Percutaneous Closure of Atrial Septal Defects

Contraindications Are Hard to Find These Days*

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With respect to closure of atrial septal defects (ASDs), there is a saying that large ASDs need to be closed because they are large and small ASDs need to be closed because they are small. The saying was the fruit of percutaneous device closure. When open heart surgery was the only option, the indication bar was set relatively high at a shunt index expressed as $Q_p/Q_s > 1.5$. This meant that the pulmonary blood flow volume per minute had to be 50% higher than the systemic. Smaller shunts were by no means acquitted from enlarging the right ventricle and both atria or from allowing paradoxical embolism, but their respective risks were deemed not to justify the perils of open heart surgery. Now, this indication threshold has become an oxymoron. There is the possibility to close a small ASD in an outpatient procedure with just local anesthesia of the groin in $< 30$ min and send the patient back a few hours later to a completely normal life including sports.

In this issue of JACC: Cardiovascular Interventions, a Japanese group lay to rest another possible contraindication for percutaneous ASD closure, namely, old age (1). Looking at 3 age groups (50 to 59 years, 60 to 74 years, and $\geq 75$ years), they confirm that even in the oldest age group, percutaneous ASD closure was safe and beneficial. Although the oldest age group had a higher mortality than the younger ones, this was unrelated to the ASD or its closure. Exercise capacity, heart failure markers, and echocardiographic parameters were significantly improved in all age groups examined. The average hospital stay was more than 3 days, but this was likely more due to Japanese customs than to the age of the patients or the treatment applied.

The problem of atrial fibrillation (AF) remains. Somewhat surprisingly, the prevalence of permanent AF was only 17%, i.e., 3% in the youngest, 14% in the middle, and 42% in the oldest age group. The expected and also documented decrease in atrial size may theoretically prevent a new occurrence of AF or potentially revert some permanent AF. Conversely, it is known that device closure may trigger AF. There is no mention in this paper of a new onset of AF in the roughly 3 years of follow-up. However, that does not mean that it did not occur. It may simply not have been taken for an event serious enough to be reported. Nevertheless, it may be worthwhile to focus on AF in the elderly. AF is the most feared complication of an ASD and the most common reason for significant morbidity or mortality. Surgical closure after the age of 25 years appeared not to decrease the occurrence of AF over long-term follow-up in a 20-year-old report (2). Similarly, device ASD closure did not influence permanent AF at any age but seemed to reduce the incidence of paroxysmal AF in younger patients (3). A review of a respective comparative trial attested to both surgical and transcatheter closure, a significant benefit regarding atrial tachycardia. Surgery, but not using a transcatheter technique, also achieved a significant reduction of AF (4).

The authors of this seminal paper state that physicians cannot decide whether transcatheter ASD closure should be performed in older patients or not.
because of the lack of scientific evidence.” That problem has been taken care of by their paper, removing the last remaining doubts after similar previous publications (3,5). The fact that percutaneous device closure can be at least tried with virtually all anatomic variations of an ASD secundum (perhaps except those larger than 35 mm by transesophageal echocardiography) invites offering this therapy to all patients afflicted. Closures of small ASDs will work virtually without exceptions. With larger shunts, the worst to be expected is a failure to securely and correctly implant the device. If the device is not yet released from the deployment cable, it can be withdrawn. It will usually not be billed for by the manufacturer but rather replaced at no cost with an identical device according to the terms of a worldwide safety policy. If poor hemodynamic tolerance of the shunt closure is feared, the device can be left in place for 30 min or longer before being detached. During this time, cardiac pressure assessments can be made, and the patient can be asked for any shortness of breath in the typical supine position. Should such symptoms only occur hours after the intervention, the device can fairly easily be removed percutaneously for a couple of days after implantation. In the current report and in my personal experience, all devices were tolerated and none had to be removed at any time. In the rare case of device embolization, this is usually well tolerated. Large devices generally do not leave the ventricle they end up in. Smaller devices can be retrieved from the aorta or pulmonary artery where they typically get stuck. However, in some cases, surgical removal with simultaneous ASD closure may be required (6). This may pose a problem in an otherwise inoperable patient in whom percutaneous device closure of an ASD is attempted. However, this situation has yet to be reported.

All things considered, it comes as no surprise that ASD device closure has virtually supplanted surgical interventions over the past 15 years (7). Moreover, we are slowly but surely running out of contraindications, although even very recently a respective list was published (8). Observing such a list may not necessarily be in the best interest of the patient.

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