



## CASE REPORT

# An extremely rare malformation of an atrial septal defect closure device and use of a new corrective technique



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### KEYWORDS

Atrial septal defect;  
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**Abstract** Tulip malformation is a newly defined complication of transcatheter atrial septal defect closure. This complication, in which the left atrial disc becomes concave, makes it impossible to fully retract the device into the delivery sheath. The case presented is the first report describing a simple new technique which overcomes this novel complication.

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### PALAVRAS-CHAVE

Comunicação  
interauricular;  
Malformação  
em tulipa;  
Complicação  
do dispositivo

**Uma malformação extremamente rara do dispositivo de oclusão percutânea da comunicação interauricular e uso de uma técnica terapêutica nova**

**Resumo** A malformação em tulipa é uma complicação recentemente descrita da oclusão percutânea da comunicação interauricular (CIA). Esta complicação em que o disco na aurícula esquerda adquire uma forma côncava durante o implante, impedindo a reintrodução do dispositivo na bainha. O caso apresentado é o primeiro relato que descreve uma forma nova e simples de superar esta complicação.

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## Introduction

Atrial septal defect (ASD) occluder device deformations are rare complications encountered during transcatheter ASD closure. Cobrahead device malformation is the most commonly reported of these complications.<sup>1</sup> Recently, a new malformation, called tulip malformation, has been reported with the LifeTech Cera ASD occluder.<sup>2</sup> Our case report is the second in the literature in which a tulip malformation was seen. However, a simple and previously unused technique was used to correct the deformation.

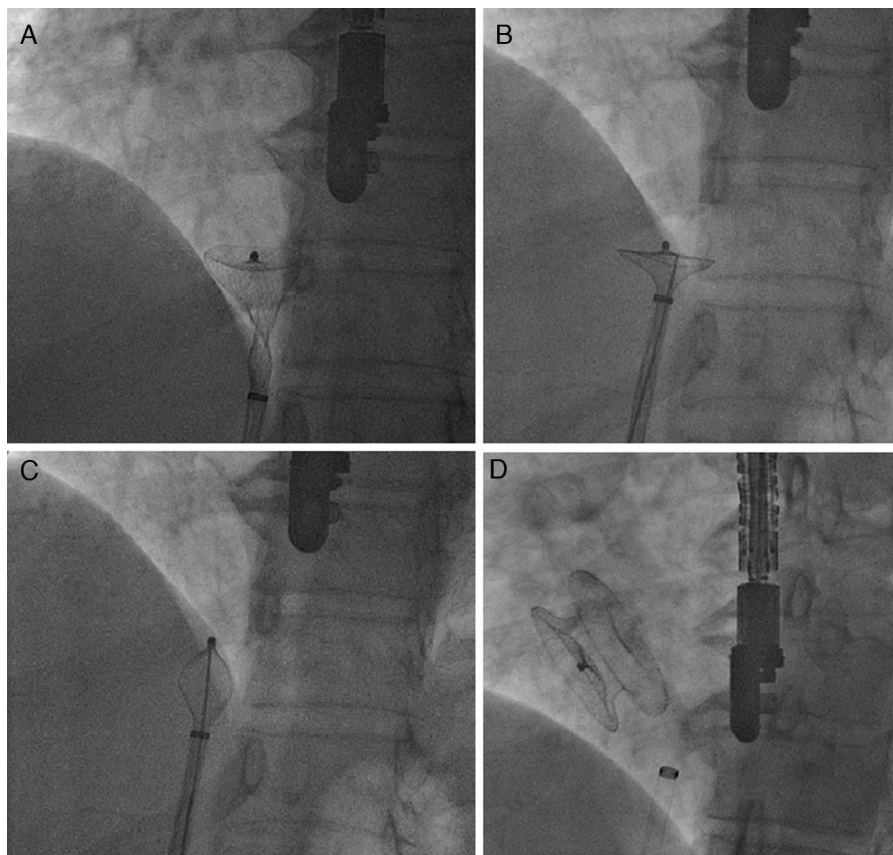
## Case report

A 51-year-old woman diagnosed with secundum ASD was referred to our center for transcatheter closure. The presence of secundum ASD was confirmed by transesophageal echocardiography (TEE), which showed the patient's defect to be 19 mm in diameter. Under local anesthesia and under the guidance of TEE, a 12 F SteerEase delivery sheath (Lifetech Scientific, Shenzhen, China) was deployed in the left atrium (LA) over a 0.035'' wire via the right femoral vein. A 22 mm Cera ASD device was then opened in the defect under fluoroscopic and TEE guidance. The attempt was unsuccessful because of failure of the device to approach the defect at the appropriate angle. During

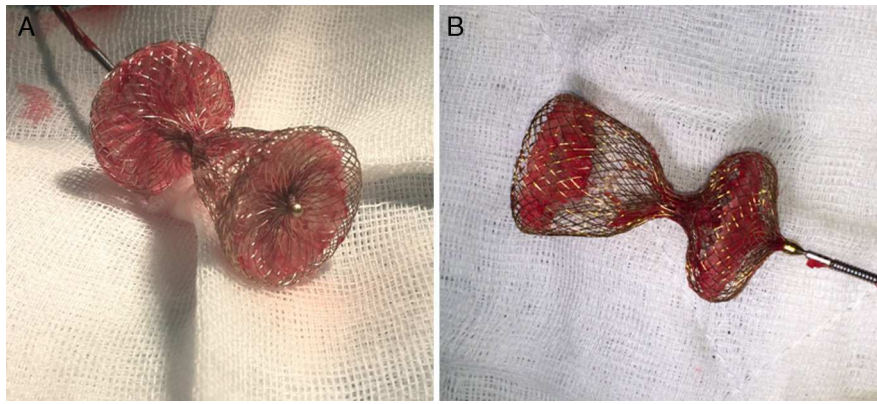
subsequent attempts, it was observed that the structure of the device had changed; the LA disc had become concave (Figure 1A) and could no longer be retracted into the sheath. This deformation could not be corrected by manipulations inside the LA. The device, which was partially retracted into the sheath, was then taken into the right atrium, which was safer. When further attempts in the right atrium failed, a different solution was considered. The stiff and flat side of a 0.038'' J-wire was guided through the sheath containing the device. With the delivery cable in traction and held stable, an attempt was made to advance the hub of the LA disc with the stiff side of the 0.038'' J-wire under fluoroscopy. After several attempts, the concave deformity was rectified by engaging the hub section, and the device was completely retracted into the sheath (Figure 1B and C, Video 1 and 2). The removed device was discovered to have a distorted structure, resembling a tulip (Figure 2). A new 26 mm Cera device was then successfully deployed in the defect (Figure 1D) and the procedure was completed.

## Discussion

The cobrahead malformation during transcatheter ASD closure has been thoroughly described.<sup>3,4</sup> However, a tulip-shaped occluder deformation has only been reported once previously.<sup>2</sup> Hayes et al. managed to rectify the concave



**Figure 1** Concave deformation of the distal left atrial (LA) disc preventing full device recapture (A); the stiff and flat side of a 0.038'' J-wire guided through the sheath to the LA disc (B); concave deformity rectified by engaging the hub section, and the device completely retracted into the sheath (C); final position of the 26 mm Cera device after implantation (D).



**Figure 2** Images of the device after extraction.

deformation by capturing the hub of the LA disc with a snare through the right internal jugular vein. Given the fact that the hub of the LA disc is only 1–2 mm in diameter, this procedure can be said to be technically challenging and requires dexterity. It also requires separate vascular access. In our technique, neither separate vascular access nor extensive snare experience is required.

## Conclusion

Transcatheter closure of secundum ASD cases is a method that is frequently and successfully applied nowadays. It is inevitable that similar device malformations will be encountered in the future with increasing frequency of the procedure. Therefore, we believe that the new technique defined in our case will provide a relatively easy, effective and rapid solution to similar device malformations.

## Ethical disclosures

**Protection of human and animal subjects.** The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

**Confidentiality of data.** The authors declare that no patient data appear in this article.

**Right to privacy and informed consent.** The authors declare that no patient data appear in this article.

## Conflicts of interest

The authors have no conflicts of interest to declare.

## Appendix A. Supplementary material

Supplementary material associated with this article can be found in the online version at [doi:10.1016/j.repc.2014.11.019](https://doi.org/10.1016/j.repc.2014.11.019).

## References

1. Fischer G, Stieh J, Uebing A, et al. Experience with transcatheter closure of secundum atrial septal defects using the Amplatzer septal occluder: a single centre study in 236 consecutive patients. *Heart*. 2003;89:199–204.
2. Hayes N, Rosenthal E. Tulip malformation of the left atrial disc in the Lifetech Cera ASD device: a novel complication of percutaneous ASD closure. *Catheter Cardiovasc Interv*. 2012;79:675–7, <http://dx.doi.org/10.1002/ccd.23246>.
3. Cooke JC, Gelman JS, Harper RW. Cobrahead malformation of the Amplatzer septal occluder device: an avoidable complication of percutaneous ASD closure. *Catheter Cardiovasc Interv*. 2001;52:83–5.
4. Trehan V, Mukhopadhyay S, Yusuf J, et al. Cobra head deformity of Amplatzer septal occluder. *Indian Heart J*. 2005;57:78–9.