

# Achieving Contrast-Free Ultra-Low Radiation Exposure Without Compromising Safety and Acute Efficacy Through Evolving AF Cryoballoon Ablation Procedure Techniques

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Reiss et al. International Journal of Cardiology, 2019.

## INTRODUCTION

- ▶ Due to the detrimental effects of radiation during catheter-based procedures, it should be assumed that a safe level of radiation exposure does not exist.
- ▶ This study demonstrates the safety and acute effectiveness of ultra-low fluoroscopy use during cryoballoon ablation for atrial fibrillation.

## METHODS

- ▶ A retrospective observational analysis was performed on 307 cryoballoon ablation procedures for pulmonary vein isolation using ultra-low fluoroscopy.

### Imaging

- ▶ Pre-procedural planning included cardiac CT or MRI.
- ▶ Trans-esophageal echocardiography to rule out thrombus.
- ▶ Intracardiac echocardiography (ICE; Zonare Ultrasound System, St. Jude Medical) was used for transeptal puncture and catheter guidance.
- ▶ 3D electroanatomic mapping (EAM) was used to recreate cardiac geometries and for catheter guidance (Achieve™ Mapping Catheter, Medtronic, Inc.; EnSite™ NavX™ Mapping System, St. Jude Medical).
- ▶ "Single-shot" fluoroscopy (3.75 frames/s) was used if resistance was felt during device exchange.

### Transeptal access

- ▶ Transeptal puncture was performed using NRG® Transeptal Needle (Baylis Medical).
- ▶ Catheter exchange in the left atrium was initially done using a STORQ® Steerable Guidewire (Cordis) during the first 18 months of the study before switching to the ProTrack™ Pigtail Wire (Baylis Medical) for the remaining 28 months.

### Cryoballoon ablation

- ▶ Ablations were performed using the Arctic Front Advance™ cryoballoon (Medtronic, Inc.).

- ▶ Direct pressure monitoring and Doppler flow were used to confirm PV occlusion in place of radiopaque contrast.

## RESULTS

- ▶ Radiation dose decreased from 6.7 mGy to 2.0 mGy over the study period ( $p < 0.01$ ).
- ▶ Fluoroscopy time decreased from 0.75 min to 0.2 min over the study period ( $p < 0.0001$ ).
- ▶ Use of a 28-mm cryoballoon required significantly lower fluoroscopy use than both the 23-mm cryoballoon and combination of 23-mm and 28-mm cryoballoons.
- ▶ Acute procedural success was achieved in 99% of patients with a 2.0% complication rate, consistent with other cryoballoon studies.
- ▶ One incidence of left atrial appendage perforation leading to cardiac tamponade was attributed to the STORQ® Steerable Guidewire, and prompted the switch to the ProTrack™ Pigtail Wire.

## DISCUSSION & CONCLUSIONS

- ▶ This study describes a method for ultra-low fluoroscopy cryoballoon ablation compared to other large sponsored studies, and demonstrates safety and effectiveness.
- ▶ The best practices for fluoroscopy reduction include:
  - ICE to visualize the NRG® Transeptal Needle for transeptal puncture and ProTrack™ Pigtail Wire for wiring across the left atrium.
  - 3D EAM, ICE, pressure waveform and Doppler imaging for catheter navigation.
  - Cryoballoon dosing algorithm to minimize freezing beyond acute PVI.
  - Slow fluoroscopy frame rate when needed.
- ▶ These tools and techniques are common within electrophysiology labs, and require minimal additional operator training.