LV Aneurysm and VSD in Ischaemic Heart Failure / Στεφανιαία νόσος, ανεύρυσμα αριστεράς κοιλίας και VSD

CABG alone. It’s enough? / Μόνο η αορτοστεφανιαία παράκαμψη είναι αρκετή;

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Postinfarct Remodelling = > 20% ↑↑ in LVEDV at 6 or 12 mo

in ~ 30% of infarcted pts

Depends on infarct size

Higher prevalence in unsuccessful reperfusion


↓↓ in LVEF is often observed during post MI remodelling

initial ventricular remodelling is not always associated with ↓↓ in LVEF

Systolic function - unchanged or even ↑↑ in the mo following an acute MI, even in the presence of ↑↑ of ventricular chambers

pts with LVESVI >60 ml/m² - 5 X ↑↑ in mortality compared with those with normal volumes post MI

- Normal LVESVI = 26 ml/m² (± 5.1 ml/m²)

LVESVI - major determinant of survival after recovery from MI

Circulation 1987; 76: 44-51
GUSTO I trial

- among MI pts with successful thrombolysis

- 17% had progressive LV enlargement > 40 ml/m$^2$

- 1-year mortality was
  - 16% with LVESVI 40 - 50 ml/m$^2$
  - 21% with LVESVI 50 - 60 ml/m$^2$
  - 33% when LVESVI >60 ml/m$^2$

Circulation 1997; 96: 116-21
REPERFUSION STRATEGIES

- Only viable myocardium is expected to recover.
- A large amount of scarred myocardium may contribute negatively to overall LV function.
  - Accelerates or worsens the process of remodeling.
  - Reduces the mechanical contribution of normal or viable myocardium via tethering of adjacent segments.

J Thorac Cardiovasc Surg 2014;148:2677-84
SURGICAL VENTRICULAR RESTORATION
ΑΝΑΔΙΑΜΟΡΦΩΣΗ ΑΡΙΣΤΕΡΗΣ ΚΟΙΛΙΑΣ

- established therapy for restoring cardiac size, shape, and function

- SVR + CABG - improves the morphologic characteristics of pts with ICM and provides clinical outcomes superior to medical therapy alone

- improves regional myocardial performance in nonischemic areas remote from the scar, improves EF, and reduces ventricular dyssynchrony
Can the addition of SVR to CABG improve
The Surgical Treatment for Ischemic Heart Failure (STICH) was a large, National Institutes of Health sponsored, multinational trial evaluating surgical therapy for ischemic cardiomyopathy.

- 2136 pts
- 127 clinical sites
- 26 countries
- 1231 days
Randomized Patients

**CAD, EF ≤ 0.35**

**Eligible for MED-only treatment?**

<table>
<thead>
<tr>
<th>Stratum A</th>
<th>n = 1061</th>
<th>Stratum B</th>
<th>n = 216</th>
<th>Stratum C</th>
<th>n = 859</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MED</td>
<td>2 MED + CABG</td>
<td>3 MED</td>
<td>4 MED + CABG</td>
<td>5 MED + CABG + SVR</td>
<td>6 MED + CABG</td>
</tr>
<tr>
<td>(527)</td>
<td>(534)</td>
<td>(75)</td>
<td>(76)</td>
<td>(65)</td>
<td>(423)</td>
</tr>
<tr>
<td>2 MED + CABG</td>
<td>4 MED + CABG</td>
<td>5 MED + CABG + SVR</td>
<td>6 MED + CABG</td>
<td>7 MED + CABG + SVR</td>
<td></td>
</tr>
<tr>
<td>(602)</td>
<td>(610)</td>
<td>(499)</td>
<td>(501)</td>
<td>(436)</td>
<td></td>
</tr>
</tbody>
</table>

**Randomized pts = 2136**

- **602 MED only**
- **1033 CABG added**
- **501 CABG + SVR added**

**Numbers for Analysis by Hypothesis**

- **Hypothesis 1**
  - n = 1212
  - MED only: 602
  - CABG added: 1033
  - CABG + SVR added: 501

- **Hypothesis 2**
  - n = 1000
  - MED only: 499
  - CABG added: 501
Coronary-Artery Bypass Surgery in Patients with Left Ventricular Dysfunction

MED alone vs. MED + CABG

No significant difference

with respect to the primary endpoint of death from any cause

- CABG lower rates of
  - death from cardiovascular causes
  - death from any cause
  - hospitalization for cardiovascular causes

17% of patients crossed over from the medical to surgical arm in the 1st yr

Re-analyzation of data based upon treatment received within the 1st yr of randomization

=> clear survival benefit to surgery

10-yr outcomes after CABG according to age in pts with HF & LVS dysfunction: an analysis of the extended follow up of the STICH trial

- median of 9.8 years
- improved clinical outcomes following CABG + MED
- significantly lower mortality in CABG + MED
  - from CV causes
  - any cause of death
- Lower hospitalization rates from CV causes

Coronary Bypass Surgery with or without Surgical Ventricular Reconstruction


- Hypothesis 2 component of the Surgical Treatment for Ischemic Heart Failure (STICH) trial – SVR + CABG, would ↓ the rate of death or hospitalization for a cardiac event, as compared with CABG alone

- 2002 - 2006, 1000 pts – EF ≤ 35%, CAD amenable to CABG, and dominant anterior LV dysfunction amenable to SVR randomly assigned to undergo either
  - CABG alone - 499 pts or
  - CABG + SVR - 501 pts

- Death from any cause and hospitalization for cardiac causes

- Median follow-up was 48 months
Coronary Bypass Surgery with or without Surgical Ventricular Reconstruction

- SVR ↓↓ the ESV index by 19%, as compared with a reduction of 6% with CABG alone
- Cardiac symptoms and exercise tolerance improved to a similar degree in the two study groups
- No significant difference was observed in the primary outcome

Conclusions

Adding SVR to CABG reduced the LV volume, as compared with CABG alone.

However, this anatomical change was not associated with a greater improvement in symptoms or exercise tolerance or with a reduction in the rate of death or hospitalization for cardiac causes.
- pts with lower baseline LVEF (≤25%) tended to do worse with CABG + SVR, and patients with higher baseline LVEF (≥33%) tended to do better
  - no significant interaction

- If pts were separated into 3 groups according to whether their baseline LVESVI was, 60, 60–90, or >90 mL/m² there was again a statistically significant treatment advantage favoring SVR in patients with LVESVI <60 mL/m²

European Heart Journal (2013) 34, 39–47
LVESVI $\geq 80 \text{ mL/m}^2$ as a risk factor for poor clinical outcome or death

Role of Surgical Ventricular Restoration in the Treatment of Ischemic Cardiomyopathy

- 221 pts with EF <0.35
- NYHA class III or IV
- CABG + SVR or CABG alone
- 2 groups of pts:
  - group 1 - (preop LVESVI < 80 mL/m², n=127) and
  - group 2 (preop LVESVI ≥ 80 mL/m², n= 94)
- mean follow-up time was 30.7 ± 10.1 months
Role of Surgical Ventricular Restoration in the Treatment of Ischemic Cardiomyopathy

- **Group I** – [preop LVESVI < 80 mL/m²]

  Readmissions after: CABG + SVR (27.8%) vs CABG (38.2%) (p=0.225). There was no difference in survival between CABG + SVR and CABG (p=0.709).

- **Group II** – [preop LVESVI ≥ 80 mL/m²]

  CABG + SVR patients showed greater EF improvement (55.6% versus 30.8%, p=0.020) and were more likely to improve to NYHA class I or II (58.3% versus 36.5%, p=0.044). Fewer readmissions for the CABG + SVR pts than for the CABG patients (30.6% versus 57.7%, p=0.012). **CABG + SVR yielded better survival** than did CABG (p=0.031).

- Conclusions. **Patients with much advanced LVESVI are more likely to benefit from surgical ventricular restoration**, and this surgical procedure still holds its ground in the treatment of ischemic cardiomyopathy.
Myocardial viability testing does not discriminate pts who would derive a mortality benefit from adding SVR to CABG

Viability testing was never a requirement of the SVR arm of STICH

Instead, ventricular size and regional function were determinants

SVR had not previously been rigorously studied, as it was in STICH

The updated 2014 ESC guidelines on revascularization - commend that **CABG + SVR may be considered** in such patients ‘‘especially if a postoperative LVESV index <70 mL/m² can be predictably achieved’’ (class IIb)

The requirement for a postop LVESV <70 mL/m² comes from STICH data
<table>
<thead>
<tr>
<th></th>
<th>Low EF</th>
<th>Υπόλοιποι</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>64.8±9.9</td>
<td>64.9±9.5</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>24(12.5%)</td>
<td>210(14.6%)</td>
<td>0.48</td>
</tr>
<tr>
<td>REDO</td>
<td>6(3.1%)</td>
<td>24(1.7%)</td>
<td>0.018</td>
</tr>
<tr>
<td>PCI</td>
<td>35(18.2%)</td>
<td>203(14.1%)</td>
<td>0.165</td>
</tr>
<tr>
<td>OEM history</td>
<td>133(69.3%)</td>
<td>702(48.6%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CPB time (median,min)</td>
<td>95.5</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>IABP</td>
<td>42(22.1%)</td>
<td>62(4.3%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Transfusions RBC (Average, SD units)</td>
<td>2.5±2</td>
<td>2±2.2</td>
<td></td>
</tr>
<tr>
<td>Mech ventilation (median hours)</td>
<td>8</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ICU (Median Days)</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>LCOS(SIMDAX)</td>
<td>68(36%)</td>
<td>24(1.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>PMI</td>
<td>4(2%)</td>
<td>16(1.1%)</td>
<td>0.239</td>
</tr>
<tr>
<td>Sternal infection</td>
<td>15(7.9%)</td>
<td>44(3%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Prolonged Vent(&gt;24 h)</td>
<td>17(8.9%)</td>
<td>31(2.1%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NIV</td>
<td>26(13.7%)</td>
<td>105(7.3%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Re-intubation</td>
<td>11(5.8%)</td>
<td>21(1.5%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>AKI</td>
<td>40(21.1%)</td>
<td>159(11%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Dialysis</td>
<td>13(6.8%)</td>
<td>24(1.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Stroke</td>
<td>10(5.3%)</td>
<td>22(1.5%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>AF</td>
<td>78(41.1%)</td>
<td>430(29.8%)</td>
<td>0.002</td>
</tr>
<tr>
<td>Mortality</td>
<td>14(7.4%)</td>
<td>14(1%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

CT Surgery Department
“G. Papanikolaou” General Hospital

06/2012 – 12/2017
2632 CTS pts
1635 CABG pts
(62.1%)

LOW EF
192 / 1635 PTS
(11.7%)
“G. Papanikolaou” GH CTS Dept

- 9 pts with DOR procedure
- CABG + DOR – 4
- DOR – 4
- DOR + MVR - 1
- 1 death (CABG + DOR)
CONCLUSION

- CABG provides a reduction in overall mortality, CV deaths and hospitalizations, independent of symptoms, baseline LV size or function

- Appropriately selected pts undergoing a technically adequate operation will derive benefit from SVR

- Additional trials, with clear patient selection criteria, are needed to evaluate the safety and effectiveness of SVR for restoration of normal heart size and shape