(0.07%), 5 of whom required urgent surgical intervention: external iliac vein repair (n=1), profunda femoris artery repair (n=1), femoral artery pseudoaneurysm repair (n=2) and internal iliac artery repair (n=1). Respiratory failure occurred in 6 patients (0.06%). Acute coronary syndrome requiring percutaneous coronary revascularization occurred in 2 patients while 1 developed an RCA air embolus. No procedural death or atrio-esophageal fistulae occurred.
Conclusion: In contrast to reported trends, life threatening complications of AF ablation in a large prospective tertiary care cohort spanning 16 years have remained low with no procedure-related deaths.

P5750
Novel ultra-low temperature ablation catheter using near-critical nitrogen: first lesion assessment in a porcine thigh muscle model

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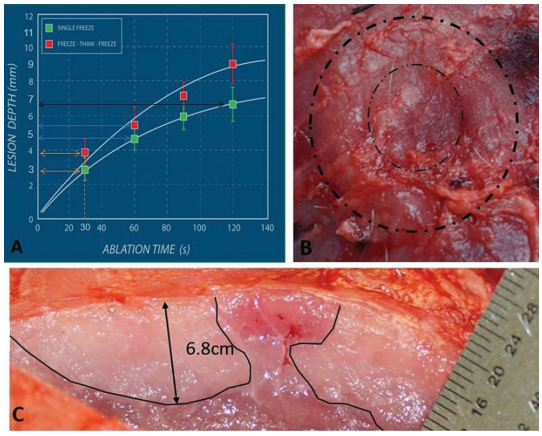
Background: Performing continuous cryoablation lesions using an endocardial catheter has never been possible in a beating heart without interrupting its blood flow. This is due to the heat sinking effect of warm blood that prevents lethal temperatures to penetrate the cardiac tissue and create lasting complete transmural lesions.
Purpose: To quantify the potential of a novel technology to treat cardiac arrhythmias, by measuring lesion size in function of predefined ablation times, in a porcine thigh muscle model, exposing the tissue to cryogenic temperatures down to -196°C.
Methods: 9Fr Loop shaped catheters of 13cm long were used to ablate 5 porcine on the thigh muscle during 30, 60, 90 and 120 seconds durations while circulating warm blood at 37°C. Lesions were also done repeating the same ablation times with one minute thaw period between freezes at each site. Triphenyl tetrazolium chloride was administered intravenously one hour after the last ablation. Principles of laboratory animal care were respected. The animals were euthanized, and the thigh muscles were sectioned to quantify the lesions sizes.
Results: All lesions created in this study were continuous for 13cm with no visual gaps (Figure B). The 30, 60, 90 and 120 ablation durations created a 3.0, 4.5, 6.0 and 6.8 mm deep lesions respectively (Figure C). Applying each ablation twice per site increased lesion depth to 4.0, 5.5, 7.2 and 9.0 mm, respectively. Lesion depths were represented on a graph according to their ablation times (Figure A). Instant catheter adherence was also observed as soon as the freeze was initiated.



Lesion depth and histology

Conclusion: This novel near-critical nitrogen cryoablation catheter system can effectively create quick and uninterrupted, linear lesions, allowing the control of lesion size by changing ablation times. The lesion depth increase at double freeze locations can be attributed to a cell death mechanism related to osmotic pressure during the thawing period. Instant catheter adherence to the tissue, assuring optimal catheter stability at target locations, may play an important role in reaching the desired lesion depth with shorter ablation times.
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P5751
Long-term outcome of radiofrequency catheter ablation for redo procedures after pulmonary vein isolation with the cryoballoon technique (first versus second generation cryoballoon)

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Catheter ablation has become the first line of therapy in patients with symptomatic, recurrent, drug-refractory atrial fibrillation. Cryoablation has been shown to be a safe and effective technique for pulmonary vein isolation. However, there is a significant arrhythmia recurrence rate after cryoablation procedures and there are no established strategies for redo procedures in these patients. Therefore, we have summarized our experience with radiofrequency catheter ablation for redo procedures after pulmonary vein isolation with the cryoballoon technique (including an analysis of pulmonary vein conduction recovery patterns ater procedures performed with the first or second generation cryoballoon).
Methods: Eighty patients (paroxysmal AF: 59 patients, persistent AF: 21 patients) had to undergo a redo procedure after initially successful circumferential PV isolation with the cryoballoon technique (Arctic Front Balloon, Medtronic: 40 patients (group A); Arctic Front Advance, Medtronic: 40 patients (group B)). The redo ablation procedures were performed using a segmental approach or a circumferential ablation strategy (CARTO; Biosense Webster) depending on the intra-procedural findings.
Results: During the redo procedure, a mean number of 1.8 re-conducting PVs were detected (using a circular mapping catheter; group A: 2.3 re-conducting PVs, group B: 1.3 re-conducting PVs). There was a slightly higher incidence of chronic PV reconnections related to the left-sided PV ostia than to the right-sided PVs in both groups. Furthermore, sites of chronic PV reconnection were found more frequently in the inferior parts of the PV ostia than in the superior parts. In 35 patients in group A, a segmental approach was sufficient to eliminate the residual PV conduction because there were only a few recovered PV fibers (1–3 reconnected PVs; group A1). In the remaining 5 patients in group A, a circumferential ablation strategy was used because of a complete recovery of the PV-LA conduction of all four pulmonary veins (group A2). In group B, a segmental approach was sufficient in all patients because there was only a minor reconnection of 1–2 PVs.
All recovered PVs could be isolated sucessfully again. At 24-month follow-up, 76.3% of all patients were free from an arrhythmia recurrence (61/80 patients; group A: 29/40 patients (72.5%), group B: 32/40 patients (80%)). There were no major complications in both groups.
Conclusions: In patients with an initial circumferential PVI using the cryoballoon technique, a repeat ablation procedure can be performed safely and effectively using radiofrequency catheter ablation. In most cases only a few re-conducting PV fibers were found and therefore, a segmental re-ablation approach seems to be sufficient in the majority of patients (especially in patients treated with the second generation cryoballoon).

P5752
Assessment of force-time integral on radiofrequency lesion size in an in vitro swine contractile model using force sensing technology

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Background: The contact force technology has enabled real-time catheter-tissue contact, accurately. Average contact force, as quantified by the force-time integral, correlates with lesion volume at a given power setting. However, little is known whether any of the time and force components that make up the force-time integral (FTI) play a more important role and what is better as a marker of FTI and force-power-time index (FPTI) considering power.
Methods: RF energy was delivered on swine skeletal muscle at 4 fixed power settings of 15W, 25W, 30W and 40W for 6 variable of time duration (5, 10, 20, 30, 40 and 50 seconds) with 6 CF setting (5, 10, 20, 30, 40 and 50g) using a catheter. Lesion depth, width and volume were measured and the incidence of steam pop was also recorded. Statistically, multiple linear regression analysis was used to explain the relationship between variables.
Results: A total of 336 lesions were made according to experimental protocol. The effect of time was more than 1.6 to 2.9 times higher than that of force in the lesion volume. In the case of steam-pop, the effect of force was greater than the effect of time. The best discriminating cutoff values for steam-pop with the highest sensitivity and specificity were 700g·s (sensitivity=83.3%, specificity=74.2%) of FTI and 31,000 g·w·s (sensitivity=80.6%, specificity=97.7%) of FPTI. The area-under-curve was greater in FPTI (0.943) than FTI (0.870). In univariate linear regression analysis, FTI and FPTI had a significant effect on lesion formation. However, the explanatory power of the linear regression model was better explained by FPTI (56.4%) than FTI.(32.1%).
Conclusion: Under the same FTI, the time factor more affects lesion formation than the force factor. When power is included and analyzed, power has a greater impact on lesion formation and steam-pop than other factors. In order to resolve the limitation of FTI not taking the power into account, the proposed FPTI seems to be a better surrogate marker for predicting lesion formation and complication.

ATRIAL FIBRILLATION – ABLATION

P5753
How to create linear conduction block at left atrial roof by cyroballoon catheter

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Background: Left atrial (LA) roof linear ablation is a strategy to improve atrial fibrillation (AF) ablation outcome. Cryoballoon ablation (CBA) is thought to be