The RECORD study

Resting perfusion defects on myocardial contrast echocardiography predict improvement after reopening of Chronic Total Occlusion.

S Barchetta¹, C Hamilton-Craig¹,², E Fedele¹, L Paraggio¹, AR De Caterina¹, G. Locorotondo¹, AG Rebuzzi¹, L Galiuto¹, F Crea¹

1. Catholic University of the Sacred Heart, Rome, Italy.
2. University of Queensland, Brisbane Australia.

Institute of Cardiology, Rome, Italy
BACKGROUND

• The best strategy for the management of patients with chronic total coronary occlusion (CTO) is unclear and the real utility of percutaneous coronary intervention (PCI) in this group of patients is under debate.

• Large randomized studies enrolling patients unselected in terms of myocardial viability have concluded for inefficacy of CTO reopening in terms of patients survival.

• In patients in whom viability has been assessed, beneficial effects on recovery of LV function have been observed.
Aim of the study

• We evaluated the role of coronary microvascular dysfunction in the outcomes of CTO’s revascularization
Study population

<table>
<thead>
<tr>
<th></th>
<th>Total population (n = 24)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (yrs) (mean ± SD)</strong></td>
<td>63 ± 13</td>
</tr>
<tr>
<td>Gender: males, n (%)</td>
<td>17 (71%)</td>
</tr>
<tr>
<td>Smokers, n (%)</td>
<td>9 (37%)</td>
</tr>
<tr>
<td>Hypertension, n (%)</td>
<td>16 (67%)</td>
</tr>
<tr>
<td>Hypercholesterolemia, n (%)</td>
<td>9 (37%)</td>
</tr>
<tr>
<td>Diabetes mellitus, n (%)</td>
<td>7 (29%)</td>
</tr>
<tr>
<td>Positive family history of CAD, n (%)</td>
<td>6 (25%)</td>
</tr>
<tr>
<td>previous history of IHD, n (%)</td>
<td>3 (13%)</td>
</tr>
<tr>
<td>CTO, n (%): IVA, DX, CX</td>
<td>12 (50%), 9 (37%), 3 (13%)</td>
</tr>
<tr>
<td>Collateral coronary circulation, n (%)</td>
<td>12 (50%)</td>
</tr>
<tr>
<td>STEMI, n (%)</td>
<td>10 (41%)</td>
</tr>
<tr>
<td>NSTEMI, n (%)</td>
<td>6 (25%)</td>
</tr>
<tr>
<td>Silent AMI, n (%)</td>
<td>3 (13%)</td>
</tr>
<tr>
<td>Stable angina, n (%)</td>
<td>5 (21%)</td>
</tr>
</tbody>
</table>
Methods:

- Prospective data from 24 patients with CTO (7 days - 6 months old) and successful recanalization
- Evaluation of microvascular integrity by MCE (Acuson Sequoia, with Sonovue, Bracco) before reopening of CTO and again after 12 months’ follow-up
- Evaluation of Contrast Score Index
- Perfusion Defect Length was blindly measured in 3 apical views averaged and expressed as % left ventricle (LV), as previously described ¹

¹ Galiuto – REMEDIA trial JACC 2006
Methods:

• Wall motion score index (WMSI), LV volumes and ejection fraction were calculated
• A planned subanalysis was carried out by dividing patients based on the presence or absence of baseline perfusion defects
Methods:

Baseline PD

No baseline PD
Methods:

Quantification: Semiquantitative Scoring

Contrast Score Index (CSI)

Sum of the scores in each segment, divided by the total number of segments

Normal opacification
Score 1

Reduced or delayed opacification
Score 2

Absent opacification
Score 3
Methods:

Quantification: Length of Perfusion Defect

Total endocardial length (blue line) and perfusion defect length (green line) are assessed and manually traced in 4-, 2-, 3-chamber views.

Contrast Defect Length (CDL) expresses the mean value of endocardial border lengths corresponding to the segments without any opacification.

Relative CDL (CDL%) is obtained by: (CDL / total endocardial length) x 100
Results

p = 0.001

p = 0.001

p = 0.005

p = 0.005
Results

p=0.001

p=0.0001
## Results

### Baseline echocardiographic characteristics in study population

<table>
<thead>
<tr>
<th></th>
<th>total population (n=24)</th>
<th>PD (n=16)</th>
<th>NO PD (n=8)</th>
<th>* p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EDV (mean ± SD)</strong></td>
<td>154 ± 30</td>
<td>160 ± 33</td>
<td>142 ± 22</td>
<td>Ns</td>
</tr>
<tr>
<td><strong>ESV (mean ± SD)</strong></td>
<td>83 ± 28</td>
<td>91 ± 28</td>
<td>65 ± 14</td>
<td>Ns</td>
</tr>
<tr>
<td><strong>EF (mean ± SD)</strong></td>
<td>48 ± 8,7</td>
<td>43,82 ± 8,16</td>
<td>54,79 ± 3,49</td>
<td>0,001</td>
</tr>
<tr>
<td><strong>WMSI (mean ± SD)</strong></td>
<td>1,73 ± 0,41</td>
<td>1,90 ± 0,38</td>
<td>1,39 ± 0,21</td>
<td>0,002</td>
</tr>
<tr>
<td><strong>CSI (mean ± SD)</strong></td>
<td>1,41 ± 0,28</td>
<td>1,57 ± 0,20</td>
<td>1,08 ± 0,10</td>
<td>&lt;0,001</td>
</tr>
</tbody>
</table>
Results

CSI

p<0.001

Baseline

Follow up

NS

NO PD

PD
Results

![Graph showing WMSI values for PD and NO PD, with significant difference (p<0.001) and no significant difference (NS) between baseline and follow-up for PD]

- **PD**
  - Baseline: 2.20
  - Follow-up: 1.80
  - **p<0.001**

- **NO PD**
  - Baseline: 1.40
  - Follow-up: 1.40
  - **NS**
Results

EDV

PD

NO PD

Baseline
Follow up

p<0.001

NS
Results

- **Baseline** vs **Follow up**
  - **PD**
    - Significant difference: $p<0.001$
  - **NO PD**
    - No significant difference: NS
Results

- **Baseline** vs **Follow up**
- **PD**: p<0.001
- **NO PD**: NS
Summary

• Reopening of CTO on the average was associated with
  - Improvement of microvascular flow
  - Improvement of regional and global LV function.

• However, the improvement was confined to the subset of patients with impairment of myocardial perfusion at baseline
Conclusions

• In patients with CTO the detection of perfusion defect at baseline MCE identifies a subset of patients who get benefit from reopening

• Lack of benefit in patient with preserved myocardial perfusion at baseline is probably related to the fact that collaterals circulation is already sufficient

• It remains to establish whether the information provided by assessment of perfusion by MCE is superior or at least comparable to that provided by assessment of myocardial viability