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Incidence and characteristics of pulmonary vein reconnection after second-generation cryoballoon-based pulmonary vein isolation: Impact of different ablation strategies

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Introduction: The second-generation CB (CB2, Arctic Front Advance, Medtronic Inc., Minneapolis, USA) has demonstrated high procedural success rates, relatively short procedure times, high durability of PVI and convincing long-term clinical success rates. Nevertheless, data on the impact of different ablations protocols on durability after CB2 based PVI is limited.

Purpose: We aimed at comparing durability of pulmonary vein isolation (PVI) following three different ablation strategies utilizing the second-generation cryoballoon (CB2) in patients with recurrence of atrial fibrillation (AF) or atrial tachycardia (AT) undergoing repeat procedures.

Methods: In 192 patients a total of 751 PVs were identified. All PVs (751/751, 100%) were successfully isolated during index PVI. Thirty-one out of 192 (16%) patients were treated with a bonus-freeze protocol (group 1), 67/192 (35%) patients with a no bonus-freeze protocol (group 2), and 94/192 (49%) patients with a "time-to-effect"-guided ablation protocol without bonus freezes (group 3).

Results: Persistent PVI was documented in 419/751 (55.8%) PVs, and in 41/192 (21%) patients all PVs were persistently isolated. The number of patients with all PVs being persistently isolated was not significant between the groups ($p = 0.594$). The total rate of PV reconnection was not significantly different between the three groups ($p = 0.134$) and the comparison of individual PVs revealed also no differences for different ablation protocols (p -values for RSPV: 0.424, RIPV: 0.541, LSPV: 0.788, LIPV: 0.346, LCPV: 0.865). The procedure times were significantly reduced in non-bonus freeze ablation protocols and/or when applying individualized application times (group 1: 123.4 ± 31.5 min, group 2: 112.9 ± 39.8 min, group 3: 86.67 ± 28.4 min, $p < 0.001$).

Conclusions: A considerably high rate of persistent PVI was demonstrated in patients after index CB2-based PVI. No differences for durable PVI were detected for different ablation protocols. Therefore, individualized ablation protocols might be a beneficial ablation strategy during CB2-based PVI.