Atrial Fibrillation (AF) - Rhythm Control, Catheter Ablation

Incidence of residual gaps identified by a high-density grid-style catheter post-cryoballoon ablation for atrial fibrillation

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Background: Despite advances in cardiac ablation technologies and the introduction of single-shot ablation devices such as the cryoballoon, the ability to consistently achieve complete and durable PVI remains elusive. While this is often attributed to PV reconnections that develop after the index procedure, recent data has suggested that traditional diagnostic techniques and technologies may in fact fail to identify gaps that remain upon completion of the index ablation. Initial observations in a small cohort of patients suggested that these residual gaps could be detected by a high-density, grid-style mapping catheter (HD Grid) post-cryoballoon ablation (CBA). The true incidence of these residual gaps as identified in a large patient population has not been previously reported.

Purpose: To quantify in a large cohort of CBA procedures, the presence of residual gaps identified by HD Grid which are missed by standard techniques of PVI confirmation using a 3.3F circular mapping catheter (CMC).

Methods: Self-reported data was prospectively collected in CBA procedures in which PVI was first confirmed using CMC followed by assessment using the HD Grid. Procedural characteristics and acute outcomes, including the incidence and location of residual gaps were analyzed.

Results: Data was collected in 150 CBA procedures performed in 24 centers across the US, Europe and Japan. De novo and repeat ablations represented 78.7% and 12.0% of cases, respectively (9.3% NR). A left common PV was present and ablated in 5.3%; right common in 0.7%. The CMC was used to confirm isolation in all cases using a variety of techniques including voltage mapping (73.3%), exit block (54.7%), and entrance block (29.3%); note: total exceeds 100% as >1 technique may be used in a single case. PVI was then reassessed with HD Grid, enabling a direct comparison of the two technologies. The HD Wave configuration, measuring simultaneous orthogonal bipoles, was used in 94.0% of cases. HD Grid identified a total of 119 gaps in 41 (27.3%) patients, which were missed by the CMC (Figure 1).

Conclusions: Assessment of PVI using the HD Grid identified residual PV conduction gaps that were missed by the CMC and standard diagnostic techniques in over a quarter of the patients evaluated. One limitation of this analysis is that the technique(s) used for confirmation of PVI were left to the discretion of the operator. Additionally, this analysis includes only workflows in which PVI was confirmed with HD Grid after confirmation using the CMC. Considering the prevalence of residual gaps observed, it is reasonable to interpret that new diagnostic catheter technologies could be critical in the pursuit of more complete and durable PVI, potentially impacting long-term clinical outcomes. Further study on other high-density mapping catheter configurations would be warranted before extrapolating these results to different technologies.

Abstract Figure.

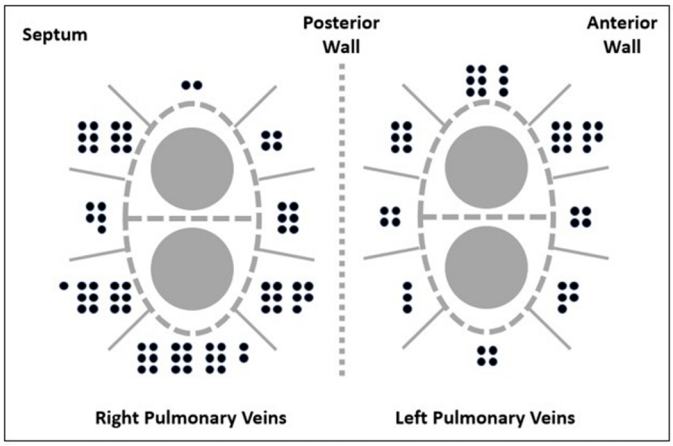

Figure 1. Incidence and location of residual gaps (across all patients in which gaps were recorded) identified by Advisor HD Grid, which were not identified by the 3.3F CMC.