ATRIAL FIBRILLATION ABLATION

P6078
Anterior mitral lines for perimitral flutter ablation: an effective alternative to mitral isthmus ablation

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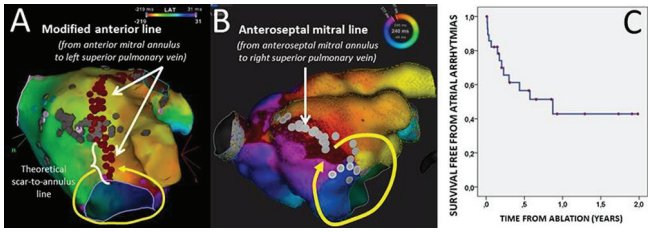
Background and objective: Anterior mitral lines (AML) have been suggested as an alternative to mitral isthmus ablation for perimitral flutter (PMF) treatment. The aim of this study was to test the efficacy of AML (i.e.: the modified anterior line (MAL, figure, panel A), the anteroseptal line (ASL, panel B), and lines between scar tissue and anterior mitral annulus) in that scenario.
Methods: From May 2014, all consecutive patients with PMF were included in the study. Activation and voltage mapping were used to define circuits and substrate. AML (type depending on expected efficacy) were performed until flutter termination. Programmed atrial stimulation was repeated to test AFL inducibility, ablating any sustained induced atrial arrhythmia. Follow-up visits with ECG and/or 24h Holter-ECG were programmed at 3 and 12 months, as well as a final telephone call.
Results: 29 patients were included (see table): PMF termination was achieved in 28 (97%), other flutter (17 patients) or atrial fibrillation (AF, 1 patient) were induced and successfully ablated in 17 cases (total procedural success rate of 93%). At a mean follow-up of 6.4±0.6 months, 4 patients recurred with a PMF, 4 with AF and 5 with other flutter. During follow-up, 25 patients (86%) were free from PMF recurrence and 16 (55%) from any recurrence, with a mean survival free from atrial arrhythmias of 1 year (95% CI: 0.7–1.4 years) (figure, panel C). Possible predictors of arrhythmia were prior ablation or AF history, with a tendency to better results with ASL.

Clinical and demographic variables. Procedural aspects

	All patients (n=29)	No recurrence (n=16)	Recurrence (n=13)	p-value
Clinical and Demographic Variables				
Age (years)	71.6±13.1	72.9±14.7	70±11.3	0.54
Sex (male)	15 (52%)	7 (44%)	8 (62%)	0.34
Left ventricle ejection fraction (%)	63.2±10.9	61.9±14	64.6±5.9	0.52
Left atrial indexed volume (ml/m^2)	45.4±20.6	48±22	42.6±19.4	0.52
Prior atrial fibrilation	18 (62%)	5 (38%)	13 (81%)	0.018
Prior ablation procedures	9 (31%)	2 (13%)	7 (54%)	0.017
Prior cardiac surgery	4 (14%)	1 (6%)	3 (23%)	0.191
Procedural Aspects				
Contact forcé catheter use	7 (24%)	5 (31%)	2 (15%)	0.321
Type of anterior mitral line				
– Modified anterior line	6 (21%)	1 (6%)	5 (38%)	0.082
– Anteroseptal line	15 (52%)	9 (56%)	6 (46%)	
– Line between scar and annulus	8 (28%)	6 (38%)	2 (15%)	



Conclusion: AML are effective in terminating PMF, although recurrence of other atrial arrhythmias was frequent, particularly in patients with prior ablation or AF history.

P6079
Short and long-term response of platelet and inflammatory biomarkers after pulmonary Vein isolation: a randomized study comparing cryoballoon versus radiofrequency ablation

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Introduction: Atrial fibrillation (AF) exhibits thromboembolism risk. Cryoballoon (CB) versus radiofrequency (RF) ablation response on thromboembolic biomarkers at short-term obtained vary results, while long-term is still unknown.
Objective: The purpose of this study was to evaluate the short and long-term response of platelet and inflammatory biomarkers after CB and RF ablation in paroxysmal AF patients.
Methods: Fifty-eight patients with drug-refractory paroxysmal AF were randomly selected to perform pulmonary vein (PV) isolation either via CB or RF ablation. Biomarkers of platelet activation [platelet surface expression of P-selectin (CD62P), CD40 ligand (CD40L), platelet factor-4 (PF-4), mean platelet volume (MPV), platelet-leukocyte ratio (P-LCR), and platelet distribution width (PDW)] and inflammatory [high sensitivity CRP (hs-CRP) and interleukin 6 (IL-6)] were measured at baseline, 18–24h and 6-Months postablation.
Results: All patients except one in CB group couldn't complete 6 months follow up. Twenty- four (86.2%) and twenty- six (89.7%) patients maintained sinus rhythm, whereas, 4 (13.8%) and 3 (10.3%) patients sustained a recurrence of AF in CB and RF group respectively (p=0.500). No significant differences in clinical characteristics and baseline biomarkers in both groups (p>0.05). Significant activations were noted in CD62P, CD40L, PF-4, IL-6, and hs-CRP levels at 18–24h postablation in both groups (p<0.001). However, CD62P (%29.1±5.4 vs. 34.4±7.7, p=0.005) was significantly decreased in CB than RF group. In addition, PDW (fL 11.4±1.1 vs. 11.9±1.1, p=0.025) was significant decrease compared to baseline level in CB group. No change in MPV and P-LCR levels in both groups (p>0.05). At 6-Month postablation, a significant decrease was observed in CD62P (% 16.4±3.8 vs. 18.5±4.4 p=0.021), CD40L (pg/mL 23.8±19.6 vs. 68±33.8, p<0.001), PF-4 (pg/mL 72.7±34.8 vs. 102±23.5, p<0.001), MPV (fL 9.9±0.5 vs. 10.1±0.5, p=0.010), PDW (fL 11.3±1.1 vs. 11.9±1.1, p=0.004), and P-LCR (% 24.3±4.5 vs. 25.9±5.2, p=0.033) compared to baseline levels in maintained sinus rhythm patients of CB group. Whereas, significant decrease in CD40L (pg/mL 31.6±29.7 vs. 70.3±47.8 p<0.001), PF-4 (pg/mL 87±26.5 vs. 108.5±18.3, p<0.001), elevation in CD62P level (% 21.3±6.1 vs. 17.9±5.9, p=0.022), no change in MPV and P-LCR (p>0.05) compared to baseline levels in maintained sinus rhythm patients of RF group. hs-CRP and IL-6 were comparable to baseline levels in both groups (p>0.05).
Conclusions: Cryoballoon ablation was associated with less platelet activation after PV isolation and decreased platelet activation in maintained sinus rhythm patients at long-term compared to RF group. These results are clinically relevant, may influence the risk of thromboembolism and CB may become an important energy to treat AF in future.

P6080
Smoke on transesophageal echocardiography predicts non-pulmonary vein triggers in patients with atrial fibrillation

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Background: Left atrial spontaneous echocardiographic contrast (SEC or "smoke") detected on transesophageal echocardiography (TEE) has been reported to be independently associated with atrial fibrosis, which in turn is a known predictor of recurrence of atrial fibrillation (AF) following catheter ablation. Triggers arising from foci outside the pulmonary veins (PV) play a critical role in the origin and maintenance of AF; the likelihood of these firings increases with fibrotic remodeling of the atrial substrate.
Objective: We evaluated the association between smoke on TEE and incidence of non-PV triggers in AF patients undergoing catheter ablation.
Methods: A total of 1231 patients undergoing their first AF ablation at our center were included in this analysis. TEE was performed for all at baseline and based on the findings, patients were classified into group 1: smoke detected and group 2: no smoke detected. Following PV and posterior wall isolation, high-dose isoproterenol challenge was used to identify non-PV triggers. These were defined as ectopic triggers originating from sites such as interatrial septum, left atrial appendage (LAA), crista terminalis, superior vena cava and coronary sinus (CS).
Results: Baseline TEE detected smoke in 132 patients (group 1) and 1099 patients having no smoke were included in group 2. Clinical characteristics were similar between the groups (age: 65.9±9.4 vs 64.9±10.3, males 76% vs 69%, BMI 30.6±5.8 vs 30.7±6.7 and LVEF 53.6±12.4 vs 55.1±10.9 in group 1 and 2 respectively) except for the prevalence of non-paroxysmal AF which was significantly higher in group 1 [102 (77.3%) vs 580 (53%), p<0.001].
Non-PV triggers were detected in 120 (91%) patients in group 1 and 797 (73%) in group 2 (p<0.001). These triggers mostly originated from CS [80 (61%) vs 405 (37%)] and LAA [78 (59%) vs 373 (34%)]. After adjusting for AF type, the Odds Ratio for non-PV triggers in patients with smoke was 2.66 (1.41–5.01), p=0.002
Conclusion: Presence of left atrial smoke was associated with >2 times increase in the risk of having non-PV triggers. This finding suggests that operators may need to adopt individualized ablation strategies to maximize procedural success in this subset of AF population.

P6081
Validation of the ATLAS score in patients undergoing pulmonary vein isolation following a previous relapses

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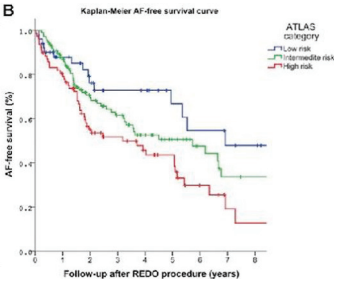
Introduction: Although pulmonary vein isolation (PVI) remains the cornerstone for the treatment of atrial fibrillation (AF), recurrence rates frequently offset the potential benefit of this procedure. The ATLAS score assesses each patient's individual risk of relapse after a first PVI and aims at improving patient selection, but its clinical relevance for repeated (REDO) procedures remains undetermined.
Purpose: Validate the ATLAS score in patients undergoing a REDO PVI.
Methods: From a single-center observational registry that included 1244 consec-

utive drug-resistant AF patients who underwent PVI, we selected those receiving REDO procedures and calculated their respective ATLAS score. The study endpoint was AF recurrence, defined as symptomatic or documented AF and other atrial arrhythmias, after a 3-month blanking period. Independent predictors of relapse were identified using Cox proportional-hazard regression analysis.
Results: Study population of 240 individuals (61 years old (IQR 53–67), 32% females, 65% with paroxysmal AF – Fig A). During a median 2- year follow-up period, 115 (48%) patients relapsed – annual relapse rate 16%/year. Non-paroxysmal AF (aHR 1.86 95% CI 1.27–2.70, P=0.001), body mass index (aHR 1.05 95% CI 1.01–1.10, P=0.033), female gender (aHR 1.92 95% CI 1.29–2.85, P=0.001) and active smoking (aHR 2.16 95% CI 1.35–3.46, P=0.001) were identified as independent predictors of relapse. The ATLAS score was also associated with AF relapse (HR 1.11 95% CI 1.07–1.16, P<0.001). A revised threshold of low (<7 points), intermediate (7–10 points) and high-risk (>10 points) score yielded the highest discriminative power (censored C statistic = 0.73), with 10%/year, 15%/year and 23%/year relapse rates, respectively (Log-rank 9.9, P=0.008, Fig B).

A

Characteristic	All patients (n=240)
Age – years (IQR)	61 (53-67)
Female Sex – no. (%)	77 (32)
Body mass index – kg/m2 (IQR)	27 (22-33)
Hypertension – no. (%)	114 (48)
Type 2 diabetes mellitus – no. (%)	17 (7)
Active Smoking – no. (%)	30 (13)
Hypercholesterolemia – no. (%)	59 (25)
Left ventricular systolic dysfunction – no. (%)	3 (1)
Previous Stroke/TIA – no. (%)	9 (4)
Paroxysmal AF – no. (%)	155 (65)
Indexed left atrial volume - mL/m² (IQR)	57 (37-77)
Previous class IC/III antiarrhythmic drugs – no. (%)	107 (45)
CHADS-VASC2 – score (IQR)	2 (0-4)
ATLAS – score (IQR)	9 (7-12)

B



Demographics and AF-free survival

Conclusion: The ATLAS score seems to be valid to assess the risk of AF relapse of patients undergoing a repeated ablation procedure. This score retains its clinical usefulness for selecting patients who will benefit the most from AF ablation, avoiding the unnecessary risks and costs of ineffective procedures.

P6082
The role of left atrial fibrosis progression detected by LGE-MRI on the post-ablation atrial fibrillation recurrence

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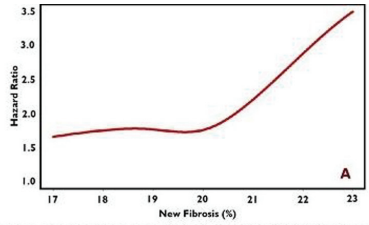
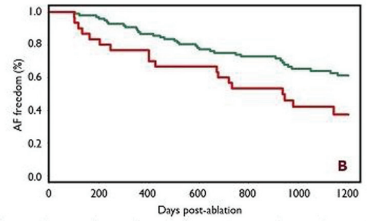
Ablating Left Atrial (LA) fibrotic tissue (a substrate for Atrial Fibrillation [AF]) emerged as a complementary method for AF management. Despite these efforts, degree of LA fibrosis often continues to increase after ablation and likely affects maintenance of sinus rhythm. We examined how regression and progression of LA fibrosis affected AF recurrence.
LA enhancement was quantified with Late Gadolinium Enhancement MRI (LGE-MRI) for 127 AF patients. Quantification was done before ablation, 3 months post-ablation and then at least 12 months later. Regressed Fibrosis (RF) was defined as enhancement seen on the first (3-months) post-ablation scan but not on the 1-year post-ablation scan and New Fibrosis (NF) as the enhancement detected only on the 1-year post ablation scan. Progression Ratio (PR) was defined as NF divided by RF.



A. Spline curve of Hazard Ratio for Atrial Fibrillation recurrence and degree of new atrial fibrosis.



	0	200	400	600	800	1000	1200	Survival	p
New Fibrosis < 20%	97	94	84	75	67	52	44	0.612	0.0145
New Fibrosis ≥ 20%	30	26	23	21	17	12	9	0.374	

B. Kaplan-Meier curve showing difference in Atrial Fibrillation freedom over time between those with ≥ 20% New Fibrosis and those with < 20%

NF and RF showed no correlation with pre-ablation LA fibrosis. An increase of 1-unit PR increases the chance of AF recurrence by 34% (Hazard Ratio [HR] 1.34, CI 95% 1.15–1.56, p<0.001), and an increase of NF by 1% increased the chance of AF recurrence by 3%. (HR 1.03, CI 95% 1–1.06, p=0.05). RF alone showed no impact on future AF recurrence. Hazard ratio for AF recurrence increased exponentially when NF exceeded 20% (Figure 1A). Additionally, patients with more than 20% NF experience significantly more recurrence post-ablation (AF freedom 37% vs 61%, p=0.01, adjusted for cardiovascular risk factors) than those with less than 20% NF (Figure 1B).
Atrial fibrosis formation is an ongoing process and continues to evolve even after targeted ablation. This data suggests that new fibrosis formation, specifically of greater than 20% regardless of the pre-ablation enhancement, is an independent predictor of AF recurrence. It remains unclear whether contemporary AF management aimed at containing fibrotic structures, can help prolong the arrhythmia free period.

P6083
Predictors of atrial fibrillation ablation failure: a French nationwide cohort study

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Background: Atrial fibrillation (AF) catheter ablation is a validated therapy for patients with symptomatic atrial fibrillation after failure or intolerance to antiarrhythmic drug therapy. Despite improvements in ablation technique, 30 to 50% of the patients may have AF recurrences. The need for atrio-ventricular (AV) node ablation in follow-up may be considered as a strong marker of symptomatic AF recurrences and AF catheter ablation failure. The purpose of the study was to find independent predictors factors related to AV node ablation after AF catheter ablation.
Methods: This French longitudinal cohort study was based on the national hospitalization database covering hospital care from the entire population. The data for all patients admitted in France from January 2010 to December 2015 were collected from the national administrative database, the PMSI (Programme de Médicalisation des Systèmes d'Information). We included all patients, over 18 years old, with AF and at least one AF catheter ablation. Routinely collected medical information includes the principal or secondary diagnoses and procedures performed. Items from the baselines characteristics were pooled into a multivariate Cox model to identify predictors of AV node ablation.
Results: Of 1,679,580 patients identified with AF, 1,599,364 were included in the cohort after exclusion of patients with pacemaker or cardiac defibrillator. Among them, 27,659 patients were treated with AF ablation (28% female, mean age 59±10 yo). Of those, 347 patients (1.2%) needed AV node ablation after a mean follow-up of 700±604 days. In multivariate analysis, age≥75yo (HR=2.69 CI95% 1.87–3.87), heart failure at baseline (HR=2.02; 95% CI 1.44–2.85), abnormal renal function (HR=1.88; 95% CI 1.40–2.51) and valve disease (HR=1.90; CI95% 1.50–2.46) were the most powerful predictors (HR >1.7) of AV node ablation after AF catheter ablation. Other independent predictors for AV node ablation (HR 1.2–1.7) were female gender, obesity, coronary artery disease, thyroid disorders and lung diseases.
Conclusion: Several factors, particularly heart failure at baseline, abnormal renal function, valve disease, and age≥75yo were associated with the need for AV node ablation after AF catheter ablation. These findings might help to choose a rate control strategy with AV node ablation first in such patients with high risk of ablation failure with highly symptomatic AF recurrences and may in addition have economic implications.

P6084
Prevalence and management of atrial thrombus in patients with atrial fibrillation undergoing transesophageal echocardiography before pulmonary vein isolation

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Introduction: Transesophageal echocardiography (TEE) is routinely performed in patients with atrial fibrillation (AF) undergoing pulmonary vein isolation (PVI). Information on the prevalence and the management of atrial thrombus is scarce, especially in the era of the non-Vitamin K oral anticoagulants (NOACs).
Purpose: The aim of this study was to determine the prevalence and management of atrial thrombus in patients with AF scheduled for PVI.
Methods: Patients undergoing PVI between April 2010 and September 2017 were included in the study. In order to include patients with a cancelled PVI procedure due to the detection of an atrial thrombus, all patients undergoing TEE (n=6856) during the same time period were analyzed. Management of atrial thrombus was at the discretion of the treating physician.