Temporal association between atrial fibrillation burden in cardiac implantable electronic devices and the risk of heart failure hospitalization

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Background: high daily atrial fibrillation (AF) burden measured in cardiac implantable electronic devices (CIEDs) has been shown to be temporally associated with increased stroke risk.\textsuperscript{1}

Purpose: We investigated whether AF burden is temporally associated with an increased risk of heart failure (HF) events in a large real-world cohort of patients with CIED devices.

Methods: We linked a de-identified database of aggregated electronic health records from 2007-2021 to a manufacturer’s device data warehouse with device based continuous diagnostic monitoring data. Patients with dual or triple chamber CIED implants with capability to measure daily AF burden and having HF events with 120 days of AF burden data prior to the HF event were included in this study. HF event was defined as an inpatient admission, emergency department presentation, or observation unit stay in a hospital with primary diagnosis of HF with intravenous diuretics administration. AF burden of \geq 5.5 hours (as defined in earlier studies) on any given day was compared during days 1-30 before (case period) and days 91-120 days (control period) before the first HF event in each patient in this case-crossover study.\textsuperscript{2}

Results: A total of 7257 earliest HF events with AF burden available in the case and control period were included. The average age of patients was 72 \pm 12 years, with 74% being males, and following co-morbidities diagnosed prior to the HF event: 83% hypertension, 48% diabetes, 74% coronary artery disease, 31% stroke/TIA, 45% CKD, and 27% vascular disease. Comparison of occurrence of AF above threshold (\geq 5.5 hours on any given day) on days 1-30 versus 91-120 pre-HF event is shown in table to illustrate the effect of temporally proximate AF on risk of HF event. A total of 957 (13\%) had discordant arrhythmic state between case and control period, with 763 (11\%) having AF \geq 5.5 hours on a day in case period versus 194 (2\%) in the control period (OR: 3.93; 95\% CI: 3.36-6.60). Higher odds of HF event was observed closer the day with AF \geq 5.5 hours is to the HF event (table 1).

Conclusions: In a large real-world population of patients with CIED devices, AF burden of \geq 5.5 hours or more on a given day increases risk of worsening HF.

<table>
<thead>
<tr>
<th></th>
<th>Case Period AF</th>
<th>Case Period No AF</th>
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<tbody>
<tr>
<td>Control Period AF</td>
<td>1324</td>
<td>194</td>
</tr>
<tr>
<td>Control Period No AF</td>
<td>763</td>
<td>4976</td>
</tr>
<tr>
<td>Odds Ratio</td>
<td>3.93 (95% CI: 3.36-6.60)</td>
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</tbody>
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Table 1: odds ratio of HF event
Figure 1: Temporal association