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Editorial

Iatrogenic Atrial Septal Defects After Transseptal Access for Atrial Fibrillation Ablations

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See article by Chan et al., pages 396–404 of this issue.

The "true" interatrial septum is formed by the floor of the fossa ovalis and the anteroinferior limbus. Transseptal (TS) access should be performed in various locations within this region depending on the exact indication for the left-sided intervention.[1] TS access was first described in 1959 by Ross et al.[2] as a method to assess left atrial (LA) pressure in patients with mitral valve disease. Because catheters were developed for accessing the right and left circulation, the need for this technique decreased, and subsequently the main indication became balloon valvuloplasty, particularly for rheumatic mitral stenosis. Valvuloplasty remained the predominant reason for performing TS access until the description of ectopic pulmonary vein foci acting as possible triggers in the initiation of atrial fibrillation (AF).[3] The significant growth of this procedure resulted in a renewed interest in TS access.

LA access for the catheter ablation of AF may be performed using a single or double technique. A double puncture technique, which uses an irrigated 4-mm ablation catheter and a mapping catheter, generally requires the use of smaller diameter sheaths (7-8.5F inner diameter). Some operators use a single puncture cannulated using both sheaths or catheters requiring larger diameter sheaths (eg, the cryoballoon), which results in a larger diameter septal defect. Persistent iatrogenic atrial septal defects (iASDs) are more common in cases using a single TS puncture site with 2 sheaths when compared with 2 separate access sites.[4] The use of a single large sheath for cryoablation appears to have a significantly higher risk of long-term iASD compared with using smaller-diameter radiofrequency catheters.[5]

In this issue of the *Canadian Journal of Cardiology*, Chan et al.[6] describe the prevalence of iASDs after TS access for 108 AF ablations using a 15F steerable sheath for pulmonary vein isolation using a cryoballoon. No patients in the study had prior TS access, and a baseline transesophageal echocardiogram (TEE) performed 1 day before the procedure showed no pre-existent ASD, interatrial septal aneurysm, or echocardiographically evident patent foramen ovale. TS access was guided by fluoroscopic imaging, with no patients undergoing TEE or intracardiac echocardiography imaging at the time of the procedure. At 9 months, 30% of all patients had an iASD (mean diameter, 4.4 ± 2.8 mm on short axis) noted on TEE with left to right shunting in all cases. Approximately 20% of these closed spontaneously at the 2-year follow-up on TEE, and a further 15% closed by 3 years. There were no further spontaneous closures noted from the 3- to 6-year follow-up, meaning that approximately 20% of all cases had a persistent iASD. Only 2% of patients required percutaneous closure (at 9 and 24 months) as a result of right ventricular dilatation and symptoms of dyspnea, with subsequent resolution of their symptoms. The only predictor of persistent iASD was the number of cryoablation applications performed. This study was somewhat weakened by the lack of TEE or intracardiac echocardiography imaging during TS access, meaning that the exact location of the puncture site and the characteristics of the IAS at that location were unknown.

There is considerable variability in the reported incidence of long-term iASDs after the use of a cryoballoon for AF ablation. Estimates range from 8.4% of patients at a median follow-up of 15.5 months using transthoracic echocardiography[7] to 37% at 2.9 years using a combination of transthoracic and transthoracic echocardiography follow-up.[8] In comparison with much of the prior published data, the study by Chan et al.[6] has a reasonable number of patients with concise TEE and clinical follow-up and a low dropout rate.[6] Therefore, it seems reasonable to conclude that approximately one fifth of patients who undergo cryoablation for AF will develop a long-term iASD after the procedure.

Other than the number of cryoablation applications performed, there were no other factors that increased the risk of iASD.[6] Although more cryoablation applications did not translate into longer procedural times, more manipulation of the sheath may have been required, which could explain this potential interaction.

The most important aspect of these findings relates to the clinical significance. Although only 2% of patients required intervention, the risk of iASD is still important to note, particularly when obtaining consent from the patient for the

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procedure. Closure of an ASD is recommended in the setting of right ventricular dilatation secondary to significant shunting even in the absence of symptoms.[9] Whether this is the case for iASDs or not is not known, but it seems reasonable to assume that similar considerations should apply. The presence of an ASD with shunting may result in paradoxical embolism and thromboembolism, particularly in the setting of thrombus within the venous system.[10]

Of interest, iASDs not only are seen in patients undergoing catheter ablation for AF but also are relatively common in structural interventions, with a reported incidence of 7% at 12 months when using a 12F sheath for LA appendage closure[11] and as high as a 50% rate at 6 months after implantation of a MitraClip (Abbott, Chicago, IL).[12]

Technological advances resulting in smaller-diameter sheaths likely will result in a lower incidence of iASDs. The use of imaging during TS access also may help, because the use of radiofrequency needles may help, although this has not been determined. This study demonstrates the importance of continued monitoring for patients who are noted to have iASDs after TS access.

Disclosures

The authors have no conflicts of interest to disclose.

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