

# Revascularization strategy in cardiogenic shock

## - case based

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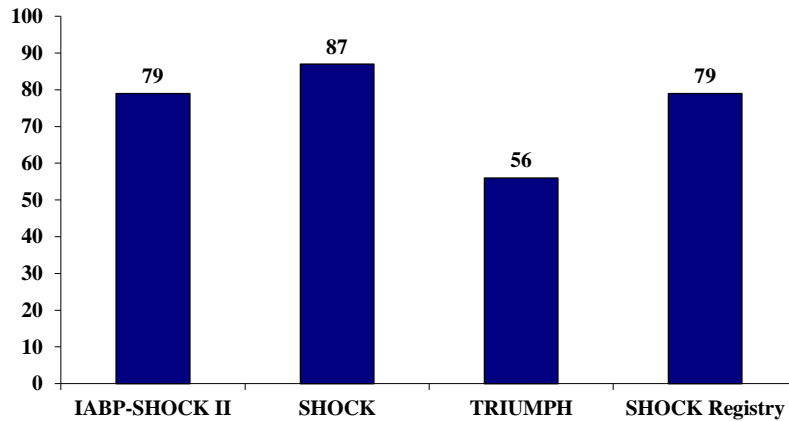


45. CardioEgypt  
Cairo 28.02.2018

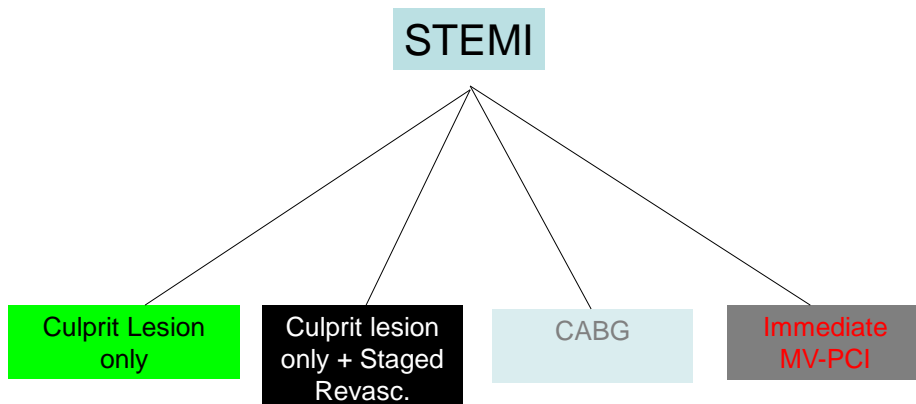
## Background

- ✓ About 40-50 % (in cardiogenic shock 70-80 %) of patients with STEMI will have multivessel coronary artery disease
- ✓ Patients with multivessel disease have a higher mortality
- ✓ The optimal revascularization strategy in these patients still has to be defined

## Incidence of multivessel disease in patients with cardiogenic shock



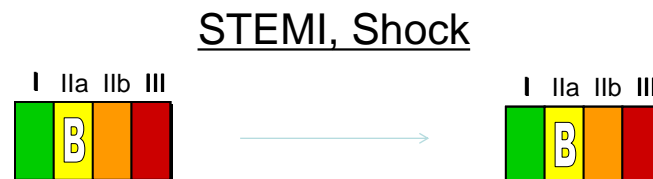
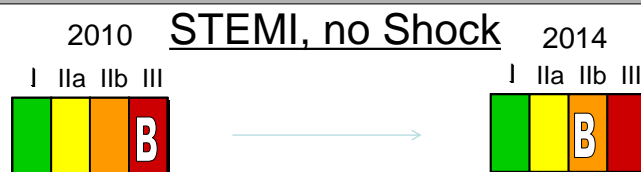
## Options in patients with STEMI and multivessel disease



## Benefit versus risk of multivessel PCI

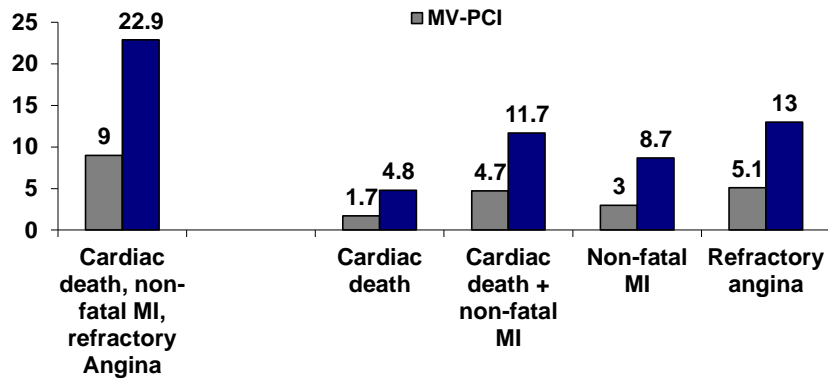
Advantages	Disadvantages
Immediate complete revascularization	Increased contrast load → risk of contrast-induced nephropathy
Treatment of remote ischemia	Radiation exposure
Treatment of secondary unstable lesions	Complications of treating additional lesions may induce deterioration of the patient
Reduced subsequent hospitalization for the patients and with resultant economic benefits	Coronary spasm might overestimate stenosis severity of non-culprit stenoses
Reduction in vascular complications by having all PCI performed during the index intervention through a single access site	Additional revascularization may not reduce ischemia more effectively than by intensive medical therapy following MI
Patient preference/comfort	Increased risk of early/late stent thrombosis (Restenosis) in the prothrombotic and inflammatory milieu in the acute phase
Limit infarct size and preserve left ventricular ejection fraction	
<b>Cardiogenic shock</b>	
Improved hemodynamics	Hemodynamic instability might be worsened by treating additional lesions (volume)

## Multivessel PCI in ACS Time trends in the ESC-Guidelines



Wijns et al. Eur Heart J 2010;31:2501-2555  
Windcker et al. Eur Heart J. 2014;35:2541-2619

## PRAMI-trial To good to be true



Wald et al. NEJM 2013;369:115-1123

## RCTs in primary PCI in multivessel disease

	PRAMI (n=465)	CvLPRIT (n=296)	PRIMULTI (n=627)	PRAGUE-13 (n=214)
<b>Lesion characteristics</b>	>50% DS	>70% DS or >50% DS in 2 views	>90% DS or FFR <0.80 in >50%-90% DS	>70% DS
<b>Strategy for non-IRA lesions</b>	Immediate	Immediate or staged within index admission	Staged within index admission	Staged between 3-40 days after index MI
<b>Primary endpoint</b>	Death/MI/refractory angina	Death/MI/heart failure/ischemia driven revasc	Death/MI/ischemia driven revasc	Death/MI/stroke
<b>Power (80%)</b>	20% reduced to 14% (30% Rx effect)	37% PEP reduced to 20% (40% Rx effect)	18% PEP reduced to 13% (30% Rx effect)	Not reported
<b>Result</b>	23% reduced to 9% (65% Rx effect)	21% reduced to 10% (55% Rx effect)	22% reduced to 13% (44% Rx effect)	16% reduced to 13.9% (n.s.)

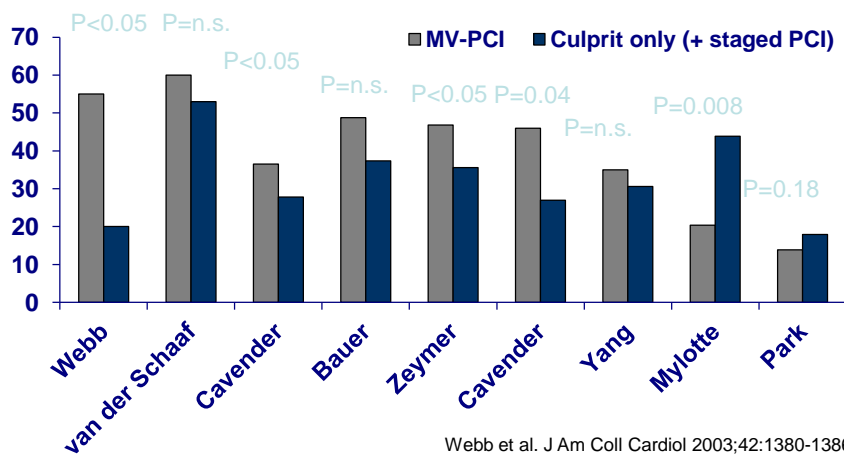
# PRIMULTI

Table 1. Clinical Outcomes at 1 Year by PCI Strategy

	IRA Only (n = 313)	Complete (n = 314)	HR (95% CI)
Primary Composite Endpoint	22%	13%	0.56 (0.38-0.83)
Ischemia-Driven Revascularization	17%	5%	0.31 (0.18-0.53)
Nonfatal MI	5%	5%	0.94 (0.47-1.9)
All-Cause Death	4%	5%	1.4 (0.63-3.0)

## Multivessel PCI or Culprit Lesion Only PCI

N=74 N=161 N=3087 N=336 N=735 N=199 N=338 N=169 N=510



Webb et al. J Am Coll Cardiol 2003;42:1380-1386.  
 van der Schaaf et al. Am J Cardiol 2010;105:955-959  
 Cavender et al. Am J Cardiol 2009;104:507-513  
 Bauer et al. Am J Cardiol 2012;109:941-946  
 Zeymer et al. EuroIntervention 2015;11:280-285  
 Cavender et al. J Invasive Cardiol 2013;25:218-224



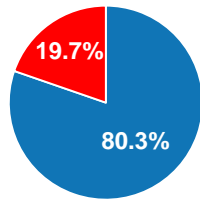
## Multivessel PCI in Cardiogenic Shock

### Metaanalysis Mortality – Registry-Data:

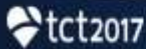
→ 10 observational studies published between 2003 and 2016

↓  
6,051 patients:

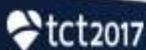
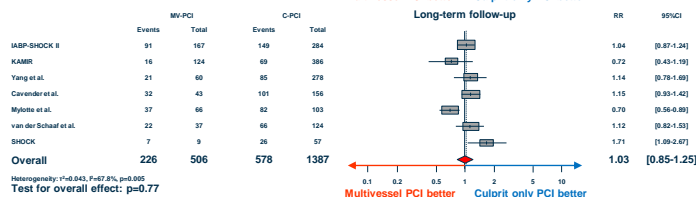
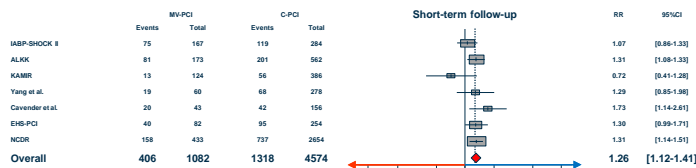
IABP-SHOCK II, ALKK, KAMIR, Yang et al., Cavender et al.;  
Mylotte et al., van der Schaaf et al., EHS-PCI, NCDR, SHOCK



- Culprit only-PCI (n=4,857)
- Multivessel-PCI (n=1,194)



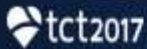
## Multivessel PCI in Cardiogenic Shock? Metaanalysis Mortality – Registry-Data



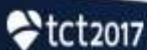
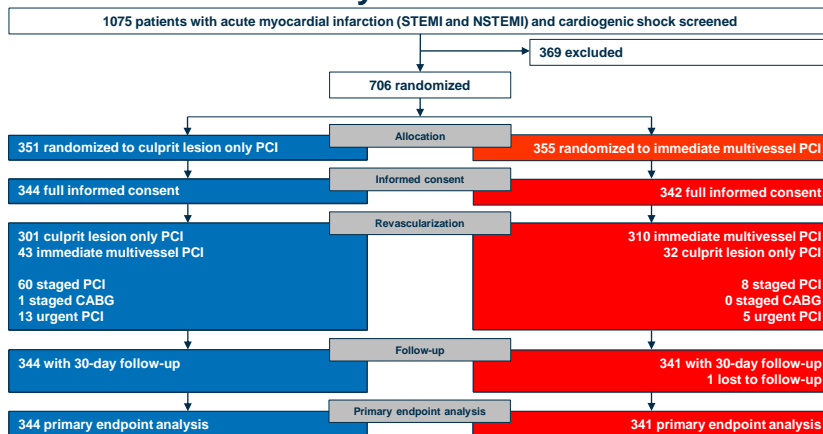


## Hypothesis

**Culprit lesion only PCI (with possible staged revascularization)**  
**is superior to**  
**immediate multivessel PCI**  
**in multivessel coronary artery disease** ( $\geq 2$  mm in diameter,  $>70\%$  stenosis incl. CTO) **patients with cardiogenic shock complicating acute myocardial infarction.**

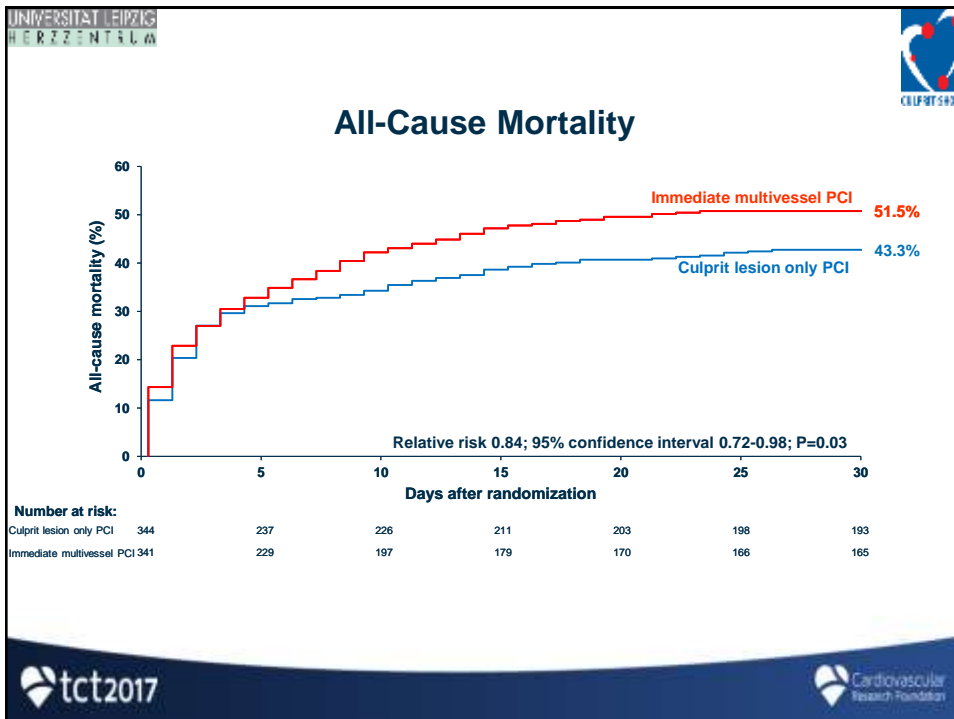


## Study Flow Chart



### Treatment

Characteristic	Culprit only PCI (n=344)	Multivessel PCI (n=342)	
Femoral access; n/total (%)	287/343 (83.7)	277/342 (81.0)	0.36
Radial access; n/total (%)	61/343 (17.8)	66/342 (19.3)	0.61
Stent implanted in culprit lesion; n/total (%)	326/343 (95.0)	324/342 (94.7)	0.86
Drug-eluting stent in culprit lesion; n/total (%)	305/326 (93.6)	308/324 (95.1)	0.41
TIMI-flow III post PCI of culprit lesion; n/total (%)	289/342 (84.5)	293/338 (86.7)	0.46
Immediate PCI of non-culprit lesions; n/total (%)	43/344 (12.5)	310/342 (90.6)	<0.001
Immediate complete revascularization; n/total (%)	26/344 (7.6)	277/342 (81.2)	<0.001
Total amount of contrast agent (ml); median (IQR)	190 (140-250)	250 (200-350)	<0.001
Staged PCI of non-culprit lesions; n/total (%)	60/344 (17.4)	8/341 (2.3)	<0.001
Staged coronary artery bypass surgery; n/total (%)	1/344 (0.3)	0/341	>0.99
Mechanical circulatory support; n/total (%)	99/344 (28.8)	95/342 (27.8)	0.77
Intraaortic balloon pump; n/total (%)	25/99 (25.3)	26/95 (27.4)	0.74
Impella 2.5; n/total (%)	16/99 (16.2)	18/95 (18.9)	0.61
Impella CP; n/total (%)	30/99 (30.3)	18/95 (18.9)	0.07
TandemHeart; n/total (%)	2/99 (2.0)	0/95	0.50
ECMO; n/total (%)	18/99 (18.2)	27/95 (28.4)	0.09
Mild hypothermia; n/total (%)	111/344 (32.3)	118/340 (34.7)	0.50
Mechanical ventilation; n/total (%)	273/344 (79.4)	282/339 (83.2)	0.20
Duration of mechanical ventilation (days); median (IQR)	3 (1-7)	3 (1-7)	0.97
Duration of intensive care treatment (days); median (IQR)	5 (2-12)	5 (2-11)	0.61





## Procedural aspects of the primary percutaneous coronary intervention strategy



Recommendations	Class	Level
<b>IRA technique (continued)</b>		
Routine use of thrombus aspiration is not recommended.	III	A
Routine use of deferred stenting is not recommended.	III	B
<b>Non-IRA strategy</b>		
Routine revascularization of non-IRA lesions should be considered in STEMI patients with multivessel disease before hospital discharge.	IIa	A
Non-IRA PCI during the index procedure should be considered in patients with cardiogenic shock.	IIa	C
CABG should be considered in patients with ongoing ischaemia and large areas of jeopardized myocardium if PCI of the IRA cannot be performed.	IIa	C

[www.escardio.org/guidelines](http://www.escardio.org/guidelines) 2017 ESC Guidelines for the Management of AMI/STEMI (European Heart Journal 2017 - doi:10.1093/eurheartj/ehw095)

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## Summary Cardiogenic shock

- ✓ Treat culprit lesion first
- ✓ If the patient improves hemodynamically, staged PCI
- ✓ If the patient remains in shock go for high-grade non culprit lesions with impaired flow
- ✓ Do not try to hard (CTO !!)
- ✓ Limit contrast volume