Computed Tomography Guided Evaluation of Pulmonary Vein Anatomy Following Percutaneous Cryoablation: 12-Month Results

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BACKGROUND: Pulmonary vein isolation (PVI), using radiofrequency energy, for treatment of atrial fibrillation (AF) has been associated with complications including pulmonary vein (PV) stenosis or thrombosis. The purpose of this study was to prospectively evaluate the PV anatomy following cryoablation.

METHODS: 50 patients underwent percutaneous PVI in 3 academic centres. Contrast-enhanced single or multi-slice spiral CT (1-2.5 mm slice thickness) was obtained before, and 3 and 12 months following PVI. All examinations were read blinded to the location(s) of ablation. PVs were evaluated quantitatively and qualitatively: the diameter at ostium and at 1 cm from ostium were measured. The presence and location of luminal irregularity or thrombosis was also assessed.

RESULTS: In ablated veins, the mean diameters at ostium were right inferior PV 1.58±0.34, 1.55±0.29 and 1.66±0.15 cm, right upper PV 1.59±0.32, 1.53±0.24 and 1.47±0.26 cm, left inferior PV 1.26±0.33, 1.24±0.33 and 1.13±0.25 cm, left upper PV 1.74±0.38, 1.7±0.36 and 1.67±0.58 cm before the procedure and 3 and 12 months after the procedure respectively. No significant difference (p=0.05) was found between diameter in ablated versus not ablated veins before and after the procedure. Three patients presented with luminal irregularity before the procedure. No patient showed luminal irregularity or thrombosis of PV following cryo-ablation.

CONCLUSION: These results suggest that PV ablation for the treatment of AF is not associated with stenosis or thrombosis of cryoablated PVs after one year follow-up.

Usefulness of a Ventricular Extrastimulus From the Summit of the Ventricular Septum in Diagnosis of Septal Accessory Pathway

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Background: A ventricular extrastimulus (VES) delivered when the His bundle is refractory that advances the subsequent atrial deflection proves the existence of an accessory pathway (AP). Moreover, a VES delivered during His bundle refractoriness which terminates the tachycardia without succeeding atrial activation proves participation of the AP in the tachycardia circuit. The purpose of the study was to compare delivery of a VES from the right ventricular (RV) apex versus the summit of the RV septum in patients with a single septal AP.

Methods: In a retrospective analysis of 16 consecutive patients with a septal AP, a VES from the RV apex delivered at the time of His deflection during tachycardia resulted in advancement of the succeeding atrial deflection in 5 patients and terminated the tachycardia without subsequent atrial depolarization in 2 patients. We prospectively analyzed the data in a separate group of 12 patients with a septal AP in which a VES was delivered from the RV apex and then from the RV summit at the time of His deflection during tachycardia.

Results: RV apical VES advanced the succeeding atrial deflection in 3 patients and terminated the tachycardia in another 3 patients. In contrast, RV summit VES advanced the succeeding atrial deflection in 4 and terminated the tachycardia in 6 patients. RV summit VES resulted in a significantly higher diagnostic yield for the presence of a septal AP compared with RV apical VES (83% vs. 46%, P<0.05). RV summit VES also resulted in a higher diagnostic yield for proof of participation of a septal AP in the tachycardia circuit compared with RV apical VES (50% vs. 18%, P<0.05). A VES from the RV summit was diagnostic of presence of an AP in all patients with a right-sided septal AP but in only 1 out of 3 patients with a left posteroseptal AP.

Conclusion: A VES during His bundle refractoriness from the RV summit increases the diagnostic yield for both presence of an AP and its participation in the tachycardia circuit with respect to RV apical VES.

Atrial Fibrillation Surgery in Patients With Coronary Artery Disease

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Atrial fibrillation (AF) is known to be a risk factor for quality of life and increased mortality. Patients with coronary artery disease undergoing open heart bypass surgery (CABG) often have associated AF. Is antihyrhythm surgery in patients undergoing CABG safe and effective and is there a subgroup of patients who will benefit most?

Methods: 52 consecutive patients (ejection fraction 54±15%, age 69±7years) with chronic permanent AF (11±10years) underwent CABG (only CABG in 32, CABG plus mitral valve surgery in 20 due to ischmical mitral valve insufficiency) plus additional intraoperative cooled-tip radiofrequency ablation to treat AF (aortic clamp 98±22minutes, bypass time 164±14minutes) treating the left atrium alone in 26 and both atria in 26 patients.

Results: Out of the total of 52 patients 39 converted to stable sinusrhythm (SR) during a mean follow-up of 23±16months ranking up to a 12-month estimated rhythm-success percentage of 85% (3 months 31/44 patients: 70%, 6 months 35/44 patients: 80%, 12 months 28/36 patients: 78%). At 6 months follow-up 79% of patients in SR had documented biatrial contraction. There is no significant difference in rhythm outcome when one or both atria are treated (86% versus 75%, p=0.24). During follow-up up 9 patients died (30-day mortality 8%) ranking up to a cumulative 12-months survival rate of 85%. Patients undergoing CABG procedure alone had a significantly higher survival in short and long term follow-up compared to patients undergoing additional mitral valve surgery (30-day mortality 3% versus 15%, p=0.038; 12-month survival 94% versus 70%, p=0.349). Conversion rates did not differ significantly in between the two groups (74% versus 94%, p=0.31).

Conclusions: Intraoperative cooled-tip radiofrequency ablation in the atria can safely and effectively be added to an open heart surgery in patients with coronary artery disease and ablation procedure is independent to the number of ablated (left versus biatrial). Patients with additional mitral valve disease have a worse outcome in regard to survival but not when considering rhythm outcome. In over 60% of these patients an anticoagulation regimem may be stopped.

Efficacy of Cryoablation for Treatment of Paroxysmal Atrial Fibrillation

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Background: Electrical isolation of the pulmonary veins (PV) by radiofrequency catheter ablation (RFCA) has been shown to be an effective treatment for paroxysmal atrial fibrillation (PAF). However, RFCA has been associated with a significant incidence of PV stenosis. Experimental and early clinical studies have shown that catheter cryoblation of the PVs is also effective in curing PAF, but without causing PV stenosis.

Methods: Therefore, we performed PV cryoblation using a 10F cryoablation catheter system (CryoCor, Ino) in 31 patients (pts), of whom 23 were males, age 56±9 yrs with drug-refractory PAF (failure of ≥2.1±1.1 drugs in previous procedure). Of these pts a history of atrial flutter (AFL). All pts underwent map-guided, segmental, pulmonary vein isolation, with success defined as complete elimination of PV potentials. Event recording, both symptomatic and scheduled, was used to capture arrhythmia episodes prior to and for 3 months following cryoblation. Patients underwent spiral CT scans to evaluate PV anatomy at baseline, 3 and 6 months after ablation.

Results: There were 29±31 pts (94%) successfully treated in the index procedure with 86 of 90 veins ablated (96%). At 6 months follow-up there were 13/23 pts (57%) without recurrence of PAF. Of the 10 pts with recurrent AF, 5 pts had a second ablation using RF at 2.8±0.87 months. During the 6 months following the index procedure the average frequency of AF episode in RF re-treated pts was 0.9±0.1/month, whereas the average frequency of AF episodes of those not re-treated was 0.9±1.2/month. In the 13 pts in sinus at 6 months, 8 were on anti-arrhythmic drugs, 2 of whom were on beta-blockers only. Of the 23 pts who underwent spiral CT scan at 6 months, none had PV stenosis.

Conclusion: The initial results of this pilot study show that cryoblation can be used as a single treatment for PAF with 6-month efficacy of 57%. Cryoblation appears to be without risk of PV stenosis.