Device closure of secundum atrial septal defects: To balloon size or not to balloon size

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Secundum atrial septal defect (ASD) constitutes about 10% of all forms of congenital heart disease. From our experience, over 90% of secundum ASDs should be amenable to device closure. The technique of closure has been fairly standard and has not changed much over the last 30 some years. Typically, the procedure is done under general endotracheal anesthesia with transesophageal echocardiographic (TEE) guidance. In the last 10 years, we have been doing the procedure under conscious sedation using intracardiac echocardiographic (ICE) guidance. After hemodynamic assessment and echocardiographic evaluation (TEE/ICE), many operators perform balloon sizing. The old technique of balloon sizing was using the circular balloon, from Meditech, Boston scientific where the operator inflates the balloon in the left atrium and under both echocardiographic and fluoroscopic monitoring, the balloon is withdrawn toward the atrial septum with constant gentle traction while deflating the balloon slowly. Once the balloon pops from left to right atrium, the operator determines the amount of fluid inside the balloon at the time of its passage through the defect and uses this volume to measure the balloon diameter outside the body, or frame freeze the fluoroscopy image or echo image and measure the size of the balloon when it traversed the defect. More recently and over the last 10 years, investigators have been using the stationary balloon technique. The balloon is inflated across the defect until "waisting" appears in the balloon. A cine fluoroscopy image is taken or the echo image is frozen and the waist is measured. This technique, we believe has over estimated the size of defect significantly and may have resulted in erosions in some of the cases. Therefore, since 2004, we have been using the "stop-flow" technique, which relies on color Doppler echocardiography rather than waisting in the balloon.[1]

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In this issue of the journal, Gupta *et al*,[2] evaluate their results of ASD closure using two different techniques: closure with balloon sizing (group 1) vs closure under TEE guidance alone without balloon sizing (group 2). The authors indicated that their success rate was higher in group 2, without balloon sizing. I am quite surprised at the difference in success rate between the two groups: 91% vs. 67%.

When we reported our results of device closure of secundum ASD and compared it to surgical closure,[3] all cases that underwent device closure had undergone balloon sizing and our success rate was higher than 90% for the attempted cases. Despite the fact that we used the old method of balloon sizing "waisting", we have not encountered any case of device erosion and the cases of device embolization were mainly due to undersizing or inability to seat the device well. One factor that the authors mentioned in their paper is the learning curve and experience. Perhaps many of the failed cases in group 1 were in the initial stages of their experience and were also hampered by the non availability of TEE. I would wonder if the authors divide their cases in group 1 into early experience vs. late experience and compare the two results. I would imagine the later experience might have similar success rate as in the group 2.

The practice in our center is not to do balloon sizing. We initially choose a device about 20-25% larger than the 2-dimensional diameter as measured by TEE/ICE. Most of our cases are successful using this approach. However, in occasional cases, specially those defects that are complex (large ASD>25mm by TEE/ICE; defects with more than one deficient rim; multiple defects and aneurysmal atrial septum) or in small patients, the chosen device does not work. In such cases we revert to balloon sizing. Obviously, this strategy may be associated with higher cost. However, with increased experience we have been rarely using more than once

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device for a single defect.

My recommendations for the beginners who want to engage in the device closure of secundum ASD is to do balloon sizing using the "stop-flow" technique, until the operator amasses large experience. Then once comfortable, to use selective balloon sizing for those complex defects. Such strategy will result in improved success rate and perhaps in cost savings.

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