

Device Closure of Difficult ASDs

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Introduction

Secundum atrial septal defect (ASD-II) represents about 10% of congenital heart disease and beyond bicuspid aortic valve, is the most common congenital heart defect in adulthood. Transcatheter treatment of ASD-II is an alternative treatment option to traditional surgical closure both in children and adults¹⁻⁶ Indeed, in the last decade, a considerable number of patients with isolated ASD have undergone successful percutaneous closure with different devices.⁵⁻¹¹ However, morphologic variations of ASD-II are frequent and have important impact in determining the success of the transcatheter procedure; thus, their assessment remains crucial for the selection of the best treatment approach. Most ASDs (24%–75%) are centrally located, however, there remains a good percentage of them with deficient rims. Most of these

cases are straightforward with a diagnosis made by transthoracic echocardiography; others require more detailed diagnosis and therefore decision for whether they are suitable for percutaneous closure.

ASDs termed difficult to close by percutaneous approach are frequently encountered. Some of these are large and others have deficient rims or the atrial septum is aneurysmal or fenestrated. Collectively, these difficult ASDs are better termed “Complex ASDs.” In a study by Pedra et al,¹⁴ they arbitrarily defined ASD with complex anatomy as the presence of a large (stretched diameter ≥ 26 mm) ASD associated with a deficient (≤ 4 mm) rim located at the anterior, inferior, or posterior portion of the atrial septum; two separate ASDs within the atrial septum (distant or close to each other); and multifenestrated septum. Defects associated with a floppy, redundant, and hypermobile

atrial septum (excursion ≥ 10 mm), considered to be aneurysmal were also regarded as ASDs with complex anatomy, irrespective of their size. Therefore, the common subtypes of secundum ASD are the following.

1. Large defects (could be centrally located or not)
2. Deficient anterosuperior rim
3. Multiple or fenestrated defects
4. Deficient posteroinferior rim
5. Aneurysmal atrial septum
6. Combination of the above (eg, large ASD with deficient rims).

In this chapter, we will define each subtype of secundum ASD and techniques used to closing each one of them. There are many devices used to close ASDs successfully. In this chapter, our main target will be focused on AMPLATZER Septal Occluder (ASO) as it is the most widely used device worldwide. Other devices that are in use include CardioSEAL/STARFlex, Occlutech-Figulla, Cardia INTRASEPT, Solysafe, and the HELEX device. The reader is encouraged to review the chapters on specific devices in Part IV.

Atrial Septal Rims

An adequate rim is 7 mm and longer. However, a minimum of a 5-mm rim of atrial septum around the defect has been suggested as a prerequisite for device closure with ASO.¹⁵ However, due to its design, it is believed that the ASO would not require an anterior rim for anchorage and the device would wrap around the posterior wall of the aorta. A deficient or absent rim is anything < 3 mm. A questionable or inadequate rim is between 3 and 5 mm.

To close the ASD using the transcatheter technique, it is important for the interventional cardiologist to have sound knowledge of the atrial septal rims and the structures that surround the ASD (Fig 13.1). The atrial septum is surrounded by several important structures. The aortic root is located anterosuperiorly, the mitral valve and tricuspid valve anteroinferiorly,

the superior vena cava and right upper pulmonary vein posterosuperiorly, and the inferior vena cava posteroinferiorly. The simplified classification was initially proposed by Shrivastava and Radhakrishnan.¹⁶ With minor modification to their classification, Amin¹⁷ has suggested the following: aortic rim, the atrial septal rim that is adjacent to the aortic valve; superior vena cava (SVC) rim, the rim adjacent to the SVC; superior rim, the rim between the SVC rim and the aortic rim; posterior rim, the rim opposite to the aortic rim; inferior vena cava (IVC) rim, the rim adjacent to the IVC; atrioventricular valve (AV) rim, the rim adjacent to the AV valve rim (Fig 13.2).

Device Closure of ASD

As the AMPLATZER Septal Occluder (ASO) (AGA Medical Corporation, Plymouth, Minnesota) is the most widely used device, this review focuses on ASD closure with the ASO device. There are, however, other available devices in the market (see Part IV).^{18–21} They are: GORE HELEX Septal Occluder device (W.L. Gore, Flagstaff, Arizona); Sideris Buttoned device that

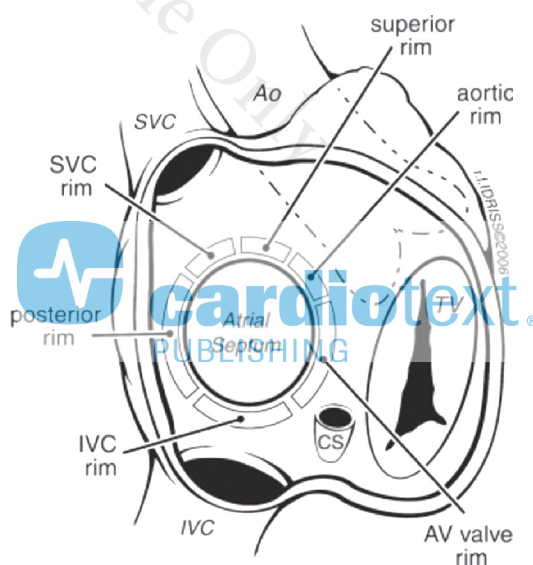


Fig 13.1—Classification of atrial septal rims. From Amin.¹⁷ (Courtesy of Wiley-Blackwell. Used with permission.)