ARCTICLINE: A NEW CRYO ABLATION CATHETER FOR THE CREATION OF LINEAR LESIONS

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Introduction: Cryoballoon ablation has been shown to be safe and effective technology for the ablation of cardiac arrhythmias. This study reports for the first time the efficacy and safety of a new catheter designed to create segmental linear lesions in both atria. The ArcticLineTM catheter employs an 11F 3mm long deflectable ablation segment. The surface is cooled by the passage of liquid nitrous oxide. Electrodes on either side of the ablation zone allow for 3D navigation and electrical recording. Methods: Via a 12F deflatable sheath the catheter was used to ablate the left (L) and right (R) isthmus and to place LA roof linear lesions (LL) connecting the PVs. The integrity of the lesions was assessed by paced activation, 3D mapping and histopathology following 4 weeks of recovery.

Results: In 3 canines, left and right CRI were accomplished with 2.75 ± 1.0 cryo applications. Left atria 19 ± 2.8/atria LL were placed. Bi-directional conduction block was documented across both isthmus. Triboelectric imaging and histology revealed contiguous transmural lesions with an average lesion segmental length of 27.7 ± 3.7 mm, width 7.3 ± 1.7 mm and depth 2.1 ± 0.9 mm and total contiguous length of 105.1 mm (shown in the figure Panel A RA isthmus and Panel B LA LL and Left atria 19 and to place LA roof linear lesions (LL) connecting the PVs). The ArcticLineTM catheter is capable of creating transmural and contiguous lesions in both the right and left atria. Ablation of the right and left isthmus lines were successfully created with the ArcticLineTM. Transmural contiguous ablations in the left atria were placed connecting the PVs.

Conclusion: The ArcticLineTM catheter is capable of creating transmural and contiguous lesions in both the right and left atria. Ablation of the right and left isthmus lines were successfully created with the ArcticLineTM. Transmural contiguous ablations in the left atria were placed connecting the PVs.

Conflict of interest: Compensation for services related to researching catheter

PLASMA TRANSFORMING GROWTH FACTOR β1-MEDIATED ATRIAL FIBROSIS TO PREDICT THE RECURRENT OF ATRIAL FIBRILLATION AFTER SURGICAL MAZE PROCEDURE

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Objective: Although the Cox maze procedure for patients with atrial fibrillation (AF) has been effective, AF recurs in some patients and atrial fibrillation can lead to its perpetuation. We evaluated the correlations between the proinflammatory levels of various biomarker expressions including transforming growth factor β1 (TGF-β1) and degree of atrial fibrosis.

Methods: We measured proinflammatory plasma biomarkers including TGF-β1, atrial natriuretic peptide and matrix metalloproteinase in 179 consecutive patients who underwent heart valve surgeries and concomitant maze operation using cryoballoon for paroxysmal AF. We also measured the degree of fibrosis from the left atrial tissue. Patients were divided into two groups: those with rheumatic heart valve disease (group R; n = 112) and those with non-rheumatic heart disease (group NR; n = 66). The median follow-up duration was 48.4 months.

Results: During follow up, the recurrence of AF was observed in 114.1% (24.179) and no intergroup difference was observed (12.1% in group R vs. 14.2% in group P; P = 0.821). Multiple regression analysis revealed that the predictors of AF recurrence were AF duration (P = 0.017), age in patients (OR, 1.01), and atrial fibrosis (OR, moderate; P = 0.027, OR, 2.99). The close correlation between the plasma TGF-β1 levels and the degree of the left atrial fibrosis was observed (group NR; r = 0.33, P = 0.007) but not in group P (r = 0.316; Figure 1).

The degree of left atrial fibrosis was independently associated with the recurrence of AF (P = 0.041; OR, 1.09) and recovery of atrial mechanical activity (P = 0.043; OR, 1.09) during follow up in group NR.

Conclusions: Proinflammatory plasma TGF-β1 was associated with left atrial fibrosis which could be used to predict the recurrence of AF in rheumatic and non-rheumatic heart disease. In atrial mechanical disease, we could not find the connection between TGF-β1 and left atrial fibrosis.

Figure 1. Correlation between plasma transforming growth factor (TGF-β1) level and the degree of fibrosis in group NR. The plasma TGF-β1 level was correlated with the degree of fibrosis (r = 0.33; P = 0.007).

Conflict of interest: none

PROGNOSTIC SIGNIFICANCE OF CYTOKINE CONCENTRATIONS IN THE SERUM TO ASSESS THE EFFECTIVENESS OF THE PULMONARY VEIN ISOLATION

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Introduction: Although local inflammation plays an important role in the initiation and sustaiining of atrial fibrillation (AF), the role of inflammatory cytokines as factors in this process is not completely understood.

Aim: To determine the prognostic significance of cytokine concentrations in blood serum to assess the effectiveness of pulmonary vein isolation procedure (PVI).

Material and methods: The study included 48 patients (33 men (69%); mean age: 53.5 ± 9.9) with paroxysmal (44) or persistent (4) symptomatic AF given PVI treatment. We analyzed the levels of interleukin-6 (IL-6), interleukin-8 (IL-8), tumor necrosis factor (TNF-α), endothelin-1 (ET-1) taken before ablation. All patients underwent complete isolation of the pulmonary veins, which had been confirmed with recordings of the circular lasso catheter. Two years after the PVI the effectiveness of treatment was assessed by a 7-day recording Holter ECG or during follow up.

Results: Complete effect of PVI defined as absence of AF recurrence after discontinuation of anti-arrhythmic drugs (AAD) was found in 25 (52%) patients (group 1); significant improvement (no recurrence of AF at AAD) in 7 (15%) patients (group II); PVI procedure was ineffective in 16 (33%) patients (group III). There were no significant differences in the concentrations of IL-6, IL-8, TNF-α between the study groups. Concentration of ET-1 was significantly higher in group 1 (Table).

Group I Mean ± SD Group II and group III Mean ± SD Value p

<table>
<thead>
<tr>
<th>Biomarker</th>
<th>Group I</th>
<th>Group II</th>
<th>Group III</th>
<th>p-value</th>
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<tr>
<td>IL-6 [pg/ml]</td>
<td>19.55 ± 6.3</td>
<td>12.46 ± 6.9</td>
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<tr>
<td>IL-8 [pg/ml]</td>
<td>0.43 ± 6.3</td>
<td>0.48 ± 0.27</td>
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<tr>
<td>TNF-α [pg/ml]</td>
<td>2.01 ± 1.4</td>
<td>2.01 ± 1.4</td>
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Conclusions: Plasma concentrations of proinflammatory cytokines have limited prognostic value for the assessed long-term PVI efficacy in symptomatic paroxysmal / persistent AF.

Conflict of interest: none

ASSOCIATION BETWEEN BIOMARKERS OF FIBROTIC TURNOVER, PR INTERVAL AND ELECTRO-ANATOMICAL SUBSTRATE IN AF PATIENTS UNDERGOING RADIOFREQUENCY CATHETER ABLATION

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Background: The PR interval prolongation is associated with an increased risk for atrial fibrillation (AF). Fibrosis is characterized by remodeling of extracellular matrix by matrix metalloproteinase and tissue inhibitors (TIMP-1 and MMP-2) as well as by inflammation with involvement of adhesion molecules like Intercellular Adhesion Molecule 1 (ICAM-1). The aim of this study was to investigate the association between PR interval and biomarkers of fibrosis turnover, inflammatory cytokines and adhesion molecules.

Methods: We studied 51 patients (62 ± 10 years, 63% males, 59% persistent AF) undergoing first AF catheter ablation. Blood samples from femoral vein were collected before ablation. Electro-anatomical substrate was semi-quantitatively estimated using a simple low-voltage index during catheter ablation. Peripheral biomarkers ICAM-1, MMP-2 and TIMP-1 of Intercellular Adhesion Molecule 1 (ICAM-1) and fibrotic turnover Tissue Inhibitor of Metallproteinase 1 and Matrix Metallproteinase 1 (TIMP-1 and MMP-1) were measured in peripheral blood.

Results: There were 27 patients (53%) presenting with sinus rhythm (SR) and 24 (47%) with AF. Patients with SR had PQR interval 176 ± 26 ms and were included into further analysis. On univariable analysis, ICAM-1 (Beta -0.528, p = 0.018), MMP-21 (Beta 0.488, p = 0.018), TIMP-1 (Beta -0.422, p = 0.032) were significantly associated with baseline PQR interval. On multivariable analysis, only MMP-12 (Beta 0.363, p = 0.033) and electro-anatomical substrate (Beta 0.509, p = 0.004) remained associated with PRQ. Patients with electro-anatomical substrate (n = 5) had numerically longer PQR interval than patients without substrate (n = 22, 172 ± 16 ms versus 192 ± 52 ms, p = 0.120).

Conclusions: Biomarkers of fibrinous turnover and PR interval are associated with electro-anatomical substrate. Further larger studies are needed to confirm these results.

Conflict of interest: none