circumnavigating the posterior border, and the other largely around the IVC and septal scar/fossa ovalis.
Conclusions: Typical atrial flutter manifests a similar activation sequence around the tricuspid annulus. However, electroanatomic mapping of postpacing intervals allows a more precise definition of the active reentrant circuit versus passively activated portions of the chamber. Even with a relatively small cohort, significant variability is seen in the driving circuit of typical atrial flutter.

PO5-15

DOES THE TIME TO ENTRAINMENT REFLECT THE POST PACING INTERVAL?

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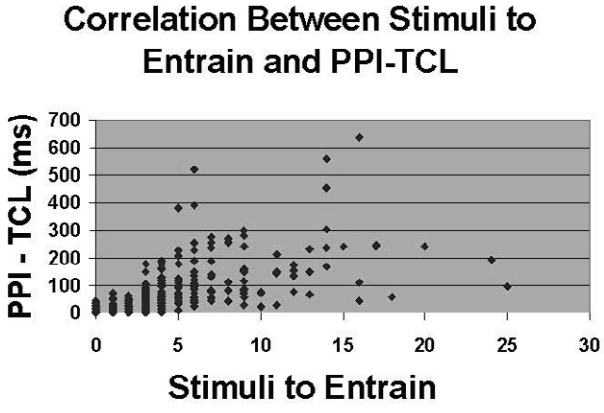
Introduction: Following ablation of atrial fibrillation, atypical atrial flutters (AFL) are common. These reentrant circuits are often complex due to abnormal atrial substrate and ablation-related fibrosis. Entrainment maneuvers are invaluable to localize these AFLs, but identifying the post-pacing interval (PPI) is complicated by electrograms that are often fractionated and of low amplitude. Alternatively, the proximity of an entrainment site to the AFL circuit may be reflected by the number of paced beats required to entrain the rhythm. This study examined whether this "time-to-entrainment" predicts the PPI.
Methods: 500 entrainments from 24 patients (Age 64.5±8.7, Male 91%, LVEF 63±7%) undergoing ablation for AFL were retrospectively analyzed. The number of stimuli required for entrainment was correlated to the difference between the PPI and tachycardia cycle length (PPI-TCL).
Results: The AFLs were atypical in 21, typical in 1 and both in 2. The TCLs were similar ($p = 0.25$) and the pacing CLs were similar ($p=0.65$) when the PPI-TCL ≤ 30 ms vs > 30 ms. Fewer stimuli were needed for entrainment when the PPI-TCL was ≤ 30 ms compared to >30 ms (4.3 vs 9.1, $p < 0.001$). The number of stimuli for entrainment correlated with the PPI-TCL ($r = 0.66$, $p<0.001$, Figure). The positive and negative predictive values for entrainment within 3 stimuli were 0.79 and 0.93, respectively.
Conclusions: The number of stimuli for entrainment correlates with the PPI. Of greater impact, when more stimuli are needed for entrainment, the PPI-TCL is typically large. Time-to-entrainment complements other techniques to localize AFL circuits.



PO5-16

VALIDATION OF AN INTEGRATED CONTACT SENSOR FOR ENHANCING SAFETY OF THE HANSEN ROBOTIC CATHETER SHEATH SYSTEM: ABSENCE OF PERFORATION WITH CONTACT SENSOR-GUIDED ABLATION

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Introduction: Although the feasibility of intracardiac navigation with the Hansen Robotic Catheter Sheath System has been reported, the potential for and mitigation of excessive catheter tip/tissue interface force has not been assessed.
Methods: The utility of incorporation of integrated contact sensing to accurately reflect catheter tip/tissue contact was therefore investigated at 371 sites in the right and left atria in 5 dogs. Resulting contact force generated by ICE-guided catheter positioning and conversely, the visual catheter tip/tissue contact seen on ICE resulting from contact sensor-guided catheter manipulation were examined and validated for a series of generated contact forces. Perforation risk of progressively increased levels of contact, as judged from the contact sensor, were examined.
Results: At the time of no contact , as established by ICE, the sensor showed -0.4±2.1 grams of contact force; minimal contact by ICE generated 4.7±5.8 grams; consistent contact produced 9.9±8.6 grams; and tissue tenting on ICE inspection generated 25.0±14.0 grams of force. Additional analysis demonstrated that the best applied force cutoff for achieving "tissue tenting" was ≥16 grams; with "consistent contact" predicted by 6-16 grams, "minimal contact" predicted by 2-6 grams, and "no contact" was predicted by <2 grams of contact pressure. No perforation was seen at any study category of strong force ≥16 grams (26.8±9.6 grams, range 16-56 grams). Excessive contact force of 108±34 grams, failed to produce intentional perforation or collateral injury with this system.
Conclusions: Contact sensor force readings showed excellent concordance with actual visualized catheter tip/tissue contact. Ablation-guidance with this information can be safety accomplished with a very low perforation risk. This tool should be of utility in enhancing the safety of the robotic catheter manipulation in patients with atrial fibrillation.

PO5-17

SAFETY USING NOVEL MULTI-ARRAY CATHETERS AND PHASED RADIOFREQUENCY ENERGY IN LEFT ATRIAL ABLATION FOR PERSISTENT ATRIAL FIBRILLATION

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Introduction: Widespread adoption of radiofrequency catheter ablation (RFCA) of persistent/permanent atrial fibrillation (CAF) has been limited by procedural risk and low efficacy. This pilot study was designed to evaluate the safety of multi-array mapping and ablation catheters combined with low power phased radiofrequency energy for RFCA of CAF.
Methods: Twenty patients (57 ± 8 years) have been enrolled in the pilot phase of a multi-center study for ablation of CAF

resistant to antiarrhythmic drug therapy. Three catheters including a circular multi-electrode Pulmonary Vein Ablation Catheter (PVAC) for pulmonary vein isolation (PVI), a Multi-Array Septal Ablation Catheter (MASC) for ablation of complex fractionated electrograms (CFAE) in the septum and a Multi-Array Ablation Catheter (MAAC) for CFAE ablation in the left atrium were utilized. Bipolar/unipolar phased radiofrequency energy was delivered simultaneously through operator selected electrodes at ratios of 1:1, 2:1, or 4:1, depending on location and the desired lesion depth. Power was limited to 10 watts/electrode. Patients were allowed one additional procedure (which reset the 6-month follow up period) if sinus rhythm was not maintained. AADs were discontinued three months post ablation. Safety reporting includes all procedure and device related adverse events noted throughout the follow up period.
Results: Twenty-seven procedures were completed from May to December, 2007. Acute success, defined as complete isolation of all PVs and sinus rhythm at the end of procedure with or without electrical cardioversion, was achieved in 96% (26/27 procedures). Seven of twenty patients (35%) have received a second ablation and 3 additional procedures have been scheduled. Current follow up is 119 ± 61 days. There have been no procedure or device related adverse events noted. 15/20 patients (75%) are currently in sinus rhythm. Five patients with follow up less than three months remain on AADs.
Conclusions: Multi-array catheters in conjunction with low power phased radiofrequency energy appear safe and may allow good efficacy for RFCA of CAF.

PO5-18

TACHYCARDIA TRANSITION DURING ABLATION OF PERSISTENT ATRIAL FIBRILLATION

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Introduction: The stepwise approach to ablation of persistent atrial fibrillation (PsAF) results in organization of activation frequently leading to atrial tachycardia (AT). Ablation of one AT frequently results in immediate transition to another AT. We hypothesized that the method of transition of one to another would clarify if the 2nd AT had a de novo onset or was already present if not apparent during the 1st AT.
Methods: This study comprised 90 consecutive patients with PsAF undergoing their first ablation procedure with termination of AF by the end of the procedure, 26%, had more than 1 AT with transitions between.
Results: All of these ATs were observed in sequence, with one AT transitioning to the next AT during ablation of the former. This resulted in 39 tachycardia transitions(TT) that had a significant increase in AT CL for the new tachycardia (P<0,001). TT was classified into 4 types. The majority (80%) was classified as Type I transition when a direct transition of a faster AT to a slower one without pause or ectopy takes place. When the transition interval was equal to cycle length (CL) of the previous AT(26%) the last beat of the fast CL was also observed to have the activation sequence of the slower AT("entrained but not fused")(Figure).
Conclusions: Direct transition of faster to slower AT during the course of PsAF ablation is highly suggestive of the presence of simultaneous AT with the faster overdriving or "entraining" the slower. This is speculative but consistent with experience to date with ablation of PsAF where extensive and often disparate sites of ablation are required to achieve a desired result.

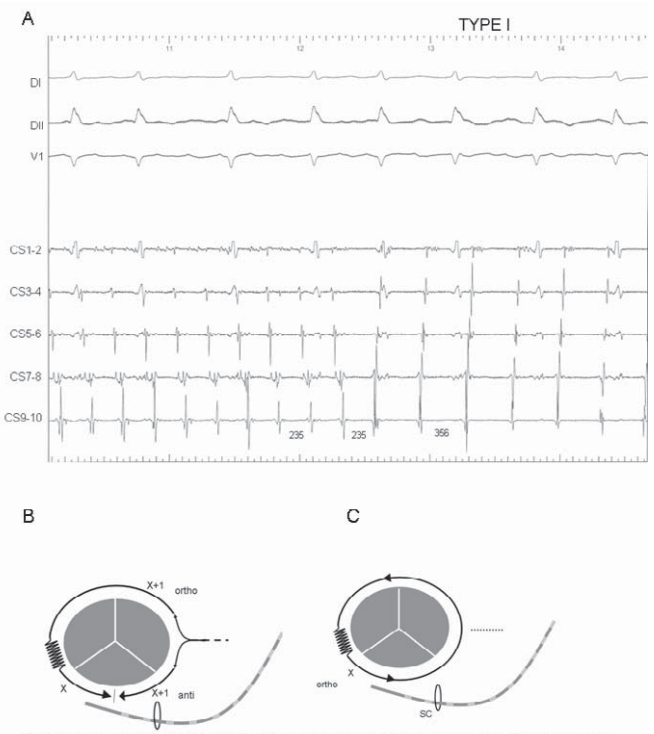

Figure -(A) Example of tachycardia transition Type I. Ablating at the left "isthmus" results in a tachycardia (235ms) transition to a slower tachycardia (356ms) with a different atrial activation sequence .The transition occurred abruptly. The slower tachycardia was ablated in the tricuspid-caval isthmus. The recording electrode near this site (proximal CS 9-10) at the transition shows the last cycle of the faster tachycardia to have the atrial activation sequence of the new slower tachycardia. This is reminiscent of cessation of pacing after entrainment where the last cycle of the slower atrial tachycardia was "entrained but not fused". On the schematics presented on the bottom of the figure the circuit of the second slower AT is entrained by the fast one that produces a orthodromic and a antidromic wave, the first being responsible by the CL and the second by the activation (B). When the faster AT is interrupted by ablation the last orthodromic wave is still traveling around the circuit maintaining for a last time the CL(entrained) of the previous AT but the there is no more antidromic wave and the activation sequence is the one of the new AT(not fused)(C). This is most compatible with two tachycardias that were simultaneously present prior to ablation, with the faster tachycardia "entraining" the slower.
I , II and V1 = surface ecg leads
CS 1-2 to CS 9-10 = coronary sinus electrode pairs from distal to proximal.

PO5-19

INCREASED LEFT ATRIAL PLATELET REACTIVITY IN PATIENTS WITH ATRIAL FIBRILLATION

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Introduction: Atrial fibrillation (AF) is associated with increased risk of thrombus formation primarily in the left atria (LA). However the mechanisms underlying this phenomenon are unknown. Although, previous studies have demonstrated elevated levels of coagulation and platelet activation when measured in peripheral blood samples, little is know about platelet function within the atrium. We therefore examined if sampling from different sites (femoral vein, right atria, left atria) affects platelet reactivity.
Methods: : 19 consecutive patients (13 males: 60±2[SEM] years) with AF undergoing ablation were studied. All patients ceased warfarin 7 days and enoxaparin 12 hours prior to the procedure. Anticoagulated blood samples were obtained at the start of the procedure immediately after transseptal puncture from the femoral vein (FV), the left atria (LA) and the right atria (RA), prior to the administration of heparin. Unstimulated blood samples were incubated with the platelet specific antibody against P-selectin (CD62P) or control and analysed by whole blood flow cytometry. Blood samples had evaluation of platelet aggregation utilizing ADP (2.5 and 5μM)-induced whole blood impedance aggregometry.
Results: In patents with AF P-selectin levels were significantly