order to approach the ostium of LSPV was feasible in 14 out of 19 pts with AF originating from LSPV or LIPV, detailed epicardial mapping through the distal CS might identify possible epicardial location of the arrhythmogenic focus.

1137-105 Steroids and Antioxidant Drugs Are Equally Effective in Preventing Late Extension of Radiofrequency Ablation Lesions: Do Multiple Mechanisms Play a Role in This Phenomenon?

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Background: Delayed effects of radiofrequency (RF) may occur, particularly as late atrio-ventricular block, but their mechanisms are unknown. We recently demonstrated that combined therapy with steroids and antioxidants (allopurinol and verapamil) prevents late extension of RF lesions. To further characterize the mechanisms involved in this phenomenon, we compared the effects of anti-inflammatory and antioxidant drugs on the healing of RF-induced histological and ultrastructural (US) abnormalities.

Methods: Temperature-controlled RF lesions (70°C/90 s) were created in the right ven-tricular endocardium of 13 dogs (15-25 kg) with standard techniques. Lesion size, histological and US characteristics in 3 zones extending from the visible pathologic lesion border, namely, A (0-3 mm); B (3-6 mm) and C (6-9 mm), were assessed at 30 days. Dogs were divided into 3 groups: group 1 (n=7) receiving combined therapy with allopurinol (400mg po) for 2 hours before RF; group 2 (300mg/kg iv in 15 min before and after RF); hydrocortisone (10 mg/kg iv after RF) and prednisone (50 mg po for 29 days); group 2 (n=3) receiving allopurinol and verapamil; and group 3 (n=3) receiving hydrocortisone and prednisone.

Results: Lesion size was similar in all groups, but pathological analysis revealed that healing was delayed in the groups receiving steroids. In all groups, significant abnormalities of the plasma membrane, gap junctions, mitochondria, sarcosomes and nucleus were noted in zone A. However, the extent of US injury and collagen proliferation was slightly less in group 1. In zone B, minor abnormalities were consistently noted in groups 2 and 3 but this region was normal in 57% (71%) dogs from group 1. Zone C was normal in all groups.

Conclusion: Anti-inflammatory and antioxidant drugs are equally effective in limiting late extension of RF lesions. Further, combined therapy with these agents seems to exert an additive effect. These findings suggest that different mechanisms of action may be responsible for the delayed myocardial effects of RF ablation.

1137-117 Circumferential Ultrasound Ablation of Pulmonary Vein Ostia: Relationship Between Ablation Time and Lesion Formation


Animal and clinical studies have used ultrasound (US) for ablation and electrical isolation of PVS. US has been used for 120-240 sec. We evaluated the effect of US application times on US lesion formation. Methods: In 12 dogs, intracardiac echocardiography (Acu son) and PV angiography were obtained to assess PV dimensions before and after ablation. An 11.5Fr catheter with a distal balloon/transducer (Atrionix) was advanced into the right superior PV for a single US application targeting 65°C. Groups of 3 animals each received US application for 30 sec Group I, 60 sec Group II, 120 sec Group III, and 240 sec Group IV. The animals were sacrificed 6-13 weeks post procedure. Results: Lesion size was similar in all groups, but pathological analysis revealed that healing was delayed in the groups receiving steroids. In all groups, significant abnormalities of the plasma membrane, gap junctions, mitochondria, sarcosomes and nucleus were noted in zone A. However, the extent of US injury and collagen proliferation was slightly less in group 1. In zone B, minor abnormalities were consistently noted in groups 2 and 3 but this region was normal in 57% (71%) dogs from group 1. Zone C was normal in all groups.

Conclusion: Anti-inflammatory and antioxidant drugs are equally effective in limiting late extension of RF lesions. Further, combined therapy with these agents seems to exert an additive effect. These findings suggest that different mechanisms of action may be responsible for the delayed myocardial effects of RF ablation.

1137-118 Radiofrequency Ablation of Supraventricular Tachycardia Using an Ultrasound-Based Navigational System and a Cooled Ablation Catheter

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A novel mapping system (RPM, Cardiac Pathways) has been developed as an aid for mapping and catheter ablation. This system uses ultrasound signals generated between small crystals placed on two reference catheters and a mapping/catheter ablation (Chilli, Cardiac Pathways) to determine the three-dimensional location of the mapping catheter in the ultrasound field. It can be used to accurately locate the ablation catheter tip and to guide and precisely localize ablation sites. We used this system for electro-anatomic mapping in 24 patients (pts) with supraventricular tachycardia including atrial flutter (AFL) in 9, AV nodal reentry (AVNRT) in 7, an accessory pathway (AP) in 10, and ectopic atrial tachycardia (EAT) in 1 pt. In 3 pts the target had died during the procedure (AVNRT and AFL in 1 pt, AP and AVNRT in 1 pt, EAT and AFL in 1 patient). Pts ages ranged 10-77 years (mean ±44) and 11 pts were female. The mapping system was used to generate electro-anatomic maps of the right atrium during coronary sinus pacing in patients with AVNRT and AFL. Energy was applied along the interior border of the triangle of Koch for AVNRT and along the cavo-tricuspid isthmus for AFL. In pts with APs, activation over the AP was mapped during sinus rhythm (pre-excitation), ventricular pacing, or induced tachycardia. Energy was delivered at sites of early activation along the tricuspid annulus in 3 pts and along the mitral annulus (in the left atrium) in 7 pts. The right atrium was mapped during EAT in one pt and sites of early activation were targeted. Cooled ablation was used in all of the pts except those with AVNRT in whom temperature monitoring without irrigation was used. All pts had successful ablation without recurrence of the targeted arrhythmias during 1-10 months (mean ± 5) of follow-up. There were no complications noted. Conclusions: This new navigational tool can be used in a wide variety of clinical supraventricular tachycardias. It allows use of an internally irrigated (cooled) electrode. Accurate localization of ablation lesions combined with super-imposition of the lesions on an electro-anatomic map facilitates treatment of arrhythmias which are amenable to anatomically-placed ablation lesions.


Background: The influence on size of radiofrequency (RF) ablation lesions depending on the electrode-tissue contact is well established. This study was designed to compare the size of the lesions created with an 8-mm tip radiofrequency catheter ablation during temperature controlled mode, performing a low energy measurement (LEM) just before the application or not.

Methods: The study was performed in 10 animals, in an experimental model in vivo (pigs, 25 ± 2 kg). Radiofrequency lesions were produced, with temperature mode control, 70°C target temperature and maximum power (100 watts). 20 lesions were created in the atrium and 20 in the ventricle. The contact force was intended to be optimal in each place, with stable electrogromes and optimal fluoroscopic appearance. Then, the LEM was measured (0.6 watts-seconds) and a radiofrequency pulse applied (60 seconds), independently of the LEM measured. After 7 days, the pig was sacrificed and the heart evaluated.

Results: The delivery of the LEM resulted in a rise of temperature of 0.79±0.41°C (1.1±0.22°C in the ventricle and 0.5±0.2 in the atrium). The tip temperature was 57±3°C. The lesion size was measured histologically. The mean volume of the lesions produced was 346±110 mm3, 430±123 in the ventricle and 170±75 in the atrium. The mean lesion depth was 7±2 mm. Lesions produced with a LEM=0.5 had a mean volume of 570 mm3. There was no cratering in any of our lesions. 50% of the lesions produced after a LEM > 0.6 were transmural and 0% (0/6) of those created with a LEM <0.2. The depth of the lesion was also significantly different, being 2±3 mm with LEM 0.6. There was an excellent correlation between the LEM obtained before the application and the size of the lesion produced (r=0.63 and p<0.001).

Conclusion: The LEM is a powerful predictor of the lesion size after a single radiofrequency pulse. Lesions created with 8-mm catheters and LEM=0.6 were significantly greater than those created with a LEM<0.2, independently of the classical criteria of fluoroscopic and electrogram stability. These results suggest that the target tissue may explain some lengthy radiofrequency ablation procedures. The use of the LEM will improve the clinical efficacy and safety of catheter ablation.

1137-120 Circumferential CS Os Ablation: Effect on Interatrial Conduction

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Background: Catheter ablation techniques for treatment of atrial fibrillation (AF) are being explored. AF maintenance depends, in part, on inter-atrial conduction. The coronary sinus (CS) musculature has shown to be an important inter-atrial conduction pathway (Chilli, Cardiac Pathways). Hypothesis: Radiofrequency (RF) energy ablation, using a novel MESH catheter can create circular ablation lesions at the CS os, altering inter-atrial conduction. Methods: Under fluoroscopic guidance a multi-polar electrode catheter was placed in the CS of dogs. The activation sequence was assessed during low right atrial (LA) pac-