Successful Cryoballoon Isolation of the Pulmonary Veins in Paroxysmal Atrial Fibrillation: What Determinates Freedom of Atrial Fibrillation Recurrence?

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Introduction: Pulmonary vein (PV) isolation with the cryoballoon technique (ARCTIC FRONT, CryoCath Technologies Inc.) is an effective and save method to treat patients with paroxysmal atrial fibrillation (AF). Freedom from AF without drugs following a single ablation procedure can be achieved in about 70-80%. However, the determinants of a recurrence-free survival following a cryoablation procedure have not been investigated yet.
Methods: 350 patients with highly symptomatic, drug refractory, paroxysmal AF underwent successful isolation of all PV`s with a 23mm or 28mm cryoballoon device. After the procedure and a blanking period of 3 months, all patients underwent follow up visits at 3, 6, 9 and 12 months, including a 7day Holter ECG recording, symptom-driven transtelephonic ECG recordings and questionnaires. 208 patients have completed 6 months follow up until now and are eligible for statistical analysis. In all patients, various clinical, anatomical, and procedural parameters were analyzed.
Results: In 43 patients, AF recurrence occurred within a 6 months follow-up period (group1). In 165 patients, no evidence was found for symptomatic or asymptomatic recurrences of AF (group 2). Between the two groups no significant differences were found with regard to age, LV ejection fraction, LA diameter, diameters of the PV`s, incidence of PV anomalies, and rate of initially isolated PV`s. However, in group 1 significantly more patients were treated exclusively with a smaller balloon (23 mm) as compared to group 2 (40 vs. 25%). In addition, the difference between the balloon size and PV diameters was significantly lower in group 1 (10,2 ±2,38 vs. 11,4 ±3,0 mm; p <0,01). 74 % of group 1 patients but only 3% of group 2 patients suffered from an early AF recurrence during the 3 months blanking period. Early AF recurrence and an exclusive utilization of a small balloon were independent predictors of long-term AF recurrences.
Conclusions: The results of this study demonstrate that absence of an early recurrence and the use of bigger balloons is associated with a better outcome after isolation of PV. This suggests that an antral substrate modification by the big balloon adds to the effect of PV isolation and that “late beneficial effects” of cryoballoon ablation are rare.