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Retrieval of the Amplatzer duct occluder II device embolizing to the pulmonary artery by Goose Neck snare

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SUMMARY

Percutaneous transcatheter closure of patent ductus arteriosus is a well-established procedure. Although it has been known as a safe treatment strategy, some complications have been reported. Embolization of the device, especially to the pulmonary artery, is one of these complications. In this report, we present a patient in whom an Amplatzer® duct occluder (ADO) II device embolized to the pulmonary artery and it was retrieved by using "Goose Neck" snare. We would like to notice the great importance of accurate preprocedural measurement of ductus arteriosus diameter during percutaneous transcatheter closure which seems to be a simple procedure.

Key words: *Amplatzer duct occluder, "Goose Neck" snare, patent ductus arteriosus, percutaneous transcatheter closure*

ÖZET

Pulmoner artere embolize olan Amplatzer duktus kapama II cihazının "Goose Neck" kement ile çıkarılması

Patent duktus arteriyozusun perkütan transkateter yol ile kapanması oldukça iyi bilinen bir yöntemdir. Oldukça güvenli bir tedavi olarak bilinmesine karşın, işlemle ilgili bazı komplikasyonlar bildirilmiştir. Cihazın özellikle pulmoner artere embolizasyonu bu komplikasyonlardan birisidir. Bu olgu sunumunda, Amplatzer® kapama II cihazının (ADO) pulmoner artere embolize olduğu bir hastayı ve embolize olan cihazın "Goose Neck" kement ile geri çıkarılmasını sunduk. Kolay gibi gözüken perkütan transkateter kapama işleminde, duktus arteriyozus çapının işlem öncesinde doğru ölçülmesinin önemini vurgulamak istedik.

Anahtar kelimeler: *Amplatzer kapama cihazı, "Goose Neck" kement, patent duktus arteriyozus, perkütan transkateter yolla kapama*

Introduction

Percutaneous transcatheter closure has been used extensively as a safe and effective alternative treatment modality to surgical closure in patients with patent ductus arteriosus (PDA) over the past 30 years (1). The Amplatzer® Duct Occluder II (ADO II) device made from nitinol wire mesh has a widespread use in the era of percutaneous transcatheter closure of PDA. Although the complications are rare, device embolization requiring transcatheter or occasionally surgical retrieval may occur. Embolization usually occurs in the early hours after implantation and trends to the branches of pulmonary arteries (2). In this report we present a case of embolization of ADO II device to the pulmonary artery and retrieval of it with "Goose Neck" snare successfully.

Case Report

A 22-year-old male was taken into the catheterization laboratory to perform percutaneous closure of PDA by using the retrograde guide-wire technique. The procedure was initated by puncturing of right femoral artery under local anesthesia. The size of PDA was measured 6 mm by descending aortagraphy and it was decided to use a 6x6 mm ADO II device. A 0.0035" glide wire was passed through the aorta into the pulmonary artery with the guidance of 6 F right Amplatz II diagnostic catheter. Subsequently, glide wire was exchanged with an extra stiff wire. The delivery system was advanced over the extra stiff wire into the pulmonary artery. The distal disc of ADO II device (AGA Medical Corp., Golden Valley, Minnesota, USA) was opened in the pulmonary artery, and then, the system was withdrawn slowly and the proximal disc opened in the aorta. Subsequently, the device was released after being sure that device was placed correctly. However, a severe residual shunt was present on control descending aortagraphy recorded 10 minutes after implantation (Figures 1A and 1B). Then

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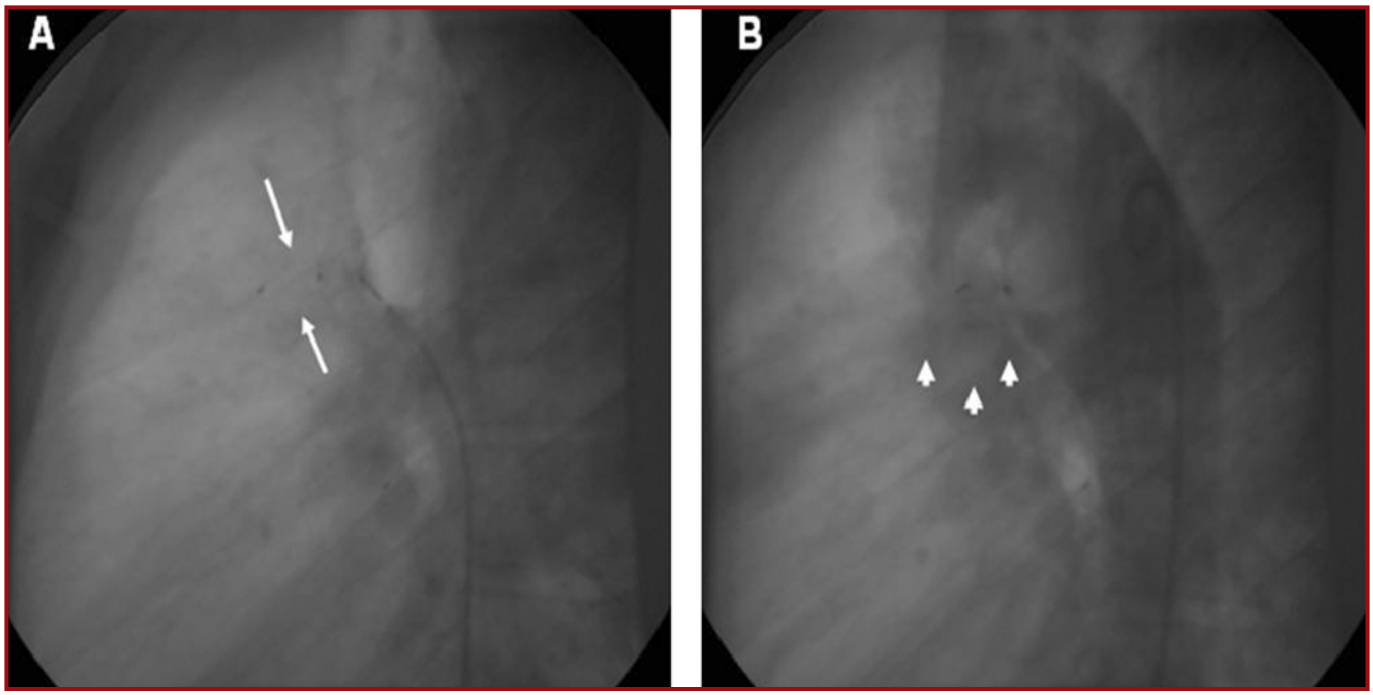

Figure 1. Cinegraphy demonstrated that ADO II device was placed correctly with retrograde guide-wire technique (A) and severe residual shunt was seen on descending aortagraphy after device release (B). White arrows show the ADO II device and arrow heads point out severe residual shunt after placement

we decided to retrieve the device by using a gooseneck snare and replace with a larger ADO II device. The device had embolized to the branches of pulmonary artery as just as touching the device with snare. The device was seen in the bifurcation among two pulmonary artery branches under fluoroscopic images and a partial blocking of pulmonary arterial blood flow was observed on pulmonary angiography (Figure 2). A gooseneck snare was advanced to the pulmonary artery via the right femoral vein. After several unsuccessful attempts to reach to the device because of several bifurcative complex branches of pulmonary artery, the device was captured from its screw by using "Goose Neck" snare and device was retrieved successfully (Figure 3). A larger size of ADO I device (8 mm aortic disc and 6 mm on pulmonary side, device length 7 mm) was implanted to the patient by using antegrade guide-wire technique. There was

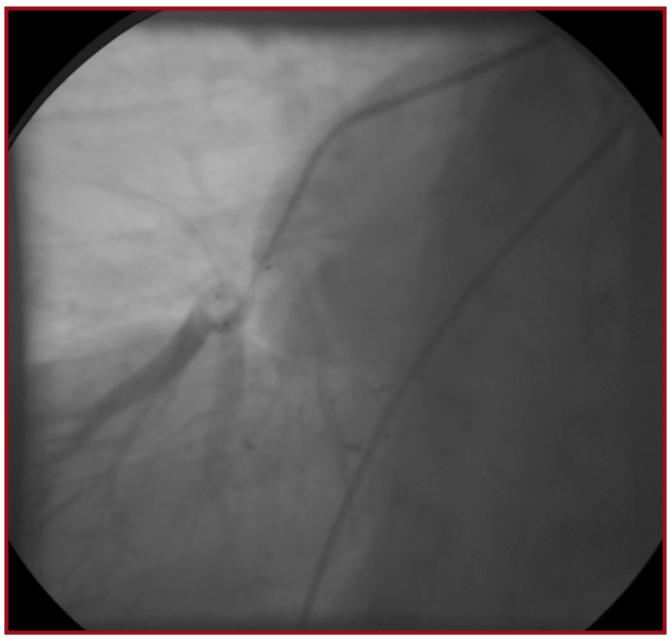

Figure 2. Cinegraphy showed that ADO II device embolized into the distal branch of pulmonary artery and blocked partially the blood flow of pulmonary artery

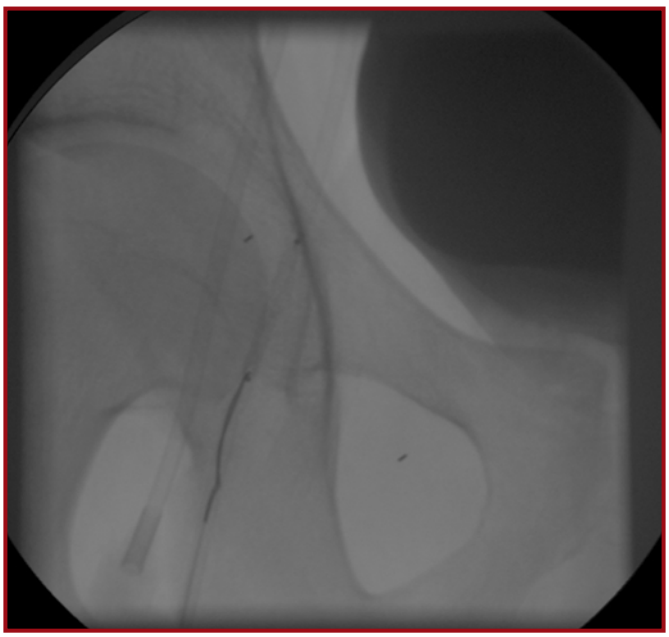

Figure 3. It was seen that the ADO II device was catched from its screw by using gooseneck snare and drawn back to the femoral sheat in right femoral vein

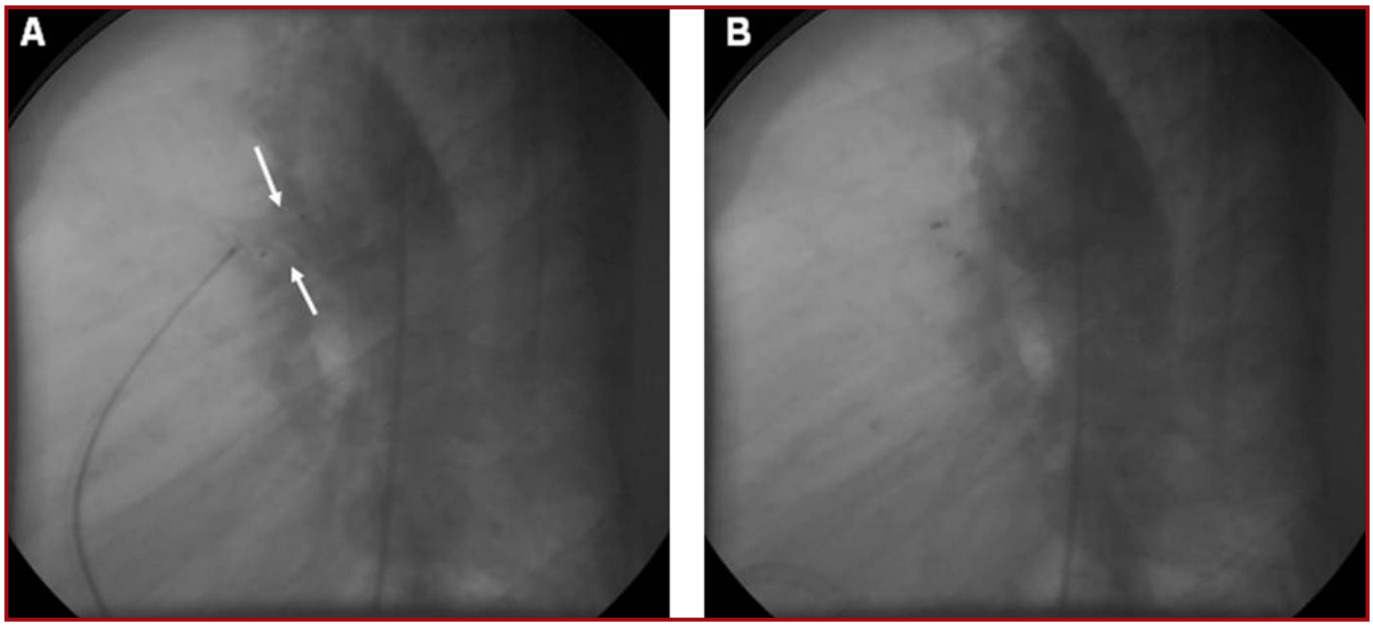

Figure 4. ADO II device was placed correctly with antegrade guide-wire technique (A) and there was no residual shunt on descending aortagraphy after the release of device (B). White arrows show the ADO II device

no abnormality on control descending aortagraphy in the next morning (Figures 4A and 4B), and then the patient was discharged in a very good condition.

Discussion

PDA is one of the most common congenital abnormalities (3). Since the first successful surgical closure by Gross and Hubbard (4), and the first transcatheter occlusion by Porstmann (5), the treatment modalities for PDA have continued to evolve. Various closure devices, occluders and coils have been used to occlude the PDA. However, they had some limitations such as high incidence rate of residual shunting, complex delivery systems and large delivery sheaths (6). ADO devices, which can be delivered through a relatively small delivery system, were introduced to handle these limitations. ADO I was introduced in 1999 and ADO II in 2009.

It has been shown that the use of the ADO was safe and the success rate of procedure was relatively higher than those of other devices. In their study of 205 patients with PDA, Bilkis et al. reported that closure of PDA using ADO I was successful in all patients and complication rate was 3% (2). Also, Faella and Hijazi reported that the occlusion rate was up to 100% after one year's follow up, and complication rate was 2% in their international registry of transcatheter closure with ADO (7).

Complications including death, device embolization (to the pulmonary artery or aorta), partial obstruction of the left pulmonary artery, aortic narrowing, arrhythmias, transient asystole, significant bleeding, loss of femoral pulse, pseudo-aneurysm formation and groin hematomas during this procedure have been reported (7,8). However, some large series reported no such complications (3). The embolization of PDA closure device is a frequent complication of this procedure and usually occurs into the pulmonary artery. It was mainly thought to be associated with undersized devices (7). A descending aortagram in the lateral projection was recorded to define the morphology and size of the duct, and this might be the reason of undersizing of PDA in our case. However, a biplane anteroposterior and lateral descending aortagram could be performed to evaluate the correct size, position and shape of the ductus.

All types of PDAs measuring 2.5 mm to 5.5 mm in diameter can be occluded with ADO II device. The "window-type" PDA in the Krichenko classification (9) and PDAs measuring >12 mm in length and >5.5 mm in diameter on angiography are not suitable for closure with ADO II. The embolization of ADO II device occurred into the pulmonary artery probably from undersizing and was retrieved successfully with snare by catching from its screw in our case. But, retrieval of the device was not easy. Because finding the correct distal branch of pulmonary artery, in which ADO II device was embolized, and catching the device from its screw were so difficult.

In conclusion, this case has been presented to emphasize the great importance of preprocedural duct measurement during percutaneous transcatheter closure of PDA, which seems to be a simple procedure.

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