High-density, high-resolution mapping in patients with recurrent atrial fibrillation after cryoballoon pulmonary vein isolation: findings and outcome after repeat ablation

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Background: Some patients have recurrent atrial fibrillation (AF) after cryoballoon (CB) pulmonary vein isolation (PVI). When these patients undergo repeat ablation, radiofrequency (RF) energy is used. However, there are scarce data from high-density, high-resolution mapping in these patients and the outcome after repeat ablation.

Objectives: We sought to determine the rate of PV reconnections in these patients and the impact of repeat ablation on long-term freedom from recurrent AF or atrial tachycardia (AT).

Methods: Following CB PVI, 70 (27%) out of 264 patients required repeat ablation. This cohort evaluated the 43 (61%) patients in whom high-density, high-resolution three-dimensional mapping and subsequent ablation were performed with the Boston Scientific RHYNHTIA system. All patients had an implantable loop recorder (ILR) capable of daily remote data transmission; all recurrences of AF/AT were adjudicated.

Results: The mean age of the 43 patients was 68 ± 9 years; 28 (65%) patients were male and the CHA2DS2-VASc score was 2.8 ± 1.8. The median AF burden (AFB) in the cohort was 2.23% (IQR: 0.40, 11.0); recurrences were paroxysmal in 27 (63%) patients. Recurrent PV connection was seen in 32 (74%) patients; these were limited to 1 or 2 veins in 26 (81%) patients. PVI alone was performed in 15 (35%) patients; the other 28 (65%) patients underwent PVI, if needed, and additional lesions. During the next year, 23 (53%) patients continued to have recurrent AT/AF with an overall median AFB of 0.36% (IQR: 0, 7.19). Outcome was similar in patients who had PVI alone and those who had additional lesions with/without PVI (Figure).

Conclusions: Following CB PVI, persistent PVI was observed in only a quarter of patients when assessed by high density, high-resolution mapping. A targeted ablation strategy based on mapping data resulted in continued AF in half the cohort, though the AFB was reduced by 84%. There is a need to identify optimal mapping and ablation strategies in patients who continue to have AF after CB PVI as well as the optimal endpoint after repeat ablation.