Multiple Arterial Bypass Grafting Should Be Routine

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Disclosures:
None
MABG Should Be Routine: Background

• Adding a 2\textsuperscript{nd} arterial graft during CABG improves long term survival.\textsuperscript{1–3}

• Either the radial artery (RA) or the right internal thoracic artery (RITA) may be used.\textsuperscript{4}

• Yet, use of a 2\textsuperscript{nd} arterial graft is 10\% (RITA 4\% and RA 6\%) in the U.S.\textsuperscript{5}

• What is potential survival benefit of “routine” multiple arterial grafting?

Implementation of 2014 hypertension guidelines in U.S. adults between 35 and 74 years. Potentially could prevent 13,000 deaths annually.

MABG Should Be Routine: Objectives

• To estimate the reduction in deaths and number of additional person years of life that could potentially be gained by nationwide adoption of routine multiple arterial bypass grafting (MABG).

• To define an achievable and optimal MABG rate.
MABG Should Be Routine: Methods

- RA: 1,965 patients; SV: 2,918 patients.
- Propensity matching on 31 prospectively collected variables resulted in 1002 matched RA and SV pairs.
- Kaplan Meier estimates of survival.
- Primary endpoints: all cause mortality using the SSDI (10/2012).
MABG Should Be Routine: Statistical Methods

• Evaluated 2 rates of MABG—20% and 80%—and compared these to the current national rate of 10%.

• Applied these MABG rates to a hypothetical population of 200,000 patients similar to our propensity matched patients (2010: 395,000 CABG in U.S.).

• Calculated the potential number of lives saved and the number of added person years of life based on the Kaplan Meier survival estimates.
MABG Should Be Routine: Results

• Propensity matched 1002 RA and 1002 SV pairs:
  Age: 62 years
  Male: 75%
  Diabetic: 40%
  3VD: 80%
  Mean # of grafts: 3.7/patient
Kaplan Meier Survival Curves: Unmatched patients

Survival %

Patients at Risk
- RA: 1965, 1396, 845, 234
- SV: 2918, 2211, 1243, 323

Years After CABG

p < 0.001
Kaplan Meier Survival Curves: Matched Patients

Survival %

Years After CABG

Patients at Risk

0% 25% 50% 75% 100%

1002 1002 756 742 496 402 135 109

RA

SV

p<0.001
200,000 patients
Present Reality in USA

MABG
20,000 (10%)

16,660 alive

83.3%

10 years

SITA
180,000 (90%)

135,000 alive

75.0%

10 years

151,660 alive at 10 yrs
200,000 patients (80% MABG strategy)

MABG 160,000 (80%)

133,280 alive

83.3%

163,280 Alive at 10 yrs

Δ=11,620 Fewer deaths

SITA 40,000 (20%)

30,000 alive

75.0%

10 years
MABG should be routine:
Results

<table>
<thead>
<tr>
<th>Time after CABG</th>
<th>Kaplan Meier RA survival rate</th>
<th>Kaplan Meier SV survival rate</th>
<th>Patients at risk RA 10%</th>
<th>Patients at risk RA 20%</th>
<th>Patients at risk RA 80%</th>
<th>Reduction in deaths @20% RA</th>
<th>Reduction in deaths @80% RA</th>
<th>Cumulative person-years @20% RA</th>
<th>Cumulative person-years @80% RA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>98.5%</td>
<td>98.0%</td>
<td>196,100</td>
<td>196,200</td>
<td>196,800</td>
<td>100</td>
<td>700</td>
<td>100</td>
<td>700</td>
</tr>
<tr>
<td>5 years</td>
<td>93.5%</td>
<td>89.1%</td>
<td>179,080</td>
<td>179,960</td>
<td>185,240</td>
<td>880</td>
<td>6,160</td>
<td>2,450</td>
<td>17,150</td>
</tr>
<tr>
<td>10 years</td>
<td><strong>83.3%</strong></td>
<td><strong>75.0%</strong></td>
<td>151,660</td>
<td>153,320</td>
<td>163,280</td>
<td><strong>1,660</strong></td>
<td><strong>11,620</strong></td>
<td><strong>9,190</strong></td>
<td><strong>64,330</strong></td>
</tr>
</tbody>
</table>
Radial Artery Utilization:
Mount Sinai Heart at Beth Israel
MABG Should Be Routine: Limitations

- Retrospective study with patient selection bias
- Propensity matching was thorough but there remains the possibility of uncontrolled confounding effects
- Model and assumptions may not be applicable to all patients
- Only all cause mortality was available
MABG Should Be Routine: Summary

• RA-based MABG strategy could potentially prevent over 11,000 deaths annually in the USA.
• Over the course of 10 years, over 64,000 person years of life may be added.
• An 80% rate of multiple arterial grafting is achievable using a RA-based multiple arterial grafting strategy.
MABG Should Be Routine: Conclusions

• Multiple arterial grafting should be routine during CABG in the majority of patients with the appropriate age, anatomy and clinical indications.

• RA grafting should be more widely utilized to achieve a rate of 80% MABG use (which may define an coronary arterial grafting reference center).