Pressure-controlled intermittent Coronary Sinus Occlusion (PiCSO) reduces Infarct Size and results in Functional Recovery after STEMI

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Background
- Infarct size (IS) predicts morbidity and mortality after STEMI
- Adjunctive (to primary PCI [pPCI]) strategies to limit infarct size (IS) may improve prognosis
- Pressure-controlled intermittent Coronary Sinus Occlusion (PiCSO, Miracor Medical Systems, Austria) intermittently increases average coronary sinus pressure and improves coronary perfusion in the ischemic zone and reduces infarct size
- The mechanism of action is reduction of reperfusion injury through improved microvascular perfusion

Aim
- We studied the effect of PiCSO on infarct size when applied during pPCI in STEMI patients

Materials & Methods
- 63 patients with a first anterior MI were enrolled in a prospective, parallel controlled study at 4 UK centers
- All patients received ACE inhibitors or ARBs, beta-blockers, atorvastatin and dual antiplatelet medication
- Antegrade blood flow (TIMI 2 or 3) was first restored in the culprit coronary artery using balloon angioplasty, followed by initiation of PiCSO treatment, during which stenting was performed
- Consecutive parallel control patients received standard treatment
- Microvascular obstruction (MVO), IS and left ventricular (LV) function were assessed by cMRI at 5-days post MI

Results

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>PiCSO</th>
<th>n</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVO (present)</td>
<td>57.90%</td>
<td>18.75%</td>
<td>19</td>
<td>0.019</td>
</tr>
<tr>
<td>Infarct Size (IS)</td>
<td>19.19 ± 12.56</td>
<td>7.72 ± 7.50</td>
<td>19</td>
<td>0.002</td>
</tr>
<tr>
<td>LVEF (%)</td>
<td>46.84 ± 8.52</td>
<td>53.21 ± 7.94</td>
<td>21</td>
<td>0.018</td>
</tr>
<tr>
<td>LVEDV (ml/m²)</td>
<td>52.11 ± 14.94</td>
<td>40.52 ± 12.50</td>
<td>21</td>
<td>0.011</td>
</tr>
<tr>
<td>LVEDV (ml/m²)</td>
<td>96.61 ± 17.35</td>
<td>84.99 ± 14.69</td>
<td>21</td>
<td>0.026</td>
</tr>
</tbody>
</table>

- After multivariate analysis to adjust for differences in baseline characteristics, PiCSO was associated with a predicted reduction in absolute IS by 10.57 percent points (95% CI (-17.19; -3.44), p=0.005) compared to controls

Conclusion
This ongoing study shows that after anterior STEMI, adjunctive PiCSO therapy during pPCI is safe, feasible and results in:
- Reduced incidence of MVO
- Significantly smaller infarct size
- Significantly reduced end-diastolic volume
- Significantly improved left ventricular function
- 4-month follow-up data are currently being analysed and trending in same direction as 5-day data

Infarct Size (% of LV) 5 days post MI

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