Revascularization in Diabetics with Multivessel Disease
A Population-based Evaluation of Outcomes

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American Heart Association, Orlando
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Background

- Projected deaths from DM and its complications are expected to rise by 50% in the next 10 years

- Diffuse coronary artery disease is a common presentation in patients with DM

- Selecting the optimal revascularization strategy is key to improving outcomes in this population
FREEDOM MACCE at 5-Years

P = 0.005 by log-rank test
5-Yr event rate: 26.6% vs. 18.7%

NNT = 12.6
Trends in NSTEMI Management with DM patients with MV-CAD (NCDR – ACTION)

489 Hospitals with 22,817 patients

A. Pandey et al ACC 2015 (abstract)
Aim

To assess the practice patterns and outcomes in a real-world population with DM and multi-vessel disease undergoing PCI or isolated CABG in the province of British Columbia, Canada between October 1, 2007 and January 31, 2014
51,203 revascularization cases (40,053 PCI; 11,150 isolated CABG) in BC from Oct 1, 2007 to January 31, 2014 (44,766 patients)

- Exclude non-diabetics
  - 14,080 procedures (12,006 patients)

- Exclude single vessel and left main disease
  - 7,843 procedures (6,830 patients)
    - FREEDOM trial exclusions
      1. Severe CHF (NYHA class III/IV)
      2. Prior CABG or PCI within 6-months
      3. Prior valve surgery
      4. Two or more chronic total occlusions
      5. STEMI within 72 hours
      6. Stroke within 6 months
  
  - 4,819 procedures (4,661 patients)
    - 2,888 PCI
      - 1,966 ACS
      - 922 Stable IHD
    
    - 1,931 CABG
      - 1,051 ACS
      - 880 Stable IHD

n=3,017

ACS = stabilized ACS
Outcomes

Primary

- First occurrence of a major cardiac/cerebrovascular adverse event after revascularization (MACCE)
  - All-cause mortality, non-fatal MI, non-fatal stroke

Secondary

- Individual components of MACCE
  - Plus repeat revascularization
  - Plus MACCE and repeat revascularization

Definitions

- Validated ICD-10 codes for MI and stroke
- Death from Vital Statistics database
- Repeat revascularization from provincial procedure database
Statistical Analyses

• Group comparisons
  ▪ Chi-square test for categorical variables; Student’s t-test for continuous variable

• Outcome Analyses
  ▪ Short term (30 days): Logistic regression
  ▪ Long term (31 days – 5 years): Cox proportional hazards
  ▪ MACCE models adjusted for baseline demographic and clinical variables
  ▪ Potential augmentation of revascularization impact on MACCE assessed with interaction term (acuity x procedure)

• Event Rates
  ▪ Kaplan-Meier rates expressed as percentages, accounting for follow-up time
## Baseline Characteristics by Revascularization Mode

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PCI (n=2888)</th>
<th>CABG (n=1931)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years) mean ± SD</strong></td>
<td>67.3 ± 10.8</td>
<td>65.2 ± 9.0</td>
</tr>
<tr>
<td><strong>Sex, Female (%)</strong></td>
<td>28.0</td>
<td>22.8</td>
</tr>
<tr>
<td><strong>Hypertension (%)</strong></td>
<td>88.1</td>
<td>91.8</td>
</tr>
<tr>
<td><strong>Pulmonary Disease (%)</strong></td>
<td>16.5</td>
<td>12.0</td>
</tr>
<tr>
<td><strong>Renal Insufficiency (%)</strong></td>
<td>7.1</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>3-vessel Disease (%)</strong></td>
<td>28.2</td>
<td>64.3</td>
</tr>
<tr>
<td><strong>Proximal LAD (%)</strong></td>
<td>23.6</td>
<td>45.0</td>
</tr>
<tr>
<td><strong>Stabilized ACS (%)</strong></td>
<td>68.1</td>
<td>54.4</td>
</tr>
<tr>
<td><strong>Urgency – Elective (%)</strong></td>
<td>29.9</td>
<td>41.1</td>
</tr>
<tr>
<td><strong>Ejection Fraction &gt; 50%</strong></td>
<td>56.9</td>
<td>66.1</td>
</tr>
</tbody>
</table>

All p<0.01 except renal disease; p = 0.81
# Baseline Characteristics by Presentation Acuity

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Stabilized ACS (n=3017)</th>
<th>Stable IHD (n=1802)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) mean ± SD</td>
<td>66.8 ± 10.6</td>
<td>66.0 ± 9.3</td>
</tr>
<tr>
<td>Sex, Female (%)</td>
<td>28.3</td>
<td>22.0</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>88.6</td>
<td>91.3</td>
</tr>
<tr>
<td>Pulmonary Disease (%)</td>
<td>15.5</td>
<td>13.2</td>
</tr>
<tr>
<td>Renal Insufficiency (%)</td>
<td>7.9</td>
<td>5.5</td>
</tr>
<tr>
<td>3-vessel Disease (%)</td>
<td>43.0</td>
<td>42.2</td>
</tr>
<tr>
<td>Proximal LAD (%)</td>
<td>31.8</td>
<td>32.8</td>
</tr>
<tr>
<td>CCS III/IV (%)</td>
<td>95.2</td>
<td>22.1</td>
</tr>
<tr>
<td>Urgency – Elective (%)</td>
<td>2.0</td>
<td>88.7</td>
</tr>
<tr>
<td>Ejection Fraction &gt; 50%</td>
<td>54.4</td>
<td>71.1</td>
</tr>
</tbody>
</table>

All p<0.01 except 3-vessel; p = 0.60 and pulmonary disease; p = 0.03
MACCE adjusted for age, sex, presentation (Stabilized ACS vs. Stable IHD), urgency (emergent, urgent vs. elective), EF (>50%, 30-50%, <30%), PAD, renal insufficiency, liver/GI disease and disease severity (3 vs. 2-vessel).
## Impact of Acuity at Presentation

### Results

#### 30-day (Short term)

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Stabilized ACS</th>
<th>Stable IHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI n=2888</td>
<td>CABG n=1931</td>
<td>p-value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PCI n=1966</td>
<td>CABG n=1051</td>
<td>p-value</td>
</tr>
<tr>
<td></td>
<td>PCI n=922</td>
<td>CABG n=880</td>
<td>p-value</td>
</tr>
<tr>
<td>p-value</td>
<td>p-value interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2%</td>
<td>3.4%</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>8.3%</td>
<td>4.4%</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>1.5%</td>
<td>2.3%</td>
<td>0.30</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

#### 31-day to 5 years (long term)

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Stabilized ACS</th>
<th>Stable IHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI n=2710</td>
<td>CABG n=1865</td>
<td>p-value</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PCI n=1802</td>
<td>CABG n=1005</td>
<td>p-value</td>
</tr>
<tr>
<td></td>
<td>PCI n=908</td>
<td>CABG n=860</td>
<td>p-value</td>
</tr>
<tr>
<td>p-value</td>
<td>p-value interaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.2%</td>
<td>17.9%</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>34.7%</td>
<td>21.4%</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>24.2%</td>
<td>13.8%</td>
<td>&lt;0.01</td>
<td>0.51</td>
</tr>
</tbody>
</table>

*Rates (%) from Kaplan Meier curves*
MACCE adjusted for age, sex, presentation (Stabilized ACS vs. Stable IHD), urgency (emergent, urgent vs. elective), EF (>50%, 30-50%, <30%), PAD, renal insufficiency, liver/GI disease and disease severity (3 vs. 2-vessel).
Secondary Outcomes (long-term post revasc)

Results

- **MACCE (%)**
  - CABG vs. PCI
  - Post 30-day 5-year rate: 17.9 vs. 31.2%
  - Log-rank test: p=0.01

- **Death (%)**
  - CABG vs. PCI
  - Post 30-day 5-year rate: 10.3 vs. 19.0%
  - Log-rank test: p=0.03

- **MI (%)**
  - CABG vs. PCI
  - Post 30-day 5-year rate: 6.8 vs. 15.5%
  - Log-rank test: p=0.01

- **Stroke (%)**
  - CABG vs. PCI
  - Post 30-day 5-year rate: 5.8 vs. 7.9%
  - Log-rank test: p=0.03

- **RR (%)**
  - CABG vs. PCI
  - Post 30-days 5-year rate: 7.8 vs. 24.4%
  - Log-rank test: p=0.01

 graphs showing time from revascularization (months) on the x-axis and the percentage on the y-axis.
Limitations

• Observational nature

• Important differences between PCI and CABG cohorts at baseline. Inverse probability weighting analysis underway

• Potential survival bias with CABG cohort

• Limited data on complexity of anatomy, completeness of revascularization
Conclusions

• Death and MI and other serious complications were significantly lower in CABG patients.
  - Consistent with findings of the FREEDOM Trial

• CABG in stabilized ACS patients with diabetes mellitus and multivessel disease worthy of consideration