



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

## 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 (PVI) using ultra-low fluoroscopy.

### Imaging

- ▶ Pre-procedural planning included cardiac computed tomography or magnetic resonance imaging.
- ▶ Transesophageal echocardiography to rule out thrombus.
- ▶ Intracardiac echocardiography (ICE; Zonare Ultrasound System, St. Jude Medical) was used for transseptal 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.

### Transseptal access

- ▶ Transseptal puncture was performed using the **NRG™** Transseptal 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 pulmonary vein 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 AND 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™** Transseptal Needle for transseptal 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.

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