

## Improving pulmonary vein isolation during cryoballoon ablation using the re-look angiography technique

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**Background:** Cryoballoon ablation for pulmonary vein (PV) antral isolation is contact-dependent. Currently, occlusion assessment using the cryoballoon is most commonly performed using contrast venogram prior to ablation. However, there is a known difference in balloon size/shape between the inflated and ablation state, due to significant increase in cryoballoon pressure, which can cause potential undetected leak and, thus, failure of PV isolation. This phenomenon is currently not detected using standard techniques and effectiveness of mitigation techniques have not been assessed.

**Purpose:** We hypothesize that repeat injection of contrast five seconds after the initiation of cryoballoon ablation can be used to assess changes in shape and confirm ongoing occlusion during ablation; the re-look angiography technique. The incidence of PVI leak and the ability for the relook angiography to remedy the leak is assessed.

**Methods:** A total of 125 patients (440 PVs) undergoing cryoballoon ablation (Medtronic Arctic Front Advance Balloon™) were assessed using the

re-look angiography technique unless they required occlusion with a segmental approach. Fifteen patients were excluded from contrast use due to renal insufficiency.

**Results:** Successful single occlusion was seen in 330 (75%) PVs and the re-look angiography technique was employed in each of those events. In 180 of the 330 (55%) single PV occlusions, a new PV leak undetected during the initial PV angiogram was identified. This prompted repositioning of the balloon to achieve complete PV isolation in 85 of 180 of the PV cases, with 95 of the cases requiring additional segmental ablation to complete full PV isolation.

**Conclusion:** A significant amount of insufficient PV antral contact during cryo-ablation may not be detected with conventional single PV angiography and may explain inadequate PV isolation. The re-look angiography technique is a simple tool to confirm robust balloon contact and guide repositioning as well as identify the need for additional segmental ablation. Additional follow up is needed for translation to improved clinical outcomes.