

## EDITORIAL COMMENT

# The Transseptal Conundrum\*



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There are lots of reasons to be cautious about doing a transseptal puncture. Visions of tamponade, vagal reactions, aortic entry, and specific placement of the puncture for therapeutic interventions quickly come to mind. To be honest, once the transseptal puncture is safely done, I always feel a bit better. But now, with large bore catheters used for therapeutic transcatheter procedures, transseptal punctures are more than that—they all become atrial septal tears. We produce iatrogenic atrial septal defects (IASD) while (hopefully) improving another abnormality. We learned that with balloon mitral valvotomy almost 30 years ago. Fortunately, the atrial septum seems to be relatively forgiving as far as “enlargement” of the puncture to accommodate large guiding catheters is concerned. If complications occur, they are mostly related to the initial puncture, not to the placement of larger catheters. What has been a bit mysterious is what happens after the procedure. In early studies, about 1 in 5 patients developed left-to-right shunts after balloon mitral valvotomy, and, of those, more than one-half had apparently “closed” or “healed” the defect just shy of 1 year (1). Even with smaller catheters, the initial 20% iASD rate occurs (2). It is likely that the incidence of iASD is actually higher because finding a post-procedure iASD is related to the test used for detection (3). Regardless, it seems clear that crossing the atrial septum for transcatheter interventions leaves an iASD that can result in left-to-right or, in some cases, right-to-left shunting. So here is the conundrum: does the iASD matter? Theoretically, for patients with right atrial hypertension from any cause (right ventricular failure,

tricuspid disease, etc.) paradoxical embolism and cyanosis are real threats. For patients with left-to-right shunts, right heart enlargement, atrial arrhythmias, right ventricular failure, and increases in pulmonary artery pressure can result.

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In this issue of *JACC: Cardiovascular Interventions*, Schueler et al. (4) shed further light on this conundrum. They report on persistence of iASD after MitraClip (Abbott Vascular, Santa Clara, California) procedures for patients with functional mitral regurgitation (MR), the latest large-catheter transseptal intervention in the structural armamentarium. Their evaluation of patient characteristics in an attempt to predict which patients are most vulnerable to iASD produces a number of important teaching points. 1) One-half of their patients had iASD by transesophageal echocardiography in follow-up. 2) No predictive demographic differences could be found among patients with and without iASD, nor were there differences in acute procedural success, mitral gradient, or residual MR. 3) MitraClip procedures were longer in patients with iASD, suggesting that more manipulation and longer “dwell-times” of the 21-F transseptal sheath make a difference. Their report also indicates that the presence of an iASD seems to make a difference in outcomes and even mortality after transcatheter mitral repair. Those with iASD had less improvement in walking distances, higher N-terminal pro-B-type natriuretic peptide, and worse New York Heart Association class at 6-month follow-up. Making any “hard” statements about mortality is flawed because of the small numbers in their study. But, though small numbers cloud the statistics, almost 20% of iASD patients died within 6 months, compared with only 3% in the non-iASD group. All belonged to a vulnerable population to begin with. They had high New York Heart Association class, no operative option, and functional MR 2+ or more. Nonetheless, most of their patients

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improved after the procedure. So what is it that makes those with iASD possibly fare less well?

Perhaps the answer lies in the follow-up echocardiographic data in the Schueler et al. (4) report. Mysteriously, only patients without iASD had reductions in both left ventricular end-systolic and end-diastolic volumes without changes in ejection fraction. The iASD patients had no change in left ventricular end-diastolic volumes, suggesting some left ventricular abnormality in iASD patients. Less mysteriously, estimated pulmonary artery pressures (PAP) were also different. In the overall cohort, PAP was reduced after the procedure. However, PAP in the iASD patients was not reduced, whereas in patients without iASD there was a significant reduction. Could persistence of pulmonary hypertension in patients with left-to-right shunting be responsible for lack of functional improvement and possibly even an increase in mortality at 6 months? That question then

raises another: should an iASD be closed after the procedure to reduce right-sided volumes and hopefully PAP? Both questions are hypothesis generating and will demand further evaluation and clinical reports. But for practical, clinical purposes, the Schueler et al. (4) data suggest that if PAP does not decrease after a successful MitraClip procedure in patients with functional MR, they may be heading for a worse outcome. Transient balloon occlusion of the iASD during a right heart catheterization in follow-up with simultaneous measurement of PAP would be enlightening. If PAP decreases with balloon occlusion, it might identify those patients who would benefit from iASD closure. That is an intriguing issue.

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