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【 EDITORIAL 】

Transcatheter Closure of an Atrial Septal Defect

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Transcatheter closure of an atrial septal defect (ASD) was approved for Japan in 2015. Approximately 3,000 cases of ASD are now treated annually with a device, with initial treatment using an Amplatzer Septal Occluder (ASO), and the Figulla Flex II (FFII) being the second choice. Discussion on these devices has mainly focused on the issue of technical deployment, size selection, and - the most serious complication - erosion.

Regarding its range, the ASO device and its delivery cable wire are relatively limited. Implanting a large device for small children, especially in those associated with a superior rim deficiency, is still a challenging task. Due to the limited space of left atrium in such cases, while deploying the device, the left atrial disk might easily become perpendicular to the posterior wall of the left atrium. As a result, the left atrial disk can thus easily prolapse into the right atrium without holding the upper side of the superior rim. Some unique techniques (1, 2) prescribed in this paper have been developed to allow the device to spread over the defect without migration, however, these techniques do require a certain level of experience. The main purpose of these techniques is to let the left atrium disk lay down parallel to the atrial septum which will thus result in a satisfactory outcome.

1. The Hausdorf sheath (Cook Medical, Bloomington, USA) has two curves at the distal part which help align the left atrial disk parallel to the septum. If the first deployment results in an unfavorable position, then the sheath should be slightly rotated counterclockwise, and then the end of the sheath should be placed posterior to atrial septum and then the following deployment of the disk can be easily placed parallel to the septum.

2. The left upper pulmonary vein technique is well known as the “American football technique.” This technique can be used for both small children and adult cases. After delivery the sheath reaches the left upper vein, and then the left atrial disk is deployed inside the left pulmonary vein.

Then the waist and the right atrial disk is placed above the defect. Once the left atrial disengages from the left pulmonary vein, the waist and the right atrial disk can then be pulled back rapidly just below the defect. The continuous retraction of the sheath while pulling back the whole left atrial disk will cause the left atrial disk to jump in parallel with the atrial septum.

3. Using a straight, side hole delivery sheath, which is a manual modification of Mullen’s transseptal sheath, which has been cut by scissors in a direction parallel to the proximal straight length of the shaft at the base of the preexisting curve, and then the device can be expand closely parallel to the atrial septum (3).

The FFII has more flexibility and it is easier to implant compared with the ASO device. Furthermore, the softness of the FFII device allows for its adjustment to adjacent structures, such as the sinus of Valsalva of the aorta and the roof of the left atrium. This situation is considered to be associated with less risk of erosion, and this device is preferably used in the case of a short rim of the aorta, especially in cases demonstrating a so-called naked aorta or bold aorta.

The etiology of erosion mainly due to continuous compression caused by an oversized device against the atrial wall remains unclear, but it may be multifactorial (4). Cardiac erosions might happen within 48 hours after device implantation. Most such erosions occur within 6 months, but they can also appear as late as 9 years after device deployment. Cardiac erosion can cause cardiac tamponade, hemopericardium, or aortic fistula. According to the MAUDE database report, 23 (0.13%) events of cardiac erosion appeared among 18,333 ASO implants (5).

Recently seven erosion cases using Occlutech devices among three generations of occluders (Figulla Flex N, Flex I, and Flex II) have been reported (6). In this report, a deficiency of the aortic rim was only observed in 3 of 7 cases (43%), while another risk factor, namely an oversized device, was only implanted in 1 case. Regular short and long-

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term follow-up is recommended after Occlutech device implantation as well as with any other ASD devices. Careful attention is required to avoid such adverse phenomena.

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References

1. Tanaka S, Imamura T, Narang N, Fukuda N, Ueno H, Kinugawa K. Practical therapeutic management of percutaneous atrial septal defect closure. Intern Med **61**: 15-22, 2022.
2. Fu Y, Cao Q, Hijazi Z. Device closure of large atrial septal defects: technical considerations. J Cardiovasc Med (Hagerstown) **8**: 30-33, 2007.
3. Kutty S, Asnes J, Srinath G, Preminger T, Prieto L, Latson L. Use of a straight, side-hole delivery sheath for improved delivery of Amplatzer ASD occluder. Catheter Cardiovasc Interv **69**: 15-20, 2007.
4. Kitano M, Yazaki S, Sugiyama H, Yamada O. The influence of morphological changes in Amplatzer device on the atrial and aortic walls following transcatheter closure of atrial septal defects. J Interv Cardiol **22**: 83-91, 2009.
5. DiBardino D, McElhinney D, Kaza A, Mayer J. Analysis of the US food and drug administration manufacturer and user facility device experience database for adverse events involving Amplatzer septal occluder devices and comparison with the Society of Thoracic Surgery congenital cardiac surgery database. J Thorac Cardiovasc Surg **137**: 1334-1341, 2009.
6. Auriau J, Bouvaist H, Aaberge L, et al. Cardiac erosions after transcatheter atrial septal defect closure with the Occlutech Figulla Flex Device. JACC Cardiovasc Interv **12**: 1397-1399, 2019.