Atrial Fibrillation (AF) - Rhythm Control, Catheter Ablation

Left atrial strain imaging evaluation: a strong predictor of atrial fibrillation recurrence after single-procedure catheter ablation
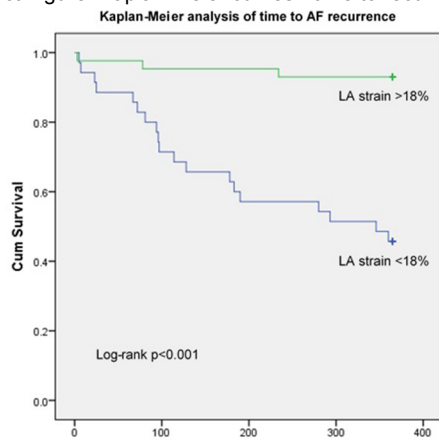
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Introduction: Identification of predictors of arrhythmia recurrence after catheter ablation of atrial fibrillation (AF) is a clinically relevant issue. Transthoracic echocardiography (TTE) is a readily accessible exam that can be useful in estimating left atrial (LA) mechanical function. The aim of this study was to evaluate LA structure and LA strain imaging at baseline and its association with AF recurrence after an index AF catheter ablation. Methods: Analysis of patients with symptomatic paroxysmal and persistent AF who underwent a single-procedure for AF ablation between 2015 and 2019 and had performed TTE in our centre prior to AF ablation. LA parameters were assessed by 2D speckle-tracking at baseline. LA diameter index (LAVi), LA ejection fraction, LA phasic strain: reservoir (LASr), conduit (LAScd) and contraction phases (LASct), as well as integrated backscatter (IBS) values were analysed. AF recurrence was documented with 12-lead ECG, 24h Holter monitoring, external loop recorder or pacemaker analysis during a 12-month follow-up period. Results: Of a total of 106 patients, 28 patients were excluded due to poor image quality. We studied 78 patients who underwent pulmonary veins isolation (PVI) (age 59 ± 14 years, 65% male, 40% with structural heart disease, 69% paroxysmal AF) with cryoballoon ablation in 53% and radiofrequency ablation in 47%. In a 12-month follow-up there was a 28% (22 patients) AF recurrence rate. Patients with AF recurrence had a baseline significantly superior LAVi (47 ± 17 mL/m2 vs. 36 ± 12 mL/m2, adjusted HR 1.04 [95% CI 1.01-1.06], $p = 0.002$) and lower estimated LA ejection fraction ($25 \pm 19.7\%$ vs. $45.4 \pm 21\%$, adjusted HR 0.96 [95% CI 0.94-0.98], $p = 0.001$). Multivariate analysis showed that baseline LA strain parameters were independent predictors of AF recurrence, as patients with AF recurrence showed impaired LASr ($9.81 \pm 5.79\%$ vs $22.94 \pm 9.98\%$, adjusted HR 0.81 [95% CI 0.73-0.89], $p < 0.001$) and LAScd ($-6.74 \pm 4.11\%$ vs. $-11.85 \pm 7\%$, adjusted HR 1.11 [95% CI 1.03-1.19], $p = 0.004$). In patients in sinus rhythm during baseline TTE, LASct also correlated with AF recurrence, as patients with recurrence also showed impaired baseline LASct ($-7.49 \pm 3.65\%$ vs $-13.74 \pm 5.4\%$, adjusted HR 1.39 [95% CI 1.11-1.75], $p = 0.005$). LASr <18% showed a sensitivity of 86% and specificity of 70% to predict AF recurrence. Kaplan-Meier curves (figure 1) showed that patients with LASr below the 18% cut-off had a significantly higher rate of AF recurrence. Baseline IBS did not reveal significant differences in AF recurrence (111.2 ± 23.9 dB vs. 105.9 ± 33.5 dB, HR 1.007 [0.993-1.002], $p = 0.349$). Conclusion: Baseline LA strain imaging parameters, including reservoir phase LA strain, were demonstrated to be independent predictors of AF recurrence after PVI. A LASr <18% showed good accuracy to predict AF recurrence.

Abstract Figure. Kaplan-Meier curves - time to recurrence