Mapping of atrial premature complexes triggering onset of atrial fibrillation in patients with atrial septal defect

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Introduction: Atrial fibrillation (AF) is one of the most common comorbidities in middle-aged and elderly patients with atrial septal defect (ASD). It has been shown that pulmonary vein (PV) ectopy can trigger AF and electrical isolation of PVs can suppress AF in many cases. And to this day, PV isolation (PVI) is the cornerstone of catheter ablation strategy for AF in patients without specific structural abnormalities. However, it is still not validated whether the PV is also the major origin of ectopic activity triggering AF and PVI is a reasonable treatment strategy in ASD patients with AF. We aimed to evaluate the origin of ectopic activities triggering the onset of AF in patients with ASD.

Methods: The subjects of this study were 14 unclosed ASD patients (7 women and 6 men, median age 67 years) who underwent catheter ablation of paroxysmal or persistent AF in our hospital. Spontaneous or isoproterenol-induced atrial premature complexes (APCs) were mapped before catheter ablation of AF. Foci of APCs triggering the onset of AF were mapped using 4 multi-electrode catheters located in the coronary sinus (covered coronary sinus and RA/SVC), right superior PV, left superior and inferior PVs, respectively. Isoproterenol (ISP) was infused through a peripheral vein at rates of 5, 10, 15, 20 μg/min for 2 minutes at each infusion rate until AF was induced. The foci of APCs were localized according to the earliest atrial activity relative to the reference electrogram or the onset of the APC’s P wave. PVI was performed after the ISP infusion study in all patients.

Result: AF was induced by ISP infusion in 9 (60%) of 15 ASD patients, and 19 PACs triggering the onset of AF were observed in those patients. Among them, the focus of 6 (32%) APCs was in the right superior PV, 12 (63%) in the left superior PV and 1 (5%) in the left inferior PV. After the ISP infusion study, PVI was performed successfully in all patients. Seven (78%) of 9 patients with PV foci APCs maintained sinus rhythm during a median follow-up period of 18 months after the PVI.

Conclusion: Our results suggest that the PVs are the important origin of APC triggering onset of AF and PVI is a reasonable treatment of AF in patients with ASD. Further larger studies are needed to confirm these findings.