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Cobra head deformity of atrial septal occluder: blessing in disguise

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Brief Report

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Abstract

It is not uncommon to have prolapse of the atrial septal occluder device despite accurate measurement of atrial septal defect and an appropriately chosen device. This is particularly a problem in cases with large atrial septal defect with absent aortic rim. Various techniques have been described for successful implantation of atrial septal occluder in such a scenario. The essence of all these techniques is to prevent prolapse of the left atrial disc through the defect while the right atrial disc is being deployed. In this brief report, we illustrate the use of cobra head deformity of the device to successfully deploy the device across the atrial septum.

Introduction

Cobra head deformity is encountered either due to faulty device design or erroneous deployment technique. For successful deployment of the device, the deformity needs either manual correction if it is transient or deployment of a new device in the case of permanent deformity. In this report, we describe the use of transient cobra head deformity as technical support for successful deployment of the device.

Case description

A 10-year-old boy was diagnosed to have a 21-mm ostium secundum atrial septal defect. He underwent transcatheter closure of the defect using a 24-mm atrial septal occluder (AGA Medical Corporation, Plymouth, Minnesota, United States of America). All initial attempts of device deployment failed including rapid deployment from the left and the right upper pulmonary vein. The left atrial disc was repeatedly prolapsing through periaortic area. After initial few attempts, the device assumed cobra head deformity (Fig 1a and b and Supplementary video S1). The deformation, however, was short lasting, and there was spontaneous resumption of normal shape. In yet another attempt, when the left atrial disc formed cobra head deformity, the right atrial disc of the device was quickly deployed in its position. By the time, the deformed left atrial disc regained its original shape, the right atrial disc was already in place and prevented the prolapse of the device resulting in successful placement of the device (Fig 1c). Follow-up echocardiogram showed a well-placed device with no residual flow.

Discussion

Cobra head deformity is a benign distortion of atrial septal occluder that occurs in approximately 3% device implantations.[1] Initially thought to result from faulty device, it is now apparent that this deformity stems from excessive device rotation. This excessive rotation and twisting of the nitinol wires occur within the delivery system or while deploying across the atrial septum.[2,3] Various technical reasons, such as the opening of the device close to the left atrial wall, difficulty in loading, excessive twisting while advancing, kinking of the delivery sheath have been proposed for the formation of Cobra head deformity. A relatively slow deployment of the left atrial disc is yet another reason postulated for cobra head deformity.[4] Larger devices, due to greater length of the device, and larger than recommended delivery sheath, due to its extra lumen, make cobra head more likely although there are reports wherein the deformity resolved using a larger sheath.[5–7] An appropriate size sheath, ease of loading the device, and failed attempts even with rapid deployment technique exclude most of the aforementioned causes in our case. Instead, the most likely reason of the deformity was excessive but reversible twisting of the nitinol wire during multiple attempts of deployment that failed.

Once formed, depending upon the degree of rotation, the cobra head deformity may remain fixed or revert to normal shape spontaneously within the heart or once retrieved outside. While it is advisable to not use a device with fixed deformity, it is acceptable to implant a device with transient deformity that readily corrects itself. We hypothesise that in our case the cobra head deformity increased the inertia of the left atrial disc and resulted in slow movement of the left atrial disc. By the time the left atrium disc arrived at the periaortic region, the right atrial disc was

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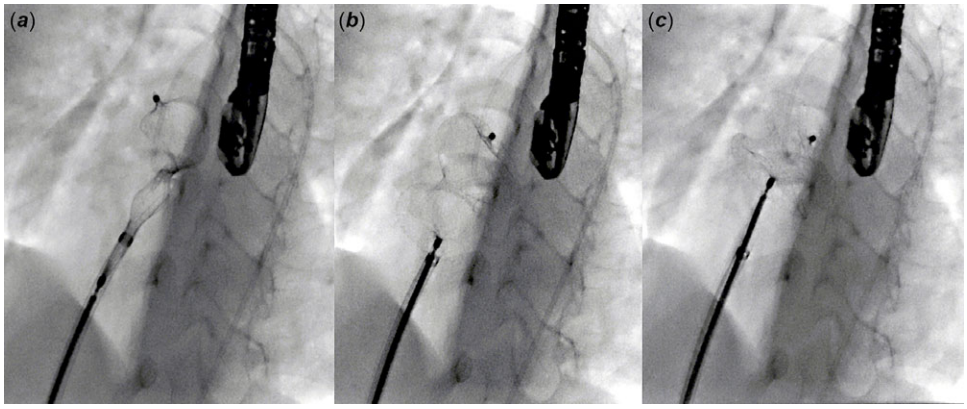

Figure 1. Fluoroscopic images in left anterior oblique projection with cranial tilt show the use of cobra head deformity of atrial septal occluder (panel ***a***) for successful deployment across ASD (panel ***b***) – better seen in accompanying video. Panel ***c*** shows the final position of the device before it was detached from the delivery cable.

already blocking the right atrial aspect of the defect and enabled successful deployment by preventing prolapse of the device.

Conclusion

Cobra head deformity is an uncommon deformity of the atrial septal occluder device. While it is advisable to not use a device with fixed deformity, it is acceptable to implant a device with transient deformity that readily corrects itself. Transient cobra head deformity and resultant delayed movement of the left atrial disc can be helpful in the successful deployment of the device.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/S1047951120004084

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Conflicts of interest. None.

Ethical standards. The authors assert that all procedures contributing to this work comply with the ethical standards as mentioned in the Helsinki Declaration of 1975, as revised in 2008.

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