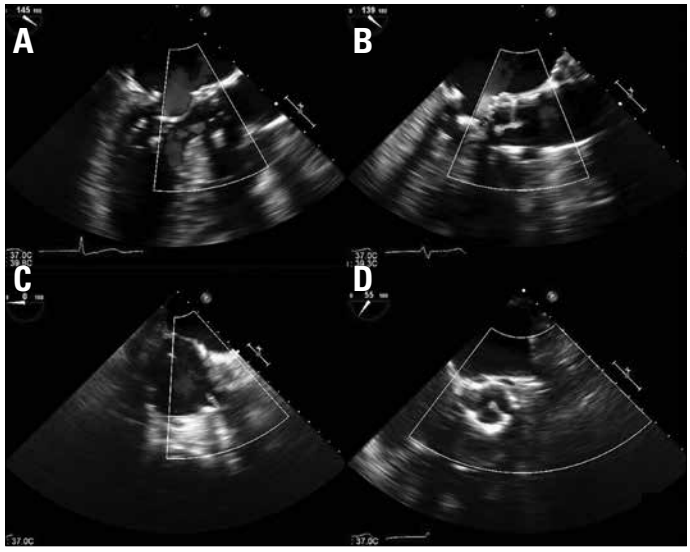

Figure 3. Pre and post-procedural TEE reveal mild degree of AR. (A) Long axis window before procedure shows severely calcifed and narrow aortic valve with mild central AR. (B) Long axis window after procedure shows a well-seated valve and mild AR. (C) Transgastric and (D) short axis windows verify the mild degree of AR
AR - aortic regurgitation; TEE - transesophageal echocardiogram

brisk upstroke of systolic pressure and recovery of a prominent dicrotic notch appear on the Ao pressure waveform. Then, terminal diastolic rise of LV pressure waveform and downslope of Ao pressure waveform should be evaluated. If there is no significant AR, Ao diastolic pressure does not decrease and LV end-diastolic pressure (LVEDP) does not appreciably increase. On the contrary, moderate or severe AR rapidly leads to an increased LVEDP and a decreased Ao diastolic pressure, resulting in large PP. Then, diastasis may also develop (5).

It is important to keep in mind that rising LVEDP, decreased Ao diastolic pressure and large PP can also result from different factors that may influence arterial stiffness, pressure-volume characteristics and compliance of the LV. These factors include heart rate, preload, afterload, pericardial or plevral pressure, diastolic function of LV and LV inotropic state. Both pressure-volume characteristics and compliance of the LV can be altered in several disorders including valvular diseases, pericardial diaseases, cardiomyopathies and coronary artery disease, result in increased LVEDP (6).

On the other hand, stiffness of the vasculature which is frequent in the very elderly and in those with arteriosclerosis frequently causes decreased Ao diastolic pressure and large PP. Aging is the major clinical determinant of arterial stiffness that progressively occurs central arteries more than muscular arteries. Besides aging, HT, diabetes, heart failure, and renal diseases also accelerate arterial stiffness (7). Many patients with multiple co-morbidities such as our 78-year-old patient with CAD, history of mitral and tricuspid valve repair, DM, HT, and HL may have a misleading hemodynamic picture after TAVR unless pre-procedure hemodynamic recordings are available.

Conclusion

Athough increased LVEDP, decreased Ao diastolic pressure and a large PP are usually signs of significant AR, these findings may be present without significant AR as seen in our case. Therefore, the pre-procedural recordings should be examined together with post-procedural pressure waveforms.

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Successful use of a cryoablation sheath for closure of problematic atrial septal defect

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Introduction

Transcatheter closure of atrial septal defects (ASD) of the secundum type with the Amplatzer Septal Occluder (ASO) has become a routine procedure with high procedural success rates. However, certain anatomical aspects, such as defect size and position in the atrial septum that cause some ASDs more difficult to close and requires different techniques. In this case, we describe the successful use of a Cryoablation Sheath for closure of this type of problematic ASD.

Case Report

A 20 years-old woman with ASD was referred to our hospital for percutaneous closure. The transesophageal echocardiography revealed a defect size of 15 mm with sufficient rims (Fig. 1). The procedure was performed under local anesthesia with transthoracic echocardiography (TTE) guidance. The 24 mm sizing balloon was positioned across the

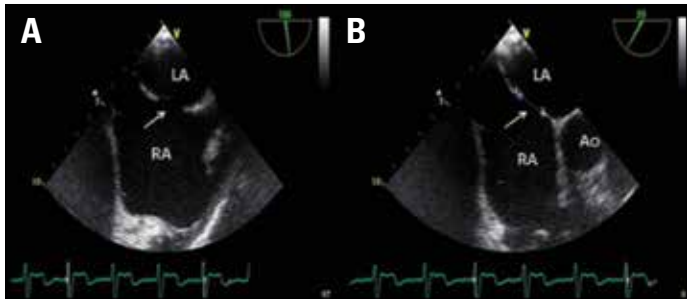

Figure 1. Transesophageal echocardiography images showing secundum atrial septal defect (white arrow) and rims
Ao - aorta; LA - left atrium; RA - right atrium

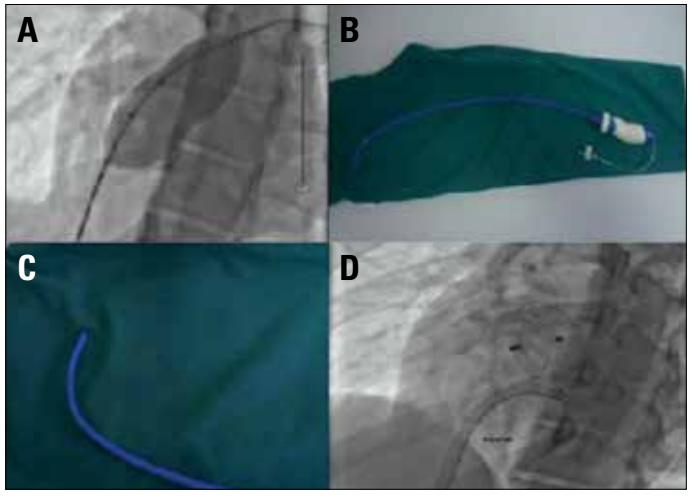

Figure 2. (A) radioscopic image of the sizing balloon (20 mm in diameter) with reference sphere. (B) and (C) images showing FlexCath, D-radioscopic images of the FlexCath and Cardi-O-Fix device occluder after implantation

defect and measured by quantitative angiography at 20 mm (Fig. 2A). A 20 mm occluder device (Cardio-O-Fix, Starway Medical Technology Inc. Beijing, China) was selected. When the entire assembly was pulled back toward the septum, it was noted that the occluder prolapsed repetitively into the right atrium. It was unsuccessful despite multiple attempts such as left and right upper pulmonary vein, balloon-assisted and Wahap techniques at repositioning the left atrial (LA) disk to be parallel to the septum. While the LA disc justification the septum, each time the device was protrude from left atrium towards the right atrium. Then sizing balloon was repeated for possibility of undersized device. Despite the defect size is the same then 22 mm Cardio-O-Fix device has been tested. But all the efforts were unsuccessful. We thought that device protrude right atrium due to unfavourable angulation of the device. Therefore instead of conventional delivery sheath, cryoablation of long sheath (FlexCath, Medtronic) (Fig. 2B-D) was used that angle can be changed manually. Device easily placed with the appropriate angle that the LA disk will be parallel to the septum. Repeat cine angiography (Fig. 2D) and TTE (Fig. 3) confirmed good device position. During a follow-up period of 6 months, the patient was asymptomatic. Also follow-up echocardiogram at 6 months showed the device to be in good position with no residual shunt.

Discussion

Factors relating to device embolization are associated with the type of device used, larger size of defect, thin rim on atrial tissue, and mobility of device post implantation, use of undersized device, deficiency or

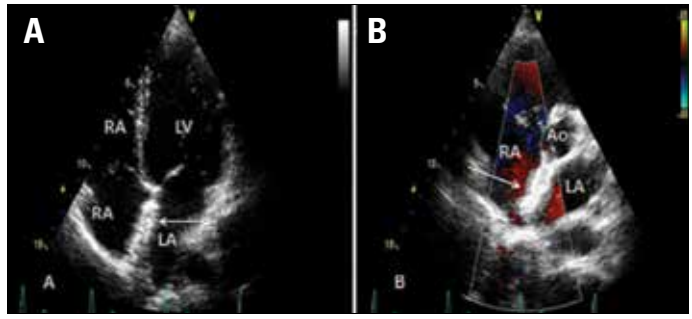

Figure 3. Transthoracic echocardiographic images of the septal occluder device (arrow) after implantation. (A)-apical 4 chamber view (B)- parasternal short axis view
Ao - aorta; LA - left atrium; LV - left ventricle; RA - right atrium; RV - right ventricle

absence of aortic rim in percutaneous ASD closure. There are various techniques such as rotation of the delivery sheath within the heart, increasing the curvature of the sheath, balloon-assisted technique that can be used to overcome such difficulties in aligning the LA disk to be parallel to the atrial septum (1). Other methods that have also been successful are engagement of the left and right upper pulmonary vein with the LA disk and deployment of the right atrial disk (2). These maneuvers LA disk to be parallel to the atrial septum and support the LA disk that prevent its prolapse into the right atrium. A previous case report described use of a modified delivery sheaths such as Boosfeld tip and Modified Cook Sheaths (3). The more manually curved FlexCath Steerable Sheath might be advantageous in our case where the delivery system approaches the interatrial septum in a parallel fashion. We have found this sheath to be very helpful in cases of difficult ASD closure. In fact, FlexCath Steerable Sheath can be deflected to provide additional maneuverability to catheters that are advanced through the sheath and into right or left chamber of the heart. In addition, one of the main advantages of cryoablation sheath is that it can be manually, easily controlled and easily curved what prevents LA disc from prolapsed into right atrium.

Conclusion

The FlexCath Steerable Sheath (Medtronic) may be an alternative to other techniques for aligning the LA disk to be parallel to the atrial septum in difficult ASD.

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