222

Can Posterior Pericardiostomy Reduce the Incidence of Postoperative Atrial Fibrillation after Coronary Artery Bypass Grafting?

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Background: Posterior pericardiostomy (PP) is a simple surgical technique that may reduce the risk of post-operative atrial fibrillation (POAF) by allowing for drainage of pericardial fluid into the left pleural space, reducing the incidence of pericardial effusion that may trigger POAF.

Methods: This systematic review sought to determine the impact of posterior pericardiostomy on the incidence of POAF, pericardial effusion, and the length of hospital stay after coronary artery bypass grafting (CABG). Electronic searches on PubMed, The Cochrane Library, EMBASE, EBSCO, Web of Science, and CINAHL databases from inception through December 15, 2018 were performed. The primary outcome of our study was reduction in POAF following PP. Secondary outcomes were reductions in pericardial effusion and length of hospital stay. A Mantel-Haenszel random effects model was used to summarize data across treatment arms. Heterogeneity between studies was assessed using the chi square test and was considered significant for p values <0.10 or I2>50%.

Results: A total of 11 randomized controlled trials consisting of 2,462 patients undergoing CABG were included in the meta-analysis. Patients who underwent PP demonstrated significant reduction in POAF (OR 0.34; 95% CI 0.21-0.55, p<0.001) as compared to controls. However, heterogeneity between studies was significant (I2=73% and 70%, respectively). No difference was observed in terms of length of hospital stay (standard mean difference -0.06; 95% CI -0.26 - 0.14, p=0.56; heterogeneity I262%, p = 0.02). Number needed to treat to prevent POAF was 6.6 (95% CI 5.38-8.39).

Conclusions: Posterior pericardiostomy is a simple intraoperative technique that can reduce the risk of POAF.

223

Heart Failure with Preserved Ejection Fraction is a Highly Arrhythmogenic Disease

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Background: Sudden cardiac death (SCD) is a relatively common mode of death in patients with heart failure preserved ejection fraction (HFpEF). However, the spectrum and burden of cardiac arrhythmias, particularly those of ventricular arrhythmias, has not well established in these patients.

Methods: We performed routine arrhythmia surveillance using a 14-day adhesive patch ambulatory ECG recorder (ZioPatch) in patients with HFpEF, enrolled in a subspecialty heart failure clinic. Cardiac electrophysiologists interpreted the ECG recordings. We extracted the clinical data from electronic medical records.

Results: A total of 40 patients (mean age 71±9.9 years, 53% women) with HFpEF underwent routine ZioPatch monitoring. Mean ejection fraction was 59±4.4±4.4% and 44% had history of coronary artery disease. Of the 40 patients, 32.5% had episodes of non-sustained ventricular tachycardia (VT) (mean ±SD 5.4±5.2 episodes), 15.0% had paroxysmal atrial fibrillation and 80.0% had episodes of supraventricular tachycardia during the monitored period. All patients had premature ventricular complexes (PVC) with 7.5% having a PVC burden that exceeded 5%. Patients with non-sustained VT had a lower EF, higher CHA2DS2-Vasc score and were more likely to be obese (Table). Inclusion: Patients with HFpEF have a high, and possibly underappreciated, burden of cardiac arrhythmias. The frequent episodes of non-sustained VT in these patients may provide insight into the mechanism of SCD in HFpEF.

224


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Background: Atrial fibrillation-flutter (AF) has been described in up to a quarter of patients after heart transplant (HT). Data on AF after HT are limited to single center experiences. To bridge this gap, we performed an analysis of the National Inpatient Sample (NIS) database to evaluate the trends and in-hospital outcomes of AF post HT from 2005 to 2014.

Methods: We utilized data from the National Inpatient Sample and the US Census Bureau to calculate annual national rates of in-hospital mortality and length of hospital stay for patients who were admitted with AF for years 2012 to 2015. We compared the in-hospital outcomes between AF post HT and an age and gender propensity score-matched group without AF and performed multivariable logistic regression of significant patient and hospital characteristics to identify predictors of in-hospital mortality. Results: A total of 1,000 hospitalizations (mean age 58.9 years, 719 males, 281 females, 81.3% whites, median CHA2DS2Vasc score 2, interquartile range 1-3) were identified for AF in HT recipients. Most commonly associated comorbidities included diabetes mellitus (34.4%), hypertension (68.3%), obesity (10.8%) and chronic renal failure (38%). Most hospitalizations were non-elective (79.4%). Anticoagulation (AC) was reported in 11.5% of the hospitalizations. Cardioversion (DCV) was performed in 31.2% and ablation in 11.4% of patients. Hospitalizations for AF undergoing ablation and DCV in HT patients appear to be stable over 10-year study period (P trend<0.04 and 0.6 respectively). Most cardiovascular and ablation procedures were reported in men (70%). In-hospital mortality was 1.48%. The mean length of hospitalization was 3.29 days. After propensity match analysis and multivariable logistic regression, AF was not associated with in-hospital mortality (Odds Ratio 1.21, 95% CI 0.95-1.55). Most hospitalizations were non-elective. Ablation post HT was significantly different at one year (HR 0.25; CI 0.06 - 1.12) however at 2 years was statistically lower in the ablation group (HR 0.22; CI 0.09 - 0.56). In both groups, 80% of strokes at 2 or more years were on anticoagulation. Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.29; 95% CI 0.18 - 0.45).

Conclusions: In patients with HFpEF and AF, catheter ablation along with medical therapy is an independent predictor of mortality.

225

Efficacy of Catheter Ablation of Atrial Fibrillation in Heart Failure with Preserved Ejection Fraction

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Background: Atrial fibrillation (AF) in heart failure with preserved ejection fraction (HFpEF) has been associated with poor clinical outcomes. Catheter ablation has been shown to be an effective way to limit recurrence of AF and reduce stroke and mortality in patients with normal ventricular function and heart failure with reduced ejection fraction (HFrEF). Efficacy of catheter ablation in patients with HFpEF is less clear. We sought to evaluate clinical outcomes in the HFpEF population with ablation plus medical therapy as compared to medical therapy alone. Methods: We conducted a single-center retrospective cohort review of 180 patients from 2007 to 2017. Inclusion criteria were patients who had a hospitalization with HFpEF and AF as hospital problems, EF≥50% and age ≥40. The ablation group includes all AF patients who underwent ablation and met inclusion criteria. The medical therapy cohort also met all the inclusion criteria and excluded patients with any ablation. Medical therapy included rate control, rhythm control or both. The primary outcome was AF at 1 year. Secondary outcomes were hospital admissions, stroke, and all-cause mortality.

Results: Out of 180 patients who met the inclusion criteria, 85 underwent catheter ablation and 95 were managed medically. More men underwent ablation vs. medical therapy (62.5% vs. 25.3%, p<0.001) and were also younger (67.9 vs. 75.5 years, p<0.001). The ablation group was more likely to be given rhythm control agents post ablation (41.1% vs. 4.2%, p<0.001) and the medical therapy group was more likely to be given rate control agents (62.3% vs. 85.0%, p<0.001). There was a significantly higher percentage of patients receiving anticoagulation in the ablation group, (83.5% vs. 68.4%, p=0.018). AF occurrence at 1 year was lower for patients who underwent ablation (RR 0.29, 95% CI 0.18 - 0.45). Risk of stroke was not significantly different at one year (HR 0.25; CI 0.06 - 1.12) however at 2 years was statistically lower in the ablation group (RR 0.22; CI 0.09 - 0.56). In both groups, 80% of strokes at 2 or more years were on anticoagulation. Risk of hospitalization at 1 year (RR 1.1; CI 0.85 - 1.41) and all-cause mortality at 1 year (RR 1.6; CI 0.29 - 9.79) were similar. Conclusion: In patients with HFpEF and AF, catheter ablation along with medical therapy is an
Navigation and control of rhythm and achieved in fewer strokes than medical management alone.

### Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Ablation</th>
<th>Medical Therapy</th>
<th>Relative Risk (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Outcome</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>AF at 1 year (%)</td>
<td>16(20.2)</td>
<td>63(70.7)</td>
<td>0.29(0.18, 0.45)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Stroke at 1 year (%)</td>
<td>2(2.3)</td>
<td>9(9.5)</td>
<td>0.37(0.10, 1.33)</td>
<td>0.11</td>
</tr>
<tr>
<td>Stroke at 2 year or more (%)</td>
<td>5(5.8)</td>
<td>25(26.3)</td>
<td>0.22(0.09, 0.56)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>All cause mortality at 1 year (%)</td>
<td>3(3.5)</td>
<td>2(2.1)</td>
<td>1.68(0.29, 9.79)</td>
<td>0.56</td>
</tr>
<tr>
<td>All cause mortality at 2 year or more (%)</td>
<td>5(5.8)</td>
<td>9(9.5)</td>
<td>0.62(0.22, 1.78)</td>
<td>0.37</td>
</tr>
<tr>
<td>Hospitalizations at 1 year</td>
<td>51</td>
<td>52</td>
<td>1.10(0.85, 1.41)</td>
<td>0.48</td>
</tr>
</tbody>
</table>

#### Background

LBBB Cardiomyopathy is a reversible cardiomyopathy resulting from chronic left ventricular dyssynchrony from left bundle branch block (LBBB). His-bundle pacing (HBP), as opposed to pure mechanical correction, alters the underlying substrate for dyssynchrony, providing a physiologic instead of mechanical treatment of LBBB. **Objective:** To assess the feasibility of HBP for cardiac resynchronization therapy (CRT) in LBBB cardiomyopathy patients. **Methods:** Retrospective chart review was conducted on patients who underwent cardiac resynchronization therapy at Indiana University Health and Erkenazi Hospital between August 1, 2015 to August 30, 2017. A subset of patients who met the pre-defined syndrome criteria of LBBB cardiomyopathy: 1) History of pre-existing LBBB of at least 6 months or greater 2) LVEF of > 50% at the time of diagnosis of LBBB) 3) Progressive decrease in LVEF to ≤ 40% with development of NYHA functional class II to IV symptoms 4) No other identifiable cause of cardiomyopathy who underwent HBP were identified. Clinical, echocardiographic, and electrophysiologic variables were extracted at baseline and follow-up. Comparison of the means at baseline and follow-up was performed using 2-tailed t testing. A p value <0.05 was considered significant.

#### Results

- From August 2015 to August 2017, 73 patients underwent CRT. 9 patients (12%) met criteria for LBBB Cardiomyopathy with 7 of those patients (78%) successfully undergoing HBP-CRT. Average time from device implantation to last follow-up was 14.5 months. Mean LVEF improved from 25 ± 6% to 50 ± 4% (p<0.0001). Mean left ventricular end systolic dimension (LVEDD) decreased from 48 ± 5 mm to 37 ± 2 mm (p=0.0008) and mean left ventricular end diastolic dimension (LVESD) decreased from 55 ± 5 mm to 48 ± 6 mm (p=0.04). Mean QRS duration decreased from 152 ± 13 ms to 115 ± 19 ms (p<0.001). New York Heart Association (NYHA) classification improved from an average of 2.7 ± 0.5 to 2 ± 0 (p=0.002). There were no device infections, procedural complications, heart failure hospitalizations, or deaths in patients who underwent HBP-CRT.

#### Conclusions

- Improvement of left ventricular function with HBP indicates that LBBB-induced cardiomyopathy is reversible and can be treated with physiological pacing. His-bundle pacing is a viable technique for pursuing cardiac resynchronization therapy in patients with LBBB Cardiomyopathy.

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**Figure 1. Echocardiographic Parameters and QRS duration of Patients Undergoing HBP-CRT.**