Background: We hypothesized that circulating biomarkers of fibrosis correlate to the amount of left atrial low voltage areas (LA-LVo) in patients with atrial fibrillation (AF) which might influence patient selection and treatment strategy for AF catheter ablation. High-Mobility-Group-Protein B1 (HMGB1), receptor for advanced glycation end products (RAGE) and Interleukin 1 receptor-like 1 (ST2) are possible biomarkers involved in cardiac remodelling and associated with AF. We sought to determine whether blood levels of HMGB1, RAGE and ST2 are associated with LA-LVo areas found during endocardial 3D electroanatomical mapping. Additionally, the dynamics of HMGB1, RAGE and ST2 after ablation with regard to LA-LVo were assessed.

Methods: We studied 20 patients with left atrial (LA) arrhythmias (n=6 paroxysmal AF, n=7 persistent AF, n=7 atrial tachycardia, 80% male, mean age: 65±11 years) undergoing LA ablation. Blood samples were collected at the beginning of the procedure, at the end of the procedure, four hours after and the following day. All patients underwent LA electroanatomical mapping with a spiral catheter. Mapping data where analysed in terms of LA-LVo areas using a NaVX Precision® research tool. Patients where categorized corresponding to the amount of LA-LVo less than 10% (group1) and more than 10% (group2).

Results: Mean amount of LA-LVo in group 1 was 2.30±2.90cm² and 33.34±22.20cm² in group 2 (p<0.01). Mean radiofrequency (RF) ablation time in group 1 was 45±19min and 55±15min in group 2 (p=0.74). Mean baseline HMGB1 value was 1.3±1.7ng/ml in group 1 and 0.57±1.7ng/ml in group 2 (p=n.s.). Median baseline RAGE value was 1016±838pg/ml in group 1 and 1281±562pg/ml in group 2 (p=n.s.). Median baseline ST2 value was 35.3±19.2ng/ml in group 1 and 35.55±17.77ng/ml in group 2 (p=n.s.). Patients in group 1 had significantly higher values of HMGB1 four hours and one day after ablation compared to group 2 with p=0.02 and p=0.01. The longitudinal dynamic of RAGE showed a rapid increase with a sudden drop and maximum values directly after ablation whereas HMGB1 and ST2 showed a slower increase with maximum values one day after ablation (Figure 1).

Conclusion: In this pilot study baseline values of HMGB1, RAGE and ST2 were not associated with the amount of endocardial LA-LVo. Patients with a larger amount of LA-LVo (group 2) had significantly lower values of HMGB1 after ablation although the amount of RF was different. A possible explanation could be that in patients with a higher amount of LA-LVo less HMGB1 can be released by healthy tissue in line with a “burned out” effect. Another possible explanation could be a potentially reduced effect of RF in patients with large amount of LA-LVo due to fibrosis. The promising findings of this pilot study are limited due to the small sample size and need to be evaluated in larger cohorts especially in terms of ablation outcome.

P990
Non-pulmonary vein triggers in patients with persistent atrial fibrillation: their prevalence, distribution, and impact on outcome

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Background: Atrial fibrillation (AF) triggers which are atrial contractions initiating and perpetuating AF play an important role not only in initiation but also in perpetuation. However, little is known about triggers from non-pulmonary veins (non-PV) in persistent AF patients.

Purpose: To evaluate the prevalence and distribution of non-PV triggers in PeAF patients receiving an initial ablation procedure, and to investigate their impact on outcome.

Methods: This retrospective single center analysis included 452 consecutive patients (age 60±11 years old, 384 males, 204 long-standing PeAF) who underwent LA-LVo ablation in our institute from 2007 to 2011. We performed cardioversion and isoproterenol infusion before and after pulmonary vein (PV) isolation to check the presence of non-PV triggers. We followed them for a median duration of 39.4 (25.6–93.9) months.

Results: Non-PV triggers were observed in 44 patients (10%) and they were from multiple origins in 11 patients (3%). Their origins located in the right atrium (n=15), left atrial posterior wall (n=14), coronary sinus or mitral valve annulus (n=10), superior vena cava (n=8), and others (n=8), but were undeterminable in 6 patients. Non-PV triggers were more frequent in those with long-standing PeAF than others (long-standing PeAF vs. others, 15% vs. 6%, p=0.0012). But age, gender or left atrial volume were not associated with Non-PV triggers. Recurrence-free rate after single procedure in patients with non-PV triggers was significantly worse than that without them (with vs. without non-PV triggers, 23% vs. 45%, hazard ratio and 95% confidence interval: 2.19 and 1.50–3.10, p=0.0001), even after adjustment by long-standing PeAF (2.02 and 1.38–2.88, p=0.0049). Recurrence free-rate after multiple procedures (1.450±0.65 sessions) was also worse in patients with non-PV triggers at the initial session than in others (35% vs. 65%, 2.60 and 1.89–3.84, p=0.0001).

Conclusions: Non-PV triggers were not uncommon in persistent AF patients, especially in those with long period of AF persistence. Non-PV triggers were a significant risk of recurrence after single and multiple procedures.

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Contact phase mapping for rotor locationing in atrial fibrillation using the PentaRay catheter: preliminary results

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Background/Introduction: Recently, electrical rotor role in sustaining atrial fibrillation (AF) has been based on basket catheter mapping, which is aimed to simultaneously acquire electroggrams (EGMs) from the whole atrium. However, this mapping might be hampered by low spatial resolution and poor contact between electrodes and left atrial (LA) wall.

Purpose: The aim of the study was to evaluate rotors detection and locationing performed by means of the PentaRay ( Biosense Webster) catheter, which is characterized by lower spatial coverage, higher resolution and better contact.

Methods: Six patients with persistent AF (age: 59 to 82 y, 2/6 male) were assessed. All patients underwent an ablation procedure using the CARTO3 ( Biosense Webster) mapping system and the PentaRay catheter was acquired using the PentaRay ( Biosense Webster) catheter. Electroggrams were analyzed applying a previously developed modified version of the sinusoidal reconstruction method and the Hilbert transform. Phase maps were constructed on the portion of the 3D geometry of the LA covered by the catheter, and to each point on the anatomy it was assigned the phase value computed considering the signal from the nearest electrode. Rotor was defined when a phase singularity with a lifespan greater than 1 cycle length of AF was detected. The implemented algorithm is able to detect stable and meandering rotors and to quantify their persistence in time.

Results: We applied an independent phase mapping approach for 3D rotor detection on the LA surface. An example of a detected rotor is shown in the figure.
On the left panel we show the phase of four EGMs; on the right panel the phase signals are color-coded on the LA surface in four different timings (A-D) and the corresponding phase singularity points are shown with the white star. Considering 10 mm as the maximum distance between the electrodes and the atrial wall, the computed coverage of the PentaRay catheter was 12.3%±2.4% of the whole intra-atrial wall. The dominant frequency estimated and used for the sinusoidal recomposition method was 4.2±0.2 Hz. On average, the number of detected stable rotors in each patient was 3.7±4.4, with a persistence in time of 326±215 ms while no meandering rotors were detected.

Conclusions: Preliminary results showed that using the PentaRay catheter stable rotors in the LA can be detected. In our patients, such rotors were found to have a very short persistence in time. We may hypothesize that LA chamber coverage has a central role for the detection of meandering rotors, whose pivot is not stable in the small portion of mapped atrial wall.

P992
Efficacy of subclinical atrial fibrillation screening by AliveCor in patients with CHA2DS2-VASc score ≥2
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Background: Atrial fibrillation (AF) is a well-known risk factor for ischemic stroke yet many patients with AF remain subclinical. Therefore, early detection of AF can help alleviate stroke burden. Studies using smartphone gadgets to screen for subclinical AF generally focus on community and primary care setting instead of patients with established risk factors.

Purpose: This study aims to assess the feasibility of subclinical AF screening in patients with CHA2DS2-VASc score ≥2 in Specialist Out Patient Department (SOPD).

Methods: The study was conducted in a local hospital in Hong Kong. Patients from geriatric and diabetic clinic, who did not have prior AF and with CHA2DS2-VASc score ≥2, were selected for 30 seconds AF screening using AliveCor’s KardiaMobile device under instruction of trained nursing staff. A single lead ECG tracing would be generated; the AF detection algorithm of AliveCor would interpret the rhythm and classified the results into “Normal”, “Suspicious of AF” or “Un-interpretable”. A standard 12 leads ECG would be performed for confirmation by a cardiologist in patients detected as “Suspicious of AF”. Patients who have “Un-interpretable” result would repeat the test up to 2 times. If the test results remain “Un-interpretable”, nursing staff would analyze tracing from AliveCor manually for P-wave and rhythm regularity. If the rhythm were still in question, a standard 12 leads ECG would be performed and interpreted by cardiologists.

Results: From January to December 2016, 2036 patients aged 75±9.3 years were recruited, amongst 1202 (59%) were female. Mean CHA2DS2-VASc score was 3.7±1.2. Twenty-one patients (1%) had result of “Suspicious of AF” detected by AliveCor. Among them, eight (38.1%) had false positive result with underlying prematurity atrial or ventricular complexes. Two hundred and sixty-four patients (12.9%) had “Un-interpretable” results, and all of them turned out to be sinus rhythm after confirmation. Overall, thirteen patients (0.6%) were detected with newly diagnosed AF.

Conclusions: Among those high-risk populations, majority of them have 12 leads ECG done in their first consultation or previous hospitalization, and a proportion of them should have been screened out. Yet, the incidence rate (0.6%) of newly diagnosed AF identified in this study is comparable to other local studies performed in community and primary care setting, and such high risk patients (CHA2DS2-VASc score ≥2) were all indicated for anticoagulation. This suggest high efficacy of screening in high-risk patients. Of significant note, there are 12.9% of “Un-interpretable” results and high false positive rate (38%) for “Suspicious of AF”, which required further confirmation by health-care professionals. This reinforced the practicability of AF screening in high-risk population setting (i.e. SOPD) where, within the same setting, cardiologists are more easily accessible for prompt diagnosis as well as subsequent management.

Atrial fibrillation – Ablation / Atrial fibrillation – Ablation 2

Consecutive pts undergoing primary CBA (28-mm CB) for perAF in a 2’240s per vein protocol were studied. VRs were defined as: bradycardia <40 bpm, asystole or higher degree AV-block. Follow-up (FU) visits at 3, 6 and 12 months (m) were performed including a 7-day Holter ECG. Recurrence of atrial tachycardia (AT) represented the primary endpoint of our study.

Results: A total of 250 pts (64.1±11.5 years old, 70% male) were analysed. Within 12 m after CBA, the primary endpoint of our study was reached in 76 pts (30%). VRs occurred in 61 pts (24%). Concerning ablation strategies VRs were predominantly evoked by the isolation of the first PV (n=34, 50%), which most often had been a left sided PV (33 pts, 97%; LSPV n=27 (82%), LCT n=4 (12%), LIPV n=2 (6%)). Kaplan Meier plot analysis revealed VRs as highly significant parameter for AF-free survival (log-rank p-value <0.001) (figure 1). Univariate Cox regression analyses confirmed VRs as a strong predictor for AF-free survival (p-value <0.001, hazard ratio (HR) 0.114) whereas female gender (p-value 0.023, HR 1.709), tachycardia (p-value 0.028, HR 1.011) and AF (p-value 0.026, HR 1.674) on admission and/or the beginning of the procedure were predictive for AF recurrences.