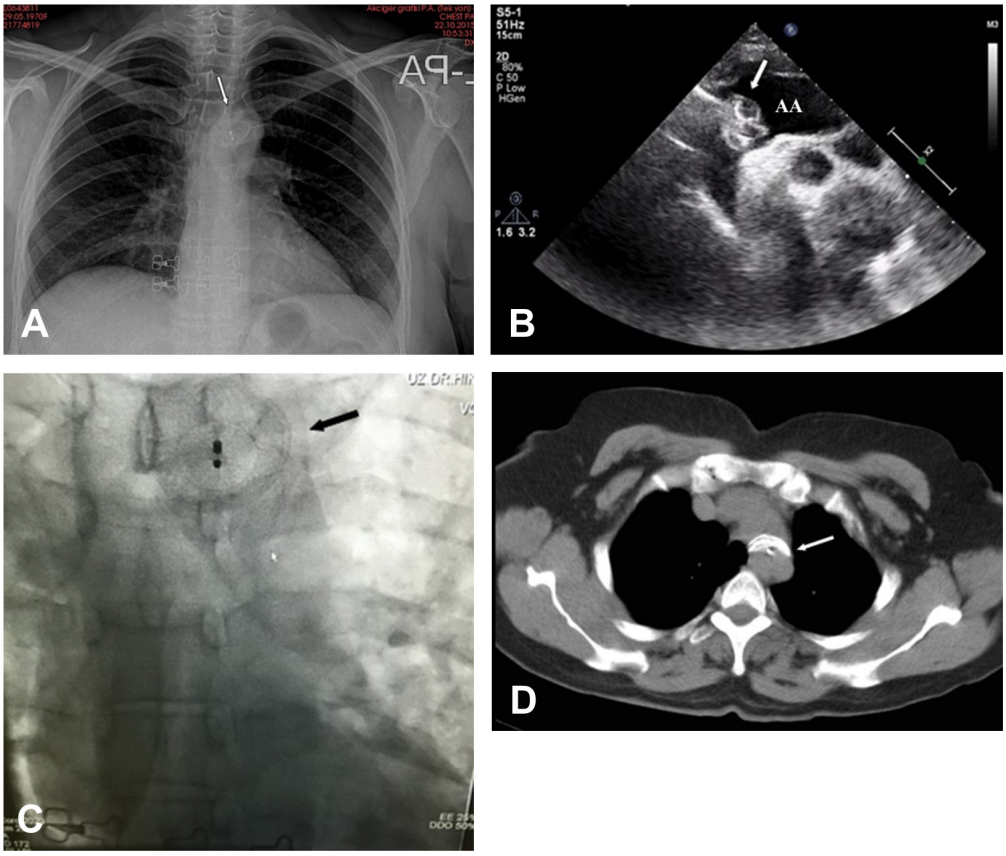

Figure 1. The images on admission. (A), Chest x-ray showing the device migration into the aortic arch. **(B)**, Transthoracic echocardiography showing atrial septal defect occluder device embolized into aortic arch. **(C)**, Fluoroscopy showing atrial septal defect occluder device embolized into aortic arch. **(D)**, Thorax computed tomography showing atrial septal defect occluder device embolized into aortic arch.

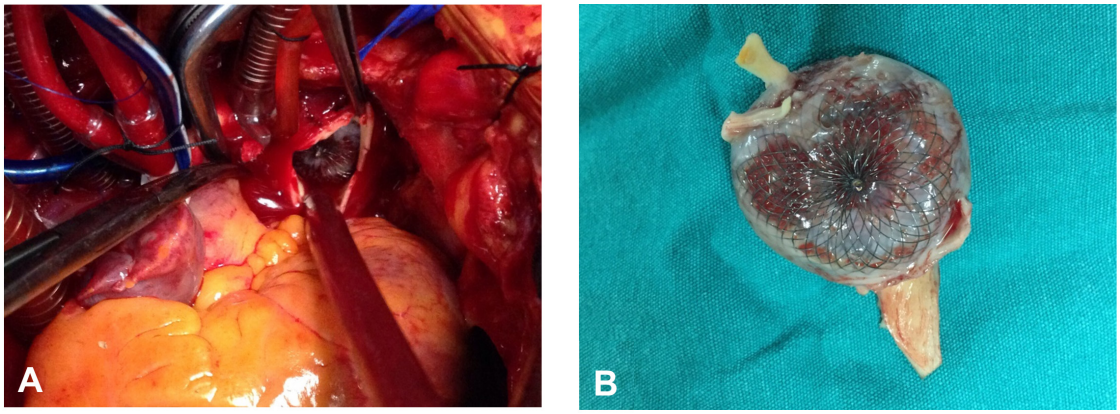

Figure 2. Intraoperative and macroscopic images. (A), Removal of the device with an incision of the aortic arch. **(B)**, Macroscopic image of the removed device.

on the aortic wall and the regions with endothelial damage were repaired from inside with the sutures reinforced with Teflon. Aortotomy was primarily repaired.After filling and air extraction process, the clamp in the innominate artery was retrieved and switched to perfusion with normal flow. While heating the patient, the right atriotomy was closed. The perfusion was completed smoothly.The postoperative course was uneventful and the patient was discharged with full recovery on the 7th day.

3. Discussion

The device embolization is the most frequently seen among the complications requiring surgical intervention in the percutaneous ASD closure. This complication is seen at a rate of 0.5% (*3*), but has a great importance because it can be fatal. Although generally, the device embolization occurs within the first few days after the percutaneous ASD closure, it may also be seen many years after the intervention (*4*).

The closure of ASD by a percutaneous intervention may fail for several reasons. These reasons may include a very large defect, and the lack of strength of rims to carry the device, extremely mobile interatrial septum, rupture occurrence in septum and the technical problems related to the insufficient experience of the intervention team (*5*). The failure of the insertion of the device and the acute embolization occurring at the same time is usually associated with the malposition of the device and the use of device with non-suitable size for defects. It is considered that the subacute embolization occurring within the first few days after the implantation is largely related to the erosion occurrence in aortic rim or the septum weakness (*3*). The device mobility after the implantation and the aortic rim narrower than 5 mm also increase the risk of early and late embolization (*6*).

The surgical or percutaneous interventional methods may be used in the retrieval of the embolized devices (*5*). Pala *et al*. reported the case of interatrial septal closure device embolized into aortic arch. During the process, the device embolized into aortic arch was successfully retrieved percutaneously using bioptome (*7*). In our case, the embolization time of the device was not known. Therefore,because of the high risk of thrombosis and endothelization of the device, surgical treatment was implemented and successful results were achieved. The surgical approach makes possible to both retrieve the device and to close the defect in the cases ASD is not suitable for percutaneous closure intervention. Also, there are those who argue the only surgical method is to be preferred in the retrieval of embolized device as it enables to detect the damage in the device embolisms in pulmonary artery and other cardiac cavities, and the damage that may occur during the embolization in intracardiac structures (*8*).

We think that the reason of device embolization may be the shortness and flexibility of inferoposterior rim in the defect observed during the surgery. Also, the endothelialization status of the retrieved device showed that embolization may have occurred months earlier. Because of the high risk of thrombosis and endothelialization of the device into aortic arch due to the fact that the time of embolization of the device was not known, the percutaneous intervention was not performed.

4. Conclusion

Device embolization is a rare but potentially fatal complication of transcatheter ASD closure. Although percutaneous retrieval is feasible, surgical removal might be preferred when the endothelialization status of the device is unknown. This case underlines the importance of proper patient selection and routine follow-up after the procedure.

References

1. Chessa M, Carminati M, Butera G, Bini RM, Drago M, Rosti L, Giamberti A, Pomè G, Bossone E, Frigiola A. Early and late complications associated with transcatheter occlusion of secundum atrial septal defect. Am Coll Cardiol. 2002; 39:1061-1065.
2. Levi DS, Moore JW. Embolization and retrieval of the Amplatzer septal occluder. Catheter Cardiovasc Interv. 2004; 61:543-547.
3. Son JW, Park JS. Subacute, silent embolization of amplatzer atrial septal defect closure device to the pulmonary artery. J Cardiovasc Ultrasound. 2012; 20:201-204.
4. Lysitsas DN, Wrigley B, Banerjee P, Glennon PE, Parmar JM, Shiu MF, Been M. Presentation of an embolised Amplatzer septal occluder to the main pulmonary artery 2 years after implantation. Int J Cardiol. 2009; 131:106-107.
5. Chiappini B, Gregorini R, Di Eusanio M, Ciocca M, Villani C, Minuti U, Giancola R, Prosperi F, Petrella L, Paparoni S, Mazzola A. Embolization of an Amplatzer atrial septal closure device to the pulmonary artery. J Card Surg. 2008; 23:164-167.
6. Sahin DY, Koç M, Cakır H,Arık OZ, Elbasan Z, Caylı M. A silent and late embolization of atrial septal defect occluder device into the right pulmonary artery: A case report. Korean Circ J. 2012; 42:781-783.
7. Pala S, Açar G, Tigen K, Kırma C. Percutaneous retrieval of an interatrial septal occluder device embolized into the aortic arch.Turk Kardiyol Dern. Ars.2010; 38:502-504.
8. Amanullah MM, Siddiqui MT, Khan MZ, Atiq MA. Surgical rescue of embolized amplatzer devices. J Card Surg. 2011; 26:254-258.

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