CASE REPORT

Percutaneous retrieval of embolized Amplatzer septal occluder from pulmonary artery using a novel method

Yeni perkütan metod ile embolize olan Amplatzer septal tıkayıcı cihazının geri çıkartılması

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Summary– Percutaneous closure of atrial septal defects is accepted as a safe and effective treatment method. Device embolization is a rare, but potentially fatal complication. While embolized devices are typically removed surgically, in eligible cases, they can also be removed percutaneously at an experienced center. Presently described is the retrieval of an embolized device with a novel percutaneous technique.

Özet– Atriyal septal defektin perkütan olarak kapatılması güvenli ve etkin bir tedavi yöntemidir. Cihaz embolizasyonu nadir ama ölümcül olabilen bir komplikasyondur. Embolize olan cihazlar sıklıkla cerrahi olarak çıkarılırken, bazı olgularda ve deneyimli merkezlerde perkütan yolla da çıkarılabilir. Bu olguda, yeni bir perkütan metod ile embolize cihazın çıkartılmasını sunduk.

Atrial septal defect (ASD) is one of the most common congenital heart anomalies in adults, and it can lead to significant hemodynamic disturbances in the cardiac chambers. Percutaneous interventions are used more frequently in the treatment of secundum ASD defects than surgery. Despite the absence of an incision line and though it has a lower perioperative mortality and shorter hospitalization, rarely, complications such as device embolization may occur during the procedure. While embolized devices are usually removed surgically, in eligible cases, they can also be removed percutaneously at experienced centers.

In this case, a device embolized to the pulmonary artery was successfully retrieved with a novel percutaneous method.

Abbreviations:

ASD	*Atrial septal defect*
IVC	*Inferior vena cava*
TEE	*Transesophageal echocardiography*

CASE REPORT

A 21-year-old female patient was referred to our clinic with the complaint of shortness of breath. A physical examination revealed a 2/6 systolic murmur in the left sternal margin. Her transthoracic echocardiography revealed an ASD, moderate right ventricle enlargement, and moderate tricuspid regurgitation. The pulmonary artery systolic pressure was 40 mm Hg. The patient underwent a transesophageal echocardiography (TEE) procedure to evaluate "the suitability" percutaneous closure. TEE revealed a secundum ASD with a 5-mm aortic rim, a 9-mm inferior rim, a 13-mm superior rim, and an 11-mm posterior rim. The patient was considered to be eligible for percutaneous closure and taken to the catheter laboratory. The patient's blood pressure was 126/75 mm Hg, the heart rate was 75/minute, and the oxygen saturation level was 98%. The intervention was performed through the right femoral vein. The defect diameter was measured as 26 mm with a 34-mm Amplatzer sizing balloon (AGA Medical Corp., North Plymouth, MN, USA), and a 28-mm Amplatzer septal occluder device (St. Jude Medical, St. Paul, MN, USA) was inserted. After the Minnesota maneuver was performed, the device was disconnected. Control echocardiography revealed that the device was not in the atrial septum, and its passage from the right atrium to the right ventricle and then to

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the pulmonary artery was observed. A decision was made to retrieve the device percutaneously. Though the device was grasped by the right atrial knob, snare grasping could not be fully achieved. Similarly, despite many attempts with a biopsy bioptome, it could not be captured. The outer cell of the nitinol mesh of the right disk of the ASD device was passed with a 0.035-inch hydrophilic wire (Terumo Interventional Systems, Somerset, NJ, USA). The distal tip of the hydrophilic wire was then caught by a snare (ONEne snare; Merit Medical Systems, Jordan, UT, USA) (Figures 1, 2). The multipurpose catheter on the hydrophilic wire was advanced to the point where the snare in the pulmonary artery was caught. The snare, hydrophilic wire, and multipurpose catheter were all retracted at the same time and the device was brought into the right ventricle. Due to the risk of tricuspid chordal damage, the device was pulled toward the right atrium without force. It was then taken to the inferior vena cava (IVC), where it was held with the bioptome by the middle of the device and the retrieval mechanism was removed (Fig. 2). Upon retrieval, it was observed that the device was deformed (Fig. 3). The detached hydrophilic wire in the IVC was caught and retrieved with the snare. Echocardiography showed no disturbances in the tricuspid valve and subvalvular structures. Since the procedure had been quite long in duration, percutaneous reclosure was postponed to another session and the procedure was terminated.

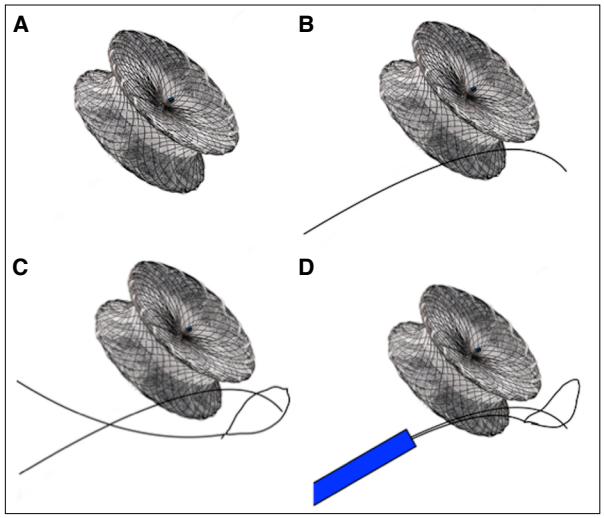

Figure 1. Detailed illustration of the procedure. **(A)** Embolized septal occluder device; **(B)** Passing the 0.035-inch hydrophilic wire across the outer border of the embolized device; **(C)** Snare in the appropriate position; **(D)** Snaring the distal part of wire, making a loop, and pulling back the snare.

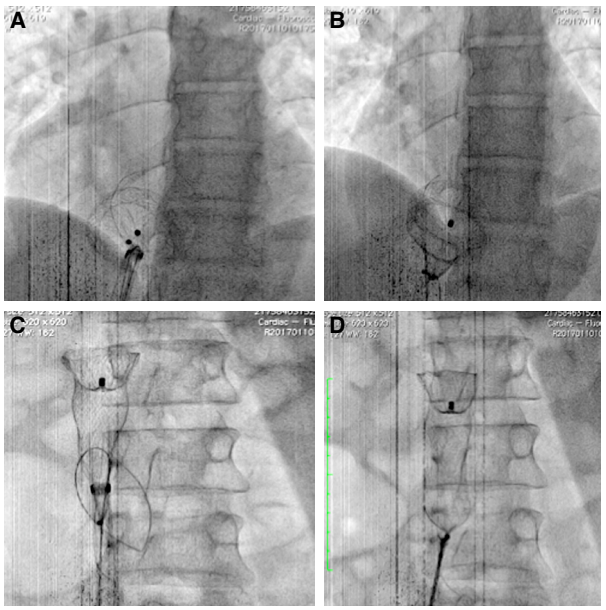

Figure 2. **(A)** The capture of the embolized septal occluder device located in the right ventricle; **(B)** The trapped embolized device being pulled into the right atrium; **(C)** The trapped device located in the right atrium; **(D)** The embolized device being pulled into the inferior vena cava with a bioptome.

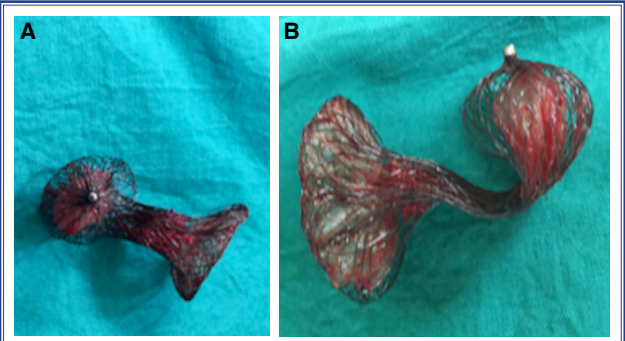

Figure 3. **(A, B)** The deformed septal occluder device.

DISCUSSION

Percutaneous closure of an ASD is normally performed with a high success rate. However, device embolization has been reported at a rate of 0.5% in the literature.[1,2] An embolized device should be retrieved immediately. We believe that device embolization in our case was caused by the loose structure of the posterior rim. While an embolized device is usually retrieved surgically, this operation can be performed percutaneously with a 70% chance of success.[3] The

most important step in the percutaneous method is to catch the device by the right atrial disk knob, usually using a snare. However, it may be challenging to catch the device by the right atrial disk due to disruption of its orientation. Since the left atrial knob is shorter, it is not a good target to catch with a snare. In our case, though the device was caught by the right atrial disk, it could not be moved because it was lodged in the pulmonary artery, or perhaps because of the device size, and the lack of a snare grasp on the disk knob. There are reports in the literature of devices that could not be caught or moved with a snare having been caught and removed with a bioptome or ablation catheter.[4] In our case, the device knob could not be caught and an ablation catheter was not available. A similar method was used in 1 case in the literature, but a coronary wide was used in that case.[5] In our patient, a 0.035-inch hydrophilic wire was used, with the thought that it would provide more support. We believe that this method can be performed easily, relatively quickly, and with a high rate of catch in cases where an ablation catheter is not available or the device cannot be caught by the knob using an ablation catheter.

Conclusion

The wire trap and snare technique may be used to recover embolized septal occluder devices. This method can be easily performed in a short time with high rate of catch in cases where an ablation catheter is not available or the device cannot be caught by the knob using an ablation catheter.

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