Coronary Revascularization for Severe LV Dysfunction

Is the concept of viability testing still viable?

Torino2017
Before Surgery – LVEF = 26%

Wall Motion (Continued)

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Wall Motion Score Index</th>
<th>2.63</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Posterior

Base

Mid

Apex

After Surgery – LVEF = 45%

Wall Motion

<table>
<thead>
<tr>
<th>Baseline</th>
<th>Wall Motion Score Index</th>
<th>1.63</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior</td>
<td></td>
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Posterior

Base

Mid

Apex
Viability and Prognosis in Patients with LV Dysfunction

Different Substrates

- Hibernation (resting ischemia)
- Repetitive stunning (inducible ischemia)
- Extent of scar
- Extent of remodeling
- Duration of hibernation

“How much is enough – not an all or none issue”

Need for combined imaging approaches to characterize substrates and reversibility
STICH – Myocardial Viability and Survival

601 pt – viability testing

Hazard ratio 0.64
95% CI 0.48-0.86
P=0.003

Without viability (114 pt)
With viability (487 pt)

Years since randomization

Bonow: NEJM, 2011
### STICH – Myocardial Viability and Survival

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>No.</th>
<th>Deaths</th>
<th>HR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without viability</td>
<td>114</td>
<td>58</td>
<td>0.70 (0.41-1.18)</td>
<td>NS</td>
</tr>
<tr>
<td>With viability</td>
<td>487</td>
<td>178</td>
<td>0.86 (0.64-1.16)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Bonow: NEJM, 2011
“If you are not confused by this – you are not thinking clearly.”

Pogo
## STICH Viability Study

### Limitations

- Study is underpowered
- Non-randomized – viability performed at physician discretion and unblinded
- Baseline differences between pt with/without viability testing – ↓ comorbidities

### Generalizability to contemporary population

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>ICD</td>
<td>50%</td>
</tr>
<tr>
<td>CRT</td>
<td>20%</td>
</tr>
</tbody>
</table>

- 85% of patients in substudy – non-USA
- 3 VD only present in approximately one third
- Viability determined in a binary fashion – PET and CMRI – greater accuracy and provide additional information
- Does not distinguish between dysfunctioning potentially viable myocardium and reversibility
Inducible Myocardial Ischemia and Outcomes of Revascularization

- STICH Trial
- EF <0.35

Stress testing

- Inducible ischemia 64%
- % ischemic myocardium (18±11%)

Mortality

No Ischemia

MED (31 events)
CABG (22 events)

Ischemia

MED (56 events)
CABG (47 events)

Panza: JACC, 2012
Importance of Angina in Patients With Coronary Disease, Heart Failure, and Left Ventricular Systolic Dysfunction

Insights From STICH

Jolicouer et al

“Presence of angina does not confer markedly worse prognosis or a greater benefit from revascularization by CABG. But CABG does improve angina symptoms compared with medical therapy alone.”

EDITORIAL COMMENT

Angina in Revascularization of Ischemic Cardiomyopathy

The Whole Quilt, or Just a STICH?*

Jeffrey B. Geske, MD, Bernard J. Gersh, MB, ChB, DPhil.
Impact of Ischemia and Scar on Therapeutic Benefit from Coronary Revascularization

- 13,969 pt
- Adenosine or exercise SPECT

Role of ischemia in pt with >10% fixed myocardial defect

- % ischemic myocardium = P=0.089
- Ischemia treatment interaction = P=0.489
Impact of Ischemia and Scar on Therapeutic Benefit from Coronary Revascularization

- 13,969 pt
- Adenosine or exercise SPECT

Role of ischemia on benefit of revascularization was nullified by presence of extensive infarction/scar

Hachamovich: EHJ, 2011
Is There a Role for Viability and Ischemia Testing? Is the Concept Still Valid and Rational?

- No effect of viability, inducible ischemia and angina on surgical outcomes
- ↑ remodeling with non-viability but no effect on surgical outcomes

In patients with LV dysfunction and CAD, are the presence of viability, inducible ischemia and angina still therapeutic targets?

YES

Considerations

Viability and Ischemia

Extent of scar and remodeling

What is the point of no return?
Clinical Scenarios Indicative of Viability

- Severe CAD and no history of MI
- Absent Q waves on ECG
- Significant angina or stress-induced ischemia

Patients with CAD and severe LV dysfunction (EF ≤ 0.35)

- “Flash” pulmonary edema with subsequent improvement
  - Clinical EF?

- Angiography
  - Subtotal occlusions
  - Collaterals
## Role of Viability Testing in Clinical Decision Making in Patients With LV Dysfunction

### Not Essential
- Significant angina
- Good distal vessels
- **ECG**
  - No Q waves
  - Preserved voltage
- Reasonable surgical risk

### Potentially Helpful
- Severe LV dysfunction
- Extensive LV remodeling
- Multiple comorbidities
- Incomplete revascularization is likely
- Angina – less severe
Role of Viability Testing

Conclusions

• May predict response to revascularization in *selected* pts with CAD and LV dysfunction

• Marker of prognosis

• May influence response to medical therapy

• Impact of viability and residual ischemia may be overwhelmed by extensive scar and remodeling.

• Should “not” be a routine determinant of decision to revascularize
“The reports of my death are greatly exaggerated.”

Text of a cable sent by Mark Twain from London to the press in the U.S. after his obituary had been mistakenly published.
“If the truth is left alone, sooner or later it will come to the surface,

But that is very difficult – If an authoritarian body has come up with the wrong answer”.

R.A. Willis