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?
Guilherme Farelo, Angelo de Paola, Oswaldo Mora, Ivone Barbosa, Eduardo Katchburian, Marcelo Franco, Paulista School of Medicine, Sao Paulo, Brazil.

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 versapamil) 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 ventricular endocardium of 13 dogs (15-20 Kg) with standard techniques. Lesion size, histological and US characteristics were assessed 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 2 and 2 hours before RF), versapamil (200 mg/15 min before and after RF); hydrocortisone (10 mg/kg iv after RF) and prednisone; group 2 (n=3) receiving allopurinol and versapamil; 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 applied for 120-240 sec. We evaluated the effect of US application time on US lesion formation.

Methods: In 12 dogs, intracardiac echocardiography (Acuson) and PV angiography were obtained to assess PV dimensions before and after ablation. An 11.5F catheter with a distal balloon/transducer (Atrionix) was advanced into the PV and PV angiography were obtained to assess PV dimensions before and after ablation. PV stenosis is more likely a result of mechanical trauma than US application time. Proximal and distal PV branching may limit lesion circumferentiality. These findings suggest that different mechanisms of action may be responsible for the delayed myocardial effects of RF ablation.

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 Navigation System and a Cooled Ablation Catheter
David M. Fitzgerald, Thomas Wannenmacher, Tony W. Simmons, Pihua Feng, Nancy L. Radtke, Craig Hedrick, K. Alastair, Jr., Wake Forest University School of Medicine, Winston-Salem, North Carolina.

A novel mapping system (RPM, Cardiac Pathways) has been developed as an aid for mapping and catheter ablation. This system uses ultrasonic 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 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 we used this system to guide 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 ipsilateral 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 who temperature monitoring without irrigation was used. All pts had successful ablation without recurrence of the targeted arrhythmia 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.

1137-119
Lesions Produced with Radiofrequency Ablation Catheters in an Experimental In-Vivo Model Using the Low-Energy-Measurement Method. Prediction of Lesion Size
Jose G. Rebolledo, Antonio Hernandez-Madrid, Arinal Rodriguez, Lucas Cano, Gonzalez Peña, Detelina Savova, Atunio Camino, Manuel G. Bueno, Jose M. Cano, Concepcion Moro, Ramon y Cajal Hospital, Madrid, Spain, Alcal University, Madrid, Spain.

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 abation 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, 25-32 Kg). 40 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 electrograms and optimal fluoroscopic appearance. Then, the LEM was measured (0.6 watts±15 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 0.794±0.4°C (1.1±0.2°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 cratersing in any of our lesions, 50% of the lesions produced after a LEM >0.6 were transmural and 0% of those created with a LEM <0.2. The depth of the lesion created (r=0.92 and p<0.01).

Conclusions: 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 fluoro- scopic appearance and electrogram stability, the size of the lesions produced after a LEM >0.6 were transmural and 0% of those created with a LEM<0.2. The lesion depth 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 obtained after the application (n=92 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 fluoroscopy appearance and electrogram stability, the size of the lesions produced after a LEM >0.6 were transmural and 0% of those created with a LEM<0.2. The lesion depth 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 obtained after the application (n=92 and p<0.001).

1137-120
Circumferential CS OS Ablation: Effect on Intraluminal Conduction
Peter Ooi, Ding Sheng He, Russ Collins, Frank L Marcus, Mike Bosnos, Gary Fratantoni, Heart Center Tucson, Arizona.

Background: Catherter 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 been 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 (LRA) pac-