Effect of Sodium Nitroprusside on the Incidence of Post-Operative Atrial Fibrillation after Cardiopulmonary Bypass

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Introduction

Post-operative atrial fibrillation (POAF) is the most common occurring arrhythmia following cardiopulmonary bypass surgery, occurring in 16% to 60% of patients, with 70% of events occurring within four days of the surgical procedure.1,2 Development of POAF may lead to perioperative myocardial infarction (MI), renal insufficiency, increased inotropic drug utilization, prolonged mechanical ventilation, and readmission to the ICU.1 In addition, patients are three to five times more likely to experience a cerebrovascular accident (CVA).6 Post-operative atrial fibrillation leads to more time spent recovering in the hospital and additional interventions (e.g. pharmacological therapy, physical and occupational therapy, etc.), increasing costs and time spent on a complication that is difficult to minimize.

Objectives

Primary Objective: Determine the odds of developing POAF given the utilization of sodium nitroprusside during cardiopulmonary bypass.

Secondary Objectives: Include the incidences of post-operative Cerebral Vascular Accidents (CVA) and Trans-ischemic Attacks (TIA), and length of stay in the intensive care unit and the hospital overall.

Methods

Study Design:

This is a retrospective cohort study being conducted at Mercy Hospital in Scranton, Pennsylvania, a 256 bed community hospital. It has been reviewed and approved by the Institutional Review Board of the Scranton-Temple Residency Program.

Patient Selection:

All patients admitted to Mercy Hospital between January 1, 2007 and July 31, 2010 who underwent cardiopulmonary bypass will be considered for inclusion in the study. Exclusion criteria consist of patients with a history of atrial fibrillation or treatment for atrial fibrillation (e.g. return to normal sinus rhythm), those undergoing surgery to treat atrial fibrillation (e.g. MAZE procedure), and pre-existing cardiac surgery or procedure

Data Collection:

Information for eligible patients will be collected from the hospital’s adult cardiac surgery database and pharmacy’s medication billing database. Patient data from the cardiac surgery database will be cross-listed by date of surgery and medical record number with the pharmacy records billing system to determine if patients had received sodium nitroprusside post-operatively.

Results and Evaluation

*Table 1: Baseline Demographics of the Cardiac Surgery Database

<table>
<thead>
<tr>
<th>Age, mean (SD)</th>
<th>67 (11.3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Sex, No. (%)</td>
<td>375 (35.1)</td>
</tr>
<tr>
<td>Caucasian, No. (%)</td>
<td>1044 (97.8)</td>
</tr>
<tr>
<td>Smoker, No. (%)</td>
<td>193 (17.9)</td>
</tr>
<tr>
<td>Diabetes, No. (%)</td>
<td>371 (34.7)</td>
</tr>
<tr>
<td>Hypertension, No. (%)</td>
<td>905 (84.7)</td>
</tr>
<tr>
<td>Congestive Heart Failure, No. (%)</td>
<td>373 (34.9)</td>
</tr>
<tr>
<td>Cerebrovascular Disease, No. (%)</td>
<td>153 (14.3)</td>
</tr>
<tr>
<td>Arrhythmia, No. (%)</td>
<td>195 (18.3)</td>
</tr>
<tr>
<td>AFib/Aflutter, No. (%)</td>
<td>166 (15.5)</td>
</tr>
<tr>
<td>Peripheral Vascular Disease, No. (%)</td>
<td>151 (14.1)</td>
</tr>
<tr>
<td>Myocardial Infarct, No. (%)</td>
<td>365 (34.2)</td>
</tr>
</tbody>
</table>

Data Collection took place during the month of September 2010. During this time, 1068 patients were screened for inclusion into our study (Table 1). Of these, 8% (n=88) had undergone prior cardiothoracic surgery. In addition, 10% (n=110) subjects underwent atrial fibrillation corrective surgery. However, excluding these patients from our sample is still ongoing at this time. Overall, there were 1471 procedures conducted, with the majority being coronary artery bypass grafts (CABG) (Figure 1). In addition, there were a total of 277 events of POAF experienced in the population (Figure 2).

Figure 1: Type of Cardiothoracic Surgery

Figure 2: Incidence of POAF

Pre-operative medications were also evaluated to determine if they may have influenced the rate of POAF (Figure 3). Post-operative medications were also evaluated to determine if there was a significant change in medications from baseline (Figure 4).

Discussion

Cavalli and colleagues were the first to study if sodium nitroprusside played a role in decreasing POAF.7 They conducted a prospective, double-blind, placebo controlled, randomized trial that evaluated 100 patients undergoing their first elective CABG. Their results were significant as they found a decreased incidence of POAF and time spent in the hospital for patients administered sodium nitroprusside when compared to the placebo. The significance of our study lies in determining if sodium nitroprusside can be used to minimize the incidence of POAF, and if confounders and Cavalli and colleagues study may explain their success.

References


Disclosure

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:

Timothy Dy Augnst: Nothing to disclose
Scott Bolesla: Nothing to disclose

Scott Bolesta: Nothing to disclose