Preoperative Hemoglobin A1c and the Occurrence of Atrial Fibrillation Following On-pump Coronary Artery Bypass surgery in Type-2 Diabetic Patients

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Atrial Fibrillation

- The most common type of arrhythmia
- Characterized by rapid and irregular beating
Atrial Fibrillation
Post-operative Atrial fibrillation (POAF)

- A frequent serious problem
- Associated with an increase in the length of hospital stay, morbidity, and mortality
- From 10% to 45% in various studies
- Known risk factors: older age, obesity, heart rate variability, hyperglycemia, hypertension, left atrial size and function, use of statins, and preoperative AF
Post-operative Atrial fibrillation (POAF)

- Moderate-intensity blood glucose control after CABG can effectively improve clinical outcomes and reduce the incidence of POAF.
- Data on the association of the magnitude of hyperglycemia, as detected by preoperative hemoglobin A1c (HbA1c) as a surrogate marker of glycemic control and its impact on the development of POAF is insufficient.
Aim of the study

To investigate the association of the preoperative HbA1c with occurrence of POAF in a cohort of type-2 diabetic patients who underwent isolated CABG at our center.
Methods

- Prospective cohort
- Enrolling type-2 DM patients, aged 40-80 years, who underwent elective CABG between March 2012 and March 2013 at Tehran Heart Center
- follow-up for developing POAF
Methods

- Primary endpoint:

  Onset of atrial fibrillation following CABG
Methods

Exclusion criteria:

1. The presence of AF or atrial flutter before the surgery;
2. Pacing rhythm;
3. Treatment with amiodarone or other specific antiarrhythmic drug;
Methods

- Exclusion criteria:
  
  (4) emergency operation;
  
  (5) prior or concurrent valve replacement surgery or prior other cardiac surgeries;
  
  (6) history of any chronic inflammatory disease, or malignancy;
Methods

Exclusion criteria:

(7) chronic hepatic disease or end-stage renal insufficiency dependant on hemodialysis;

(8) history of hemolytic anemia, or hemoglobinopathy;

(9) recent acute blood loss or blood product transfusion;
Methods

- Exclusion criteria:

  (10) and any severe valvular disease in the preoperative echocardiographic evaluation.
Methods

- **Data collection:**
  - Demography
  - Medical history
  - Clinical and laboratory measurements, particularly blood glucose and Hb A1c
Methods

- **AF diagnosis:**
  - 12-lead ECG before the surgery
  - Telemonitoring at ICU for 72 hours
  - Confirmation by ECG
Results

- From a total of 740 recruited patients, 708 patients were eligible
- Mean age of the cohort was $60.8 \pm 8.7$ years and 433 (61.2%) cases were men.
Results

- 109 (15.3%) patients developed POAF.
- most frequent on the 2\textsuperscript{nd} post-operative day (43 [39.4\%] patients)
Results

- Patients with Hb A1c > 8% had a longer duration of diabetes ($P < 0.001$),
- More males ($P = 0.001$),
- Higher levels of serum creatinine ($P = 0.001$),
- Larger left atrial size in the preoperative echocardiography ($P = 0.002$)

But no significant difference regarding POAF ($P = 0.71$)
P for trend 0.002
**Table: Multivariable model for detecting the adjusted effect of hemoglobin A1c on the development of post operative atrial fibrillation**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.04</td>
<td>1.01-1.06</td>
<td>0.001</td>
</tr>
<tr>
<td>COPD</td>
<td>4.66</td>
<td>1.41-15.39</td>
<td>0.012</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.67</td>
<td>1.06-2.65</td>
<td>0.027</td>
</tr>
<tr>
<td>Preoperative Cr</td>
<td>1.65</td>
<td>1.20-2.28</td>
<td>0.002</td>
</tr>
<tr>
<td>LA size</td>
<td>1.07</td>
<td>1.02-1.12</td>
<td>0.004</td>
</tr>
<tr>
<td>Full perfusion time</td>
<td>1.00</td>
<td>1.00-1.01</td>
<td>0.014</td>
</tr>
</tbody>
</table>

CI: Confidence interval; COPD: Chronic obstructive pulmonary disease; Cr: Creatinine; LA: Left atrium
Conclusion

- We observed an incidence of 15.3% for POAF in diabetic patients undergoing CABG.
- The development of POAF following CABG was associated with the age, hypertension, COPD, preoperative serum creatinine level, and LA size, but not the preoperative HbA1c level.
Thank you
Any question?