Catheter Ablation of Chronic Atrial Fibrillation Guided by Noncontact Mapping: Are Continuous Linear Lesions Associated With Ablation Success?

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A catheter-based, left atrial (LA) ablation procedure was performed using non-contact-mapping (NCM) in 14 patients (pts) with chronic atrial fibrillation (CAF). The LA lesion geometry used has been shown to be effective in pts with CAF, in whom intraoperative RF catheter ablation was performed to eliminate anatomically defined "anchor" reentrant circuits. Aim of this study was 1) to translate a successful LA surgical intervention into a catheter procedure, 2) to evaluate the usefulness of NCM to identify and close discontinuities in linear lesions, 3) to assess the impact of linear lesion continuity on ablation success of CAF. Methods: LA ablation was performed with four linear lesions between the mitral annulus and the left inferior pulmonary vein (PV), to the left upper PV, then to the right upper PV, and finally to the right lower PV in 14 pts with CAF. During online analysis, NCM revealed conduction access gaps in the linear lesions in all pts (overall 58 gaps were found with a mean of 4.5 ± 0.9 gaps/pts). In addition contact mapping was performed. With contact mapping a discontinuity of linear lesion was identified by a localized loss of double potentials in 27 of the 58 gaps (47%). In the remaining 31 gaps (53%) interpretation of contact mapping was difficult because of the diminished amplitude of local electrograms. Catheter ablation was guided by NCM until complete conduction block was observed. During follow-up of 12 ± 7 months, 6/14 pts (43%) remained in sinus rhythm without antarrhythmic drugs (5/6 or 83% in AAT and AFL, 3 of 5 pts in IART). In all pts the target site for ablation was identified after the initial ablation procedure. Successful ablation of CAF is associated with continuity of linear lesions.

2:30 p.m.

Remote Control of a Magnetic Electrophysiology Catheter Allows Precise Intracardiac Navigation and Eliminates Radiation Exposure to the Operator

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BACKGROUND: We have previously reported intracardiac navigation of a magnetic catheter (MC) by computer controlled magnetic field vectors. The purpose of this study in canines was to determine whether the Magnetic Navigation System (MNS) in combination with a catheter advancement system (CAS) would enable the operator to control all catheter movements from a remote work station. METHODS: The MNS is composed of bipolar fluoroscopy, a computer to control the system, an array of superconducting electromagnets that surround the subject's torso, and a computer graphics work station. The CAS consists of a variable speed rotary motor connected by a flexible drive shaft to two spring-loaded wheels that advance or retract the catheter when the wheels rotate. The rate and forward/reverse direction of the CAS is controlled by a joystick. A static 3D image of the cardiac blood pool was constructed and transferred to a fluoroscopic monitor adjacent to a conventional fluoroscopic image. The 3D-CT image provided an anatomical reference for intracardiac mapping to supplement the bipolar fluoroscopic image during cardiac mapping. RESULTS: The MC was advanced through the inter-atrial septum and the right atrium by NCM. The MNS directed the catheter to selected targets in the right atrium, tricuspid annulus, and right ventricle. The MC was positioned on the tricuspid annulus and a series of radiofrequency energy applications created a linear lesion as the CAS retracted the catheter back to the IVC. Next, the MC was inserted into the femoral artery, and the MNS/CAS was used for remote retrograde guidance of the MC to all 6 pulmonary veins in each animal. Post-mortem examination showed no evidence of perforation or injury related to catheter navigation. CONCLUSIONS: These results demonstrate the feasibility of precise, remote control of the MC by the MNS/CAS that completely eliminates radiation exposure to the operator.

2:45 p.m.

Differences in Voltage and Timing of Local Activation Between Unipolar and Bipolar Electrograms During Supraventricular Tachycardia May Affect the Outcome of Catheter Ablation Procedures

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Target sites for RFCA are identified by endocardial mapping of the activation sequence and potential distribution using either unipolar or bipolar electrograms. The aim of this was to analyze differences between unipolar and bipolar electrograms using an electroanatomical mapping system (CARTOTM).* Methods: Patients (n=44, 16 M, age 58±12 yr) referred for ablation of atrial flutter (AFL, n=17), focal atrial tachycardia (FAT, n=4), atrio-ventricular nodal reentrant tachycardia (AVNRT, n=5) or intra-atrial reentrant tachycardia (IART, n=16) were studied. Activation maps were constructed by marking the maximum negative slope of the intrinsic deflection and the maximum amplitude of respectively unipolar and bipolar electrograms. Voltage maps were constructed by measuring the peak-to-peak amplitude of the recorded signals. Results: Electrograms recorded during tachycardia ( AFL=932±125 ms, FAT=492±125 ms, AVNRT=934±125 ms, IART=1868±125 ms) were analysed. Voltages of unipolar electrograms were significantly larger than voltages of bipolar electrograms (p<0.001). This resulted in an overestimation of areas of scar tissue especially in IART. When using bipolar signals the activation sequence was correlated with the local activation time of bipolar electrograms in patients with FAT, AVNRT and AFL (n=0.4, p<0.001) but not in the IART group (n=14, p=0.2). In the IART pts more fragmented electrograms were recorded than in the other pts (p<0.05). In case of fragmented electrograms, disparity of local activation time between unipolar and bipolar electrograms is more present in areas with fragmented electrograms. Conclusion: Bipolar voltage mapping results in overestimating of areas of scar tissue and may result in "blanking" of areas of slow conduction. Therefore, additional activation mapping should be used to localize crucial pathways of slow conduction.

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118A ABSTRACTS - Cardiac Arrhythmias

3:15 p.m.

A Randomized Comparison of Unipolar Versus Bipolar Electrograms as a Guide for Segmental Pulmonary Vein Isolation

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Background: Unipolar electrograms (Uni Egms) recorded near the ostia of the pulmonary veins (PVs) may provide better discrimination between successful and unsuccessful radiofrequency (RF) ablation sites than bipolar Egms. We therefore also may provide an accurate method for localization of the ablation catheter relative to the electrodes of a Lasso catheter. The purpose of this study was to determine whether the use of Uni Egms facilitates catheter ablation of focal atrial fibrillation (AF), often located in or near the pulmonary veins (PV) is often hampered by the inapparentce of the trigger during the ablation procedure. Non-contact-mapping (NCM) permits high density mapping of transient arrhythmias. Aim of the study was 1) to evaluate the number and location of foci identified by NCM, 2) to assess how often the site of initiation of AF was located outside of the PV AF recurred. Complications: hemopedcard in 1 Lot, and a AV fistula in 1 pt. Conclusi-