How to treat multivessel disease in STEMI patients

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Frontiers in cardiovascular medicine

How to treat patients with ST-elevation acute myocardial infarction and multi-vessel disease?

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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

Cardarelli F et al. Am J Cardiol 2009;103:766–771. Jang Hoon Lee et al. Am J Cardiol 2009;104:182–189. Rasoul S et al. Coron Artery Dis 2009;20:415–421. Toma M et al. Eur Heart J 2010;31:1701–1707. Only 10% of STEMI patients initially treated by p-PCI have a clinical indication for nonculprit PCI during the subsequent 3-years follow-up.

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

Lemesle G et al. Am J Cardiol 2009;103:1189–1195. Jaski BE et al. Am Heart J 1992;124:1427–1433.

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

Corpus et al. Am Heart J 2004, 148: 493-500.



In-hospital mortality after multi-vessel vs. single-vessel PCI in STEMI from the US National Cardiovascular Data Registry

(Chen LY et al. Am J Cardiol 2005, 95: 349-354).



Aggressive approach: acute multi-vessel PCI during STEMI

Advantages

Complete revascularization

Treat ischaemia at a distance

Treat secondary unstable lesions (plaque instability may not be limited to the culprit lesion)

Patient preference/comfort

Disadvantages

Risk of contrast nephropathy

Radiation exposure

Complications of treating additional lesions may be potentially fatal

Haemodynamic and clinical instability treating additional lesions

Increased risk of stent thrombosis

Prothrombotic and inflammatory milieu in the acute phase of STEMI

Coronary spasm = overestimation of stenosis severity in non-infarct arteries

Conservative approach: acute PCI of IRA + medical therapy (unless recurrent ischaemia occurs)

Advantages

Treat only culprit lesion

Avoid complications associated with treating other lesions

Indication for non-infarct artery PCI can be supported by the objective evidence for ischaemia

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

Disadvantages

May leave behind significant ischaemiaproducing lesions

May not treat other unstable lesions

May not prevent recurrent Ischaemia

Patients have to return to cath-lab

Intermediate approach: acute PCI of the infarct-related artery followed by staged PCI of secondary lesions

Advantages

- **Optimize potential for complete revascularization**
- PCI of a stable stenosis might be intervened more safely at a later phase, after stabilization

Disadvantages

Economics

May treat asymptomatic lesions

Complications of treating secondary lesions early after index event

Timing uncertain

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)

<u>Clinical / echo / lab:</u>

- 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 <u>critical</u> 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

Jensen LO et al. EuroIntervention 2012; 8: 456-64. 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.

Meliga E et al. J Interv Cardiol 2011; 24: 535-41. 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).



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]



6-mo survival

Kornowski R, HORIZONS-AMI Trial Investigators. Staged vs "one-time" multivessel PCI in AMI: analysis from the HORIZONS-AMI trial.

J Am Coll Cardiol 2011; 58: 704-11



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.