Editorial

# Transcatheter closure of atrial septal defects: how large is too large?

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**Abstract:** Transcatheter closure has become an accepted alternative to surgical repair for ostium secundum atrial septal defects (ASD). However, large ASDs (>38 mm) and defects with deficient rims are usually not offered transcatheter closure but are referred for surgical closure. Several studies have reported the feasibility of transcatheter closure in complex cases with a variety of modified implantation methods such as balloon assisted technique (BAT). AA Pillai and co-authors report the transcatheter closure of ASD ≥35 mm with the BAT. However, the true significance of their study is rather in demonstrating the superiority of BAT to conventional technique and other modified implantation techniques in patients with ASD rather than feasiblity of transcatheter closure of large defect. Finally, a single dimension does not reflect the true ASD size because many defects are not round in shape but rather oval or even crescentric. Hence, future studies will need not only to demonstrate the ideal implantation method but also the appropriate 3-dimensional (3D) imaging definition of the defect in this patient population.

**Keywords:** Closure; atrial septal defects (ASD)/PDA/PFO; congenital heart disease; adults

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Transcatheter closure has become an accepted alternative to surgical repair for ostium secundum atrial septal defects (ASD) (1). The technique is commonly offered as first intention treatment. It accomplishes safe and effective closure in 80% of unselected ASD population. Large ASDs (>38 mm) and defects with deficient rims are usually not offered transcatheter closure. These are referred for surgical closure (2). Such complex defects comprise approximately 20% of patients with ASDs (2). Recently, several studies have reported the feasibility of transcatheter closure in complex cases with a variety of modified implantation methods including the balloon assisted technique (BAT) (3-7). In the February issue of this journal, AA Pillai and co-authors report the transcatheter closure of ASD ≥35 mm with the BAT in 36 adult patients in whom they achieved successful closure in 33 cases. While techniques other than BAT resulted in successful device placement in only 16% of cases, with the application of BAT, 92% of those in whom it was attempted could undergo device placement. Moreover the technique was effective in achieving device implantation in the presence of deficient aortic and/or posterior rims. The authors conclude that BAT can be successfully used in 90% of patients with very large defects to obtain ASD closure (8).

In our opinion, the true significance of this study is in demonstrating the superiority of BAT to conventional technique in patients with ASD. It should be noted that the authors refer to all modified implantation techniques other than the BAT as conventional technique. This is somewhat inaccurate as the 'conventional technique' denotes the standard deployment from left atrium to the right atrium without enrollment of the upper right and left pulmonary veins, special sheaths, balloons or complex manipulations in the placement of the device. Be that as it may, the authors' purpose appears to be simply to distinguish BAT from all other techniques for the purpose of a comparison. The study does indeed emphasize the BAT as the most successful method in achieving closure of large defects. This is our experience too as we have found the BAT to be the most productive and the least abrasive or disruptive technique. We speculate that the BAT may emerge as a safer technique

with respect to cardiac erosions in association with device closure of large ASDs with deficient rims.

On the other hand, the study does not demonstrate the feasibility of obtaining transcatheter closure of very large defects. The author's definition of very large defects (≥35 mm) is somewhat arbitrary. The study design in fact excludes what the authors call "extremely large defects" with "complete absence of inferior and/or inferior vena caval rim and size ≥44 mm". Additionally the authors refer to another group of 23 patients who underwent surgical patch closure during the study period. The anatomic specifics of these 23 patients other than the size of the ASD being >35 mm are not described in the paper. How big were these defects? Did they have deficient rims? Were they unsuitable candidates for transcatheter closure? Or was it simply a matter of patient's preference as is indicated in the paper and irrespective of suitability for transcatheter ASD closure? Considering all these, this study does not per se address the expanded applicability of transcatheter closure of ASDs in defects where such a therapy is traditionally contraindicated (>38 mm) (2).

The study, like many others on the subject reports a single ASD dimension. A single dimension does not reflect the true ASD size. Many defects are not round in shape but rather oval or even crescentric. Because any measured diameter usually reflects the maximal diameter of the defect, an oval ASD measuring for example 46 mm in its long axis can be suitable for transcatheter closure as the diameter in short axis is much smaller. Certainly, 3-dimensional (3D) echocardiography describing measurements such as the circular index of the ASD (defined as the ratio of the maximal diameter to the minimal diameter on a 3D- image) will better clarify the indications for transcatheter closure in the near future (9).

In order to clarify how large is too large, future studies will need not only to demonstrate the ideal implantation method but also the best assessment of the defect in 3D in this patient population.

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