How to treat multivessel disease in STEMI patients

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„Primary PCI strategy“ is not just PCI!

Diagnostic part:
• Extent of coronary disease
• Infarct artery + culprit lesion
• Hemodynamic information, LV function
• Other diagnosis (AMI excluded) in 2-5%

Therapeutic part:
• Reperfusion
• Revascularization
• Multi-vessel coronary artery disease is found in 41 - 67% of STEMI patients
• Depending on the baseline characteristics (especially age) of the specific population

• Only 10% of STEMI patients initially treated by p-PCI have a clinical indication for non-culprit PCI during the subsequent 3-years follow-up.

• Multi-vessel disease is associated with worse prognosis in STEMI.

Relative proportion of single-VD vs. three most frequently used PCI strategies for multi-VD

### Aggressive approach: acute multi-vessel PCI during STEMI

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete revascularization</td>
<td>Risk of contrast nephropathy</td>
</tr>
<tr>
<td>Treat ischaemia at a distance</td>
<td>Radiation exposure</td>
</tr>
<tr>
<td>Treat secondary unstable lesions (plaque instability may not be limited to the culprit lesion)</td>
<td>Complications of treating additional lesions may be potentially fatal</td>
</tr>
<tr>
<td>Patient preference/comfort</td>
<td>Haemodynamic and clinical instability treating additional lesions</td>
</tr>
<tr>
<td></td>
<td>Increased risk of stent thrombosis</td>
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<td></td>
<td>Prothrombotic and inflammatory milieu in the acute phase of STEMI</td>
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<tr>
<td></td>
<td>Coronary spasm = overestimation of stenosis severity in non-infarct arteries</td>
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Conservative approach: acute PCI of IRA + medical therapy (unless recurrent ischaemia occurs)

<table>
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<tr>
<th>Advantages</th>
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</thead>
<tbody>
<tr>
<td>Treat only culprit lesion</td>
<td>May leave behind significant ischaemia-producing lesions</td>
</tr>
<tr>
<td>Avoid complications associated with treating other lesions</td>
<td>May not treat other unstable lesions</td>
</tr>
<tr>
<td>Indication for non-infarct artery PCI can be supported by the objective evidence for ischaemia</td>
<td>May not prevent recurrent Ischaemia</td>
</tr>
<tr>
<td>Ability to discuss with patients and their families the relative risks and benefits of treating the non-infarct related lesion vs. continued medical therapy or surgical options</td>
<td>Patients have to return to cath-lab</td>
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Intermediate approach: acute PCI of the infarct-related artery followed by staged PCI of secondary lesions

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<tr>
<td>Optimize potential for complete revascularization</td>
<td>Economics</td>
</tr>
<tr>
<td>PCI of a stable stenosis might be intervened more safely at a later phase, after stabilization</td>
<td>May treat asymptomatic lesions</td>
</tr>
<tr>
<td></td>
<td>Complications of treating secondary lesions early after index event</td>
</tr>
<tr>
<td></td>
<td>Timing uncertain</td>
</tr>
</tbody>
</table>
52-years, man, first STEMI, Killip I.
RCA 100%, LAD 90%, OM 80%.
68-years, woman, diabetes, second STEMI, Killip III. LAD 95% (culprit, ISR), RCA 100% (CTO), LCX 50%.
75-years, man, co-morbidities, inferior STEMI, Killip IV, EF 15%
LM 70%, LCX 99% (culprit), RCA 100% (CTO)
Real life: extreme variation of different clinical and angiographic scenarios!

**Angiographic:**
- Number of diseased vessels
- Lesion severity, location and type
- Chronic total occlusions
- TIMI flow
- Collaterals
- CABG candidate (angiographically)

**Clinical / echo / lab:**
- Killip class
- Immediate post-PCI haemodynamic situation
- LV function (wall motion in the infarct / contralateral territory)
- Renal function
- Diabetes
- CABG candidate (clinically)
It is unlikely that any randomized clinical trial in the future can be able to fully address this complexity and thus, experienced, wise clinical judgement will probably remain the most important factor in this difficult situation.
What do the ESC guidelines recommend?

• In multi-vessel disease, p-PCI should be directed only at the infarct-related coronary artery. Decisions about PCI of non-culprit lesions should be done later and guided by objective evidence of residual ischaemia.

• Only in the setting of cardiogenic shock is there a consensus for attempting multi-vessel PCI in selected patients with multiple critical lesions.
Recently (after guidelines) published data
Hannan EL et al. Circ Cardiovasc Interv 2013 Jan 15. [Epub]
Staged Versus One-time Complete PCI Revascularization for Multivessel CAD in non-STE ACS

3-years mortality

P=0.41

One-time complete revasc
Staged revasc
Culprit only or multivessel PCI in STEMI with multivessel disease.

- 5944 P-PCI from the Western Denmark Heart Registry 2002 – 2009
- 1-year mortality of acute MV-PCI, early staged PCI, or delayed staged PCI compared with mortality of STEMI with 1-VD.
- Acute MV-PCI (354 pts): adj. HR 1.53 (95% CI: 1.07-2.18)
- Early (same hospital stay) staged MV-PCI (194 pts): adj. HR 0.60 (95% CI: 0.28-1.26)
- Delayed (within 60 days) MV-PCI (626 pts): adj. HR 0.28 (95% CI: 0.14-0.54)

**CONCLUSIONS:** Acute multivessel PCI in patients with STEMI was associated with increased mortality.
Early complete revascularization (n=417) versus culprit vessel PCI followed by ischemia-guided staged PCI (n=383) in STEMI patients with multivessel disease (6 PCI centers).

![Graph showing comparison between Angio-guided (complete) and Ischemia-guided (incomplete) strategies]

Periproc. MI / re-MI: P = 0.01
MACE early: P = 0.017
MACE 2-years: log rank 0.05
Mylotte D et al. P-PCI in 266 STEMI pts with Resuscitated Cardiac Arrest and Cardiogenic Shock: Role of Multivessel Revascularization

*JACC Cardiovasc Interv* 2013 Jan 16 [Epub ahead of print]

![Graph showing 6-month survival rates for different revascularization strategies](image)

- SVD (n=97): 42.3%
- MVD with MV-PCI (n=66): 20.4%
- MVD with culprit PCI (n=103): 43.9%

*p = 0.0017*
CONCLUSION: A deferred PCI strategy of nonculprit lesions should remain the standard approach in STEMI, as multivessel PCI may be associated with a greater hazard for mortality and stent thrombosis.
Vlaar PJ et al. Culprit vessel vs multivessel vs staged PCI for MVD in STEMI: a pairwise and network meta-analysis. 
*J Am Coll Cardiol* 2011; 58: 692-703

- 4 prospective + 14 retrospective studies / 40280 pts
- Staged PCI associated with lower short- and long-term mortality as compared with culprit PCI and MV-PCI
- MV-PCI associated with highest mortality rates at both short- and long-term follow-up.

**CONCLUSION:** This meta-analysis supports current guidelines discouraging performance of multivessel primary PCI for STEMI.

- When significant nonculprit vessel lesions are suitable for PCI, they should only be treated during staged procedures.
Conclusions

Multi-vessel disease in STEMI is not a single entity and thus the treatment approach should be individualized. However, the general rules can be proposed till future large randomized trials prove otherwise:

- Single-vessel (IRA) acute PCI should be the default strategy.
- Acute multi-vessel PCI might be justified only in haemodynamically unstable patients with multiple truly critical (>90%) lesions.
- Significant lesions of the non-culprit arteries should be treated either medically or by staged revascularization procedures— both options are currently acceptable.