Complete PCI: Easy and Effective, Go for PRAMI and CvLPRIT Style!

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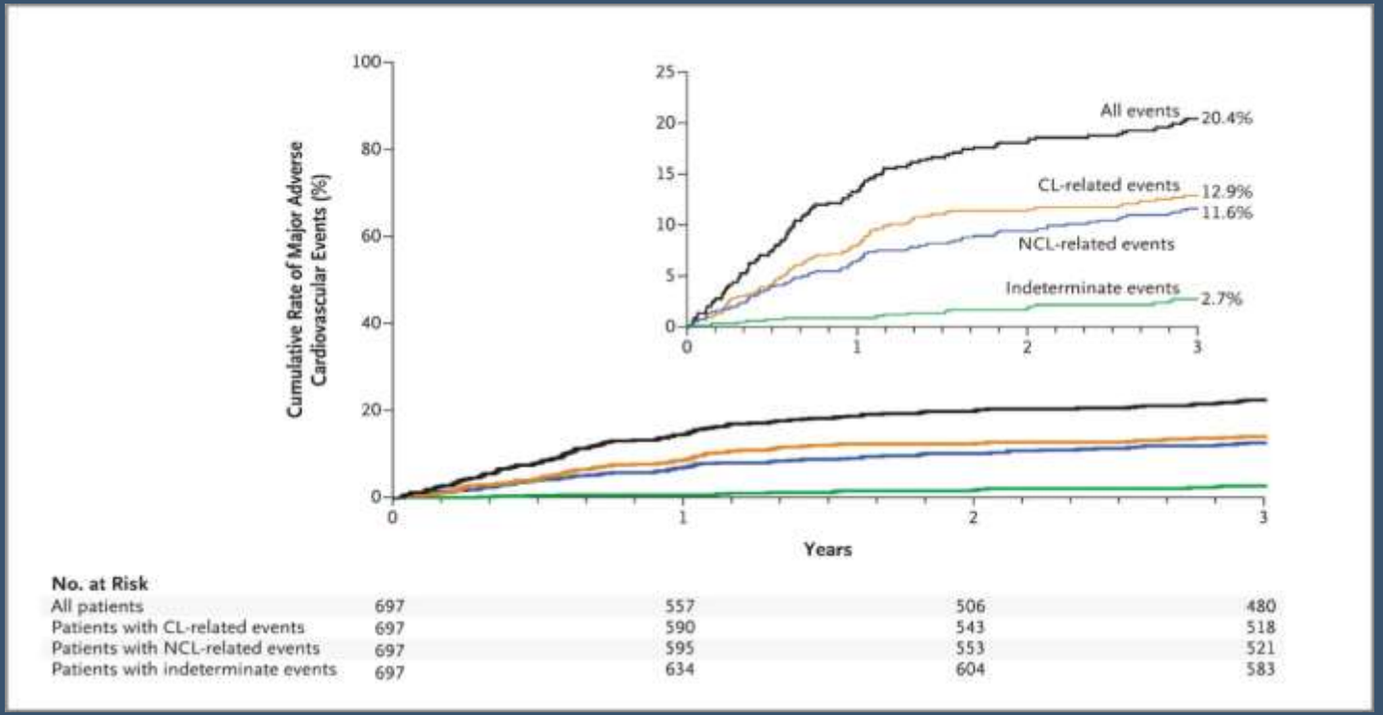
Conflict of interest

- none

IRA vs. MV PCI IN STEMI

- Identification and treatment of the IRA is the main goal of pPCI in STEMI because it prevents re-infarction and death
- MVD is present in 30-50% of STEMI patients and related to an increased by 50% risk of recurrent events
- Non-IRA lesions in ACS are subjects to inflammation and endothelial dysfunction
- Before PRAMI and CvLPRIT the treatment of angiographically significant non-IRA lesions was discouraged by guidelines based on mosty observational and registry studies

RATIONALE OF MV PCI IN STEMI



No. at Risk

All patients	697	557	506	480
Patients with CL-related events	697	590	543	518
Patients with NCL-related events	697	595	553	521
Patients with indeterminate events	697	634	604	583

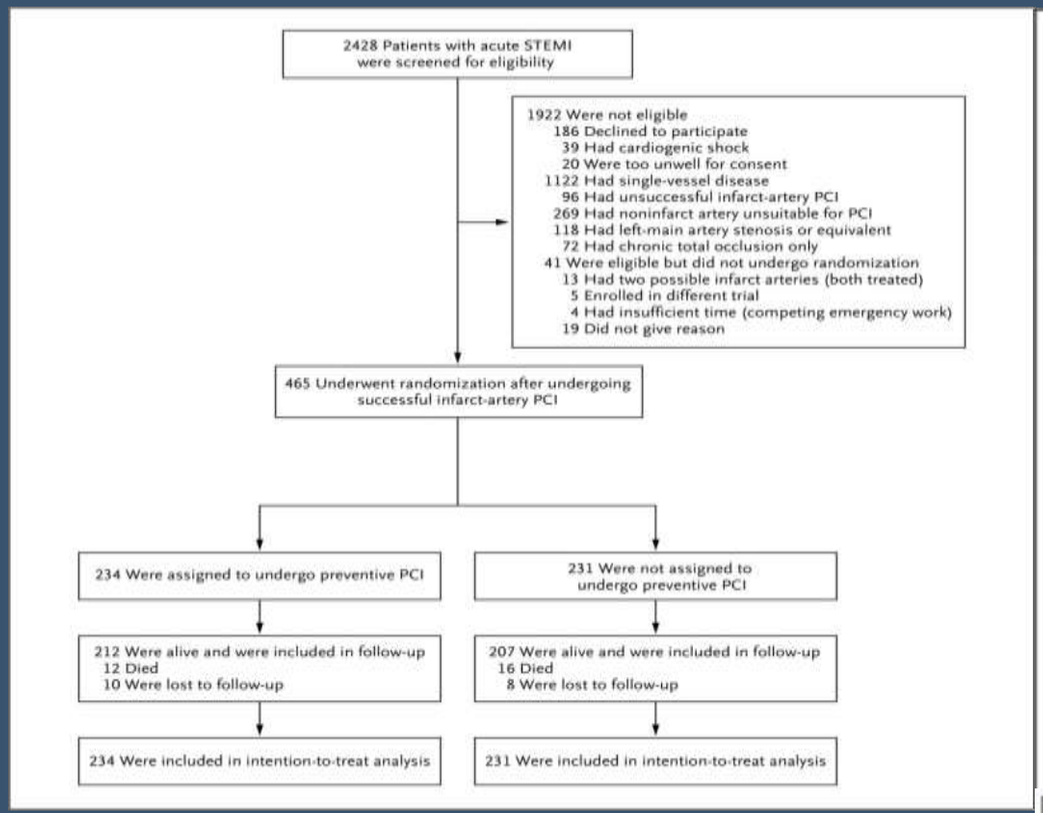
- Non-IRA lesions are frequently vulnerable plaques
- Non-IRA supply areas of myocardium supporting contractile reservetion
- Resolution of stunning/hibernation
- Risk/inconvenience of subsequent procedures
- Cost reduction
- If acceptable risk/benefit ratio (CIN, thrombosis, etc)

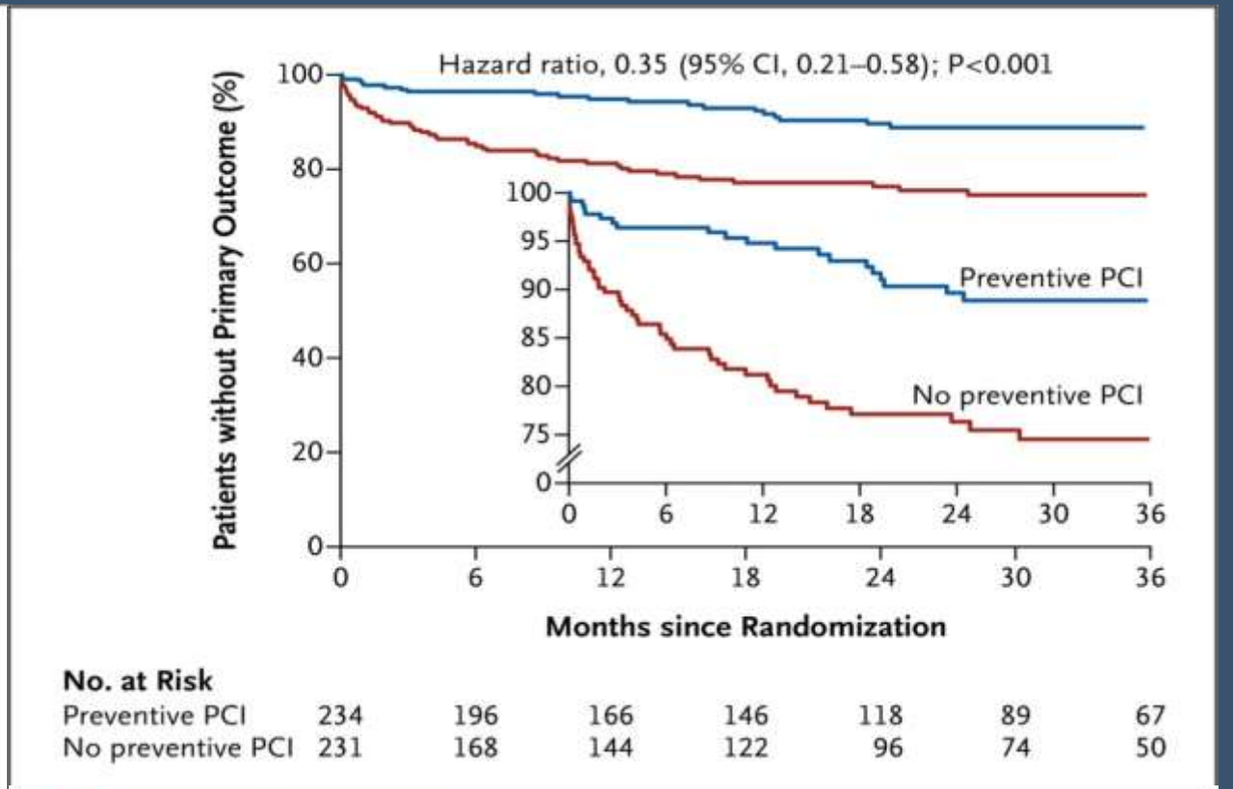
Stone GW et al. N Engl J Med 2011;364:226-235.

IRA vs. MV PCI IN STEMI

- pPCI of IRA (Guideline-style)
- Single-stage pPCI of IRA and other significantl lesions (PRAMI-style, and 2/3 CvLPRIT-style)
- pPCI of IRA and PCI of other significantl lesions during index hospitalization (1/3 CvLPRIT-style)

Randomized Trial of Preventive Angioplasty in Myocardial Infarction





Outcomes not influenced by age, sex, diabetes, infarct location and number os stenosed vesesels

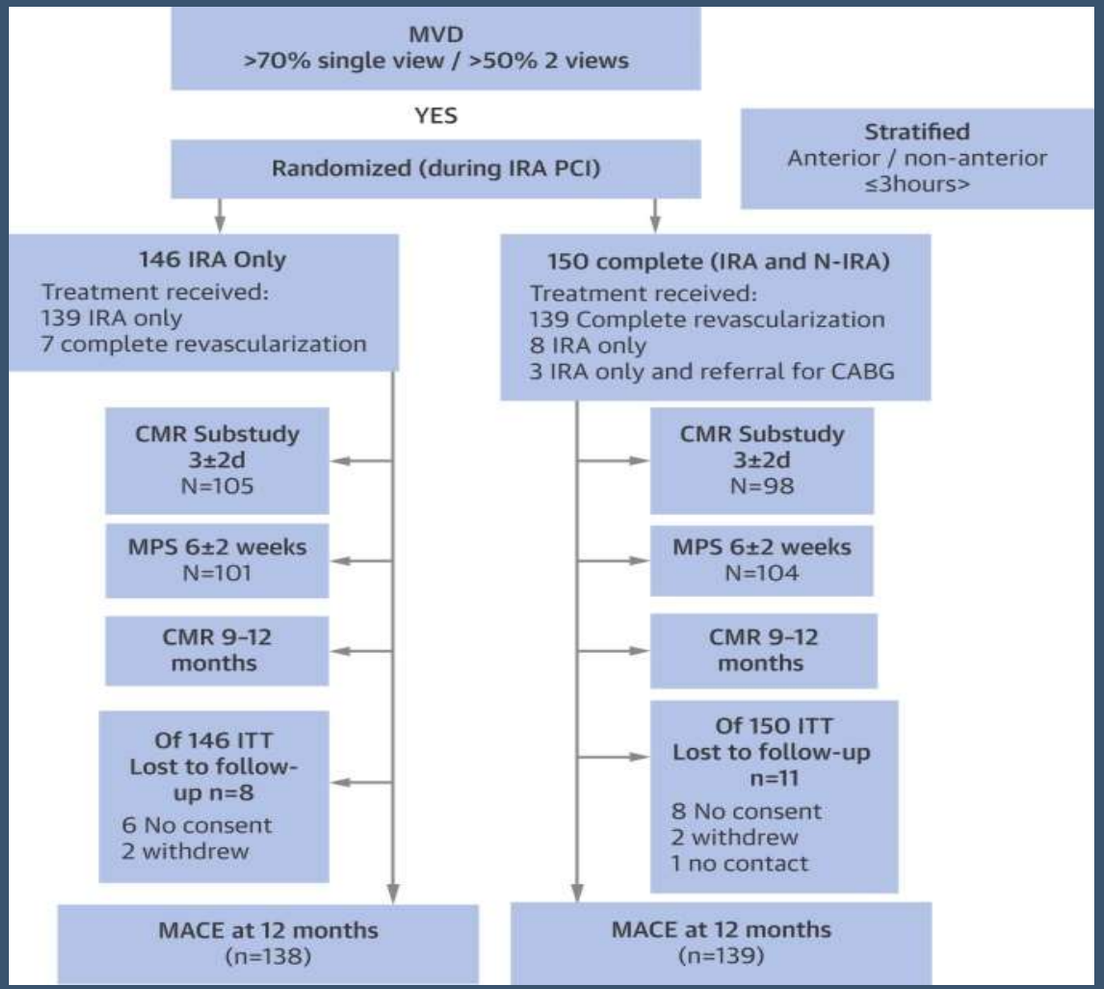
Complicatins without significant differences

Table 3. Prespecified Clinical Outcomes.*

Outcome	Preventive PCI (N=234)	No Preventive PCI (N=231)	Hazard Ratio (95% CI)	P Value
	no. of events			
Primary outcome				
Death from cardiac causes, nonfatal myocardial infarction, or refractory angina†	21	53	0.35 (0.21–0.58)	<0.001
Death from cardiac causes or nonfatal myocardial infarction†	11	27	0.36 (0.18–0.73)	0.004
Death from cardiac causes	4	10	0.34 (0.11–1.08)	0.07
Nonfatal myocardial infarction	7	20	0.32 (0.13–0.75)	0.009
Refractory angina	12	30	0.35 (0.18–0.69)	0.002
Secondary outcomes				
Death from noncardiac causes	8	6	1.10 (0.38–3.18)	0.86
Repeat revascularization	16	46	0.30 (0.17–0.56)	<0.001

Wald DS et al. N Engl J Med 2013;369:1115-1123.

Randomized Trial of Complete Versus Lesion-Only Revascularization in Patients Undergoing Primary Percutaneous Coronary Intervention for STEMI and Multivessel Disease: The CvLPRIT Trial



	CompleteRevascularization(n = 150)	IRA-Only Revascularization(n = 146)	p Value
ASA	141/142 (99.3)	131/135 (97.0)	0.16
Plus clopidogrel	59/144 (41.0)	54/138 (39.1)	0.75
Plus ticagrelor	19/144 (13.2)	18/135 (13.3)	0.97
Plus prasugrel	58/144 (40.3)	64/138 (46.4)	0.30
Plus warfarin	1/147 (0.7)	2/138 (1.5)	0.61
GPI	46/145 (31.7)	44/139 (31.7)	0.99
Bivalirudin	79/139 (56.8)	65/128 (50.8)	0.32
TIMI flow grade 0/1 on arrival	120/147 (81.6)	118/140 (84.3)	0.55
Thrombus aspiration catheter used	93/145 (64.1)	105/140 (75.0)	0.047
DES	141/147 (95.9)	127/140 (90.7)	0.08
Stents per patient	3 (2-4)	1 (1-2)	<0.0001
Total procedure time, min	55 (38-74)	41 (30-55.5)	<0.0001
Total contrast used, ml	250 (190-330)	190 (150-250)	<0.0001
Beta-blocker	137/147 (93.2)	126/135 (93.3)	0.96
ACEI/ARB	142/147 (96.6)	129/135 (95.6)	0.65
Statin	146/146 (100)	133/135 (98.5)	0.14
Aldosterone antagonist	9/147 (6.1)	8/135 (5.9)	0.95
Other antianginal agent	55/147 (37.4)	49/135 (36.3)	0.85
Loop diuretic agent	15/147 (10.2)	17/135 (12.6)	0.53

Increased contrast load
No difference in hospitalization time

J Am Coll Cardiol. 2015;65(10):963-972. doi:10.1016/j.jacc.2014.12.038

Randomized Trial of Complete Versus Lesion-Only Revascularization in Patients Undergoing Primary Percutaneous Coronary Intervention for STEMI and Multivessel Disease: The CvLPRIT Trial

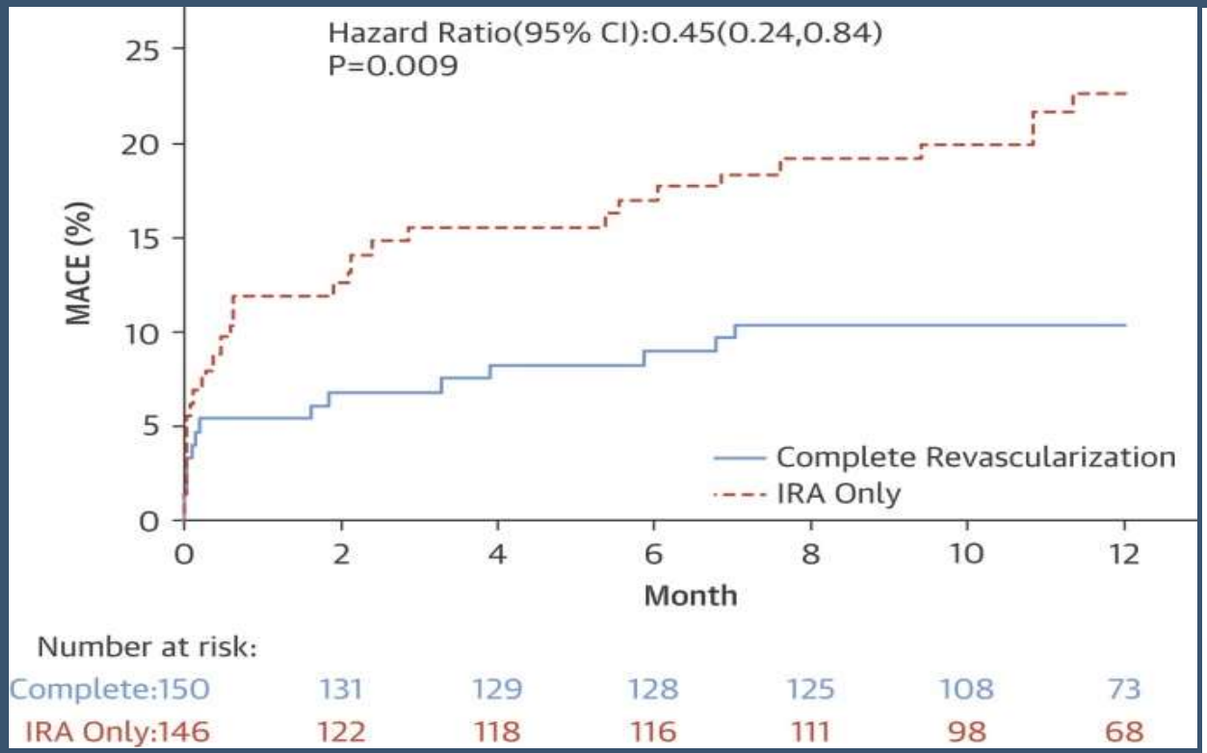
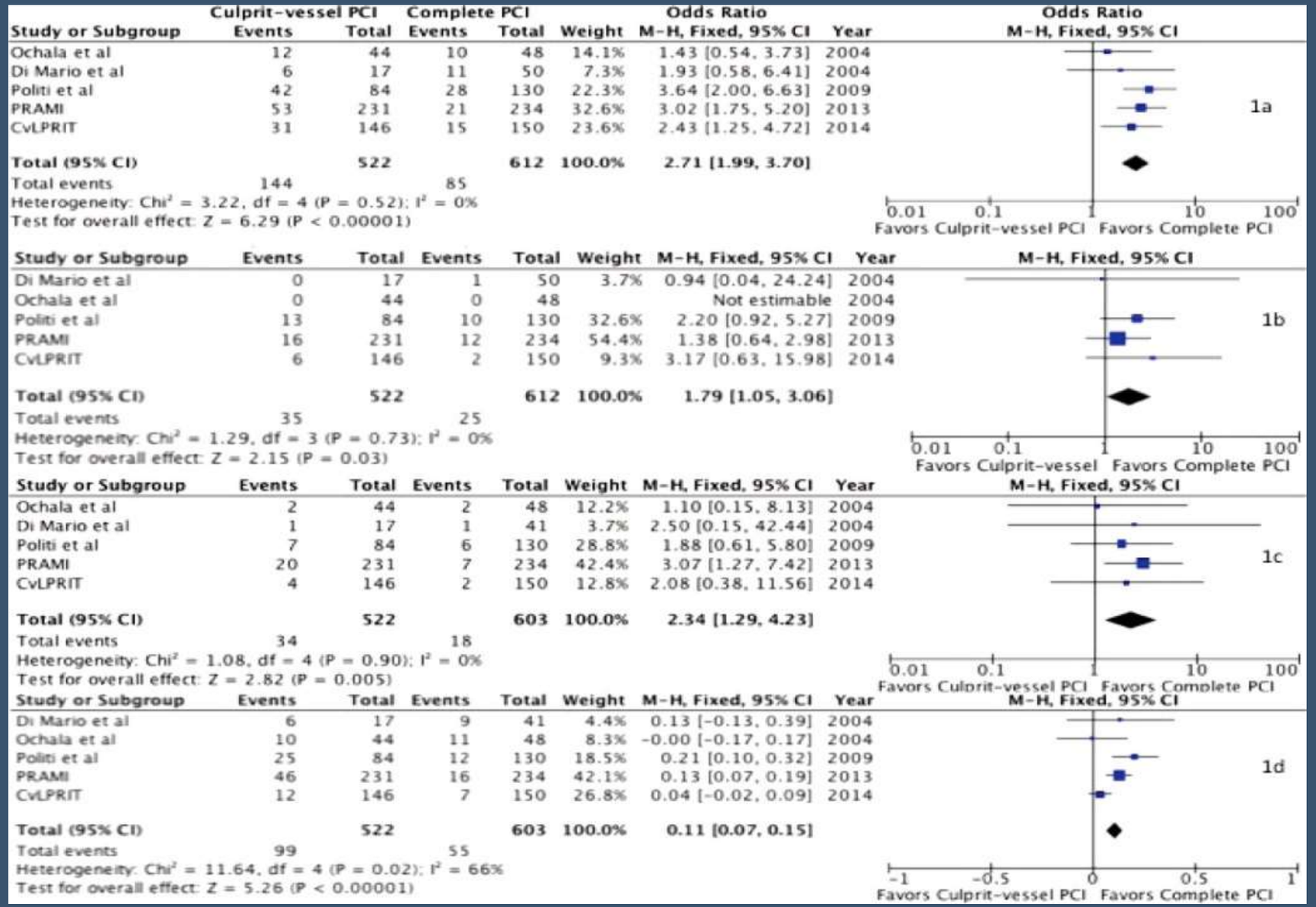


TABLE 3 Clinical Outcomes at 12 Months

	Complete Revascularization (n = 150)	IRA-Only Revascularization (n = 146)	HR (95% CI)	p Value
Time to first event				
MACE	15 (10.0)	31 (21.2)	0.45 (0.24–0.84)	0.009
All-cause mortality	2 (1.3)	6 (4.1)	0.32 (0.06–1.60)	0.14
Recurrent MI	2 (1.3)	4 (2.7)	0.48 (0.09–2.62)	0.39
HF*	4 (2.7)	9 (6.2)	0.43 (0.13–1.39)	0.14
Repeat revascularization	7 (4.7)	12 (8.2)	0.55 (0.22–1.39)	0.20
All events				
All-cause mortality	4 (2.7)	10 (6.9)	0.38 (0.12–1.20)	0.09
Recurrent MI	2 (1.3)	4 (2.7)	0.47 (0.09–2.59)	0.38
Type 1	0	2		
Type 4b	2	2		
HF	5 (3.3)	10 (6.9)	0.47 (0.16–1.38)	0.16
Inpatient	3	7		0.56
Post-discharge	2	3		
Repeat revascularization	8 (5.3)	16 (11.0)	0.46 (0.20–1.08)	0.07
Safety				
CV mortality	2 (1.3)	7 (4.8)	0.27 (0.06–1.32)	0.11
Stroke	2 (1.3)	2 (1.4)	0.95 (0.13–6.77)	0.96
Major bleed	4 (2.7)	7 (4.8)	0.55 (0.16–1.87)	0.34
Contrast-induced nephropathy	2 (1.4)	2 (1.4)	0.94 (0.13–6.75)	0.95

J Am Coll Cardiol. 2015;65(10):963-972. doi:10.1016/j.jacc.2014.12.038

CULPRIT-VESSEL VERSUS COMPLETE REVASCULARIZATION DURING PRIMARY ANGIOPLASTY IN ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION: AN UPDATED META-ANALYSIS



J Am Coll Cardiol. 2015;65(10_S). doi:10.1016/S0735-1097(15)61919-2

Randomized Trial of Complete Versus Lesion-Only Revascularization in Patients Undergoing Primary Percutaneous Coronary Intervention for STEMI and Multivessel Disease: The CvLPRIT Trial

CARDIOVASCULAR MRI SUBSTUDY (CVLPRIT-CMR)

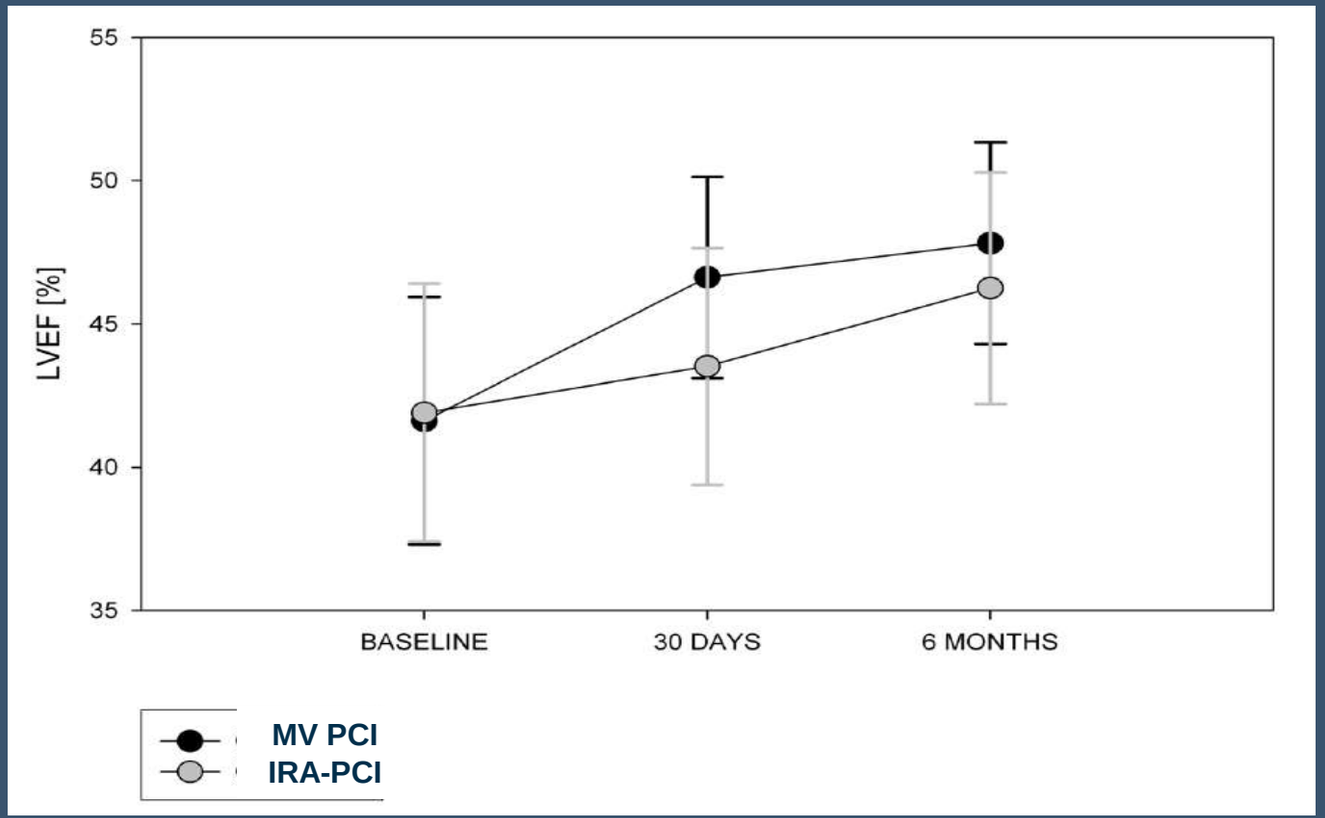
Variable	IRA-only (n=105)	CR (n=98)	p value
Age (y)	64.1±10.8	63.1±11.3	0.53
Male sex (n, %)	83/105 (79.0)	87/98 (88.8)	0.06
Anterior infarct (n, %)	37/105 (37.2)	35/98 (35.7)	0.94
Symptom-PCI time (min)	171 (127-268)	192 (131-302)	0.20
Total infarct size (% LV mass) on acute CMR	13.5 (6.2-21.9)	12.6 (7.2-22.6)	0.57
Myocardial salvage index (%) on acute CMR	60.5 (40.6-81.9) [n=76]	58.5 (32.8-74.9) [n=75]	0.14
Total infarct size (% LV mass) on follow-up CMR	7.6 (3.2-15.1)	7.3 (3.0-14.4)	0.41
Presence of reversible ischaemia (n, %) on follow-up CMR	16/77 (20.8)	17/82 (20.7)	0.99
Global ischaemic burden (% LV) in all patients on follow-up CMR	4.3±11.3	3.4±8.9	0.81

J Am Coll Cardiol. 2015;65(10_S). doi:10.1016/S0735-1097(15)60017-1

The function of the left ventricle after complete multivessel one-stage percutaneous coronary intervention in patients with acute myocardial infarction (PRIMA trial)

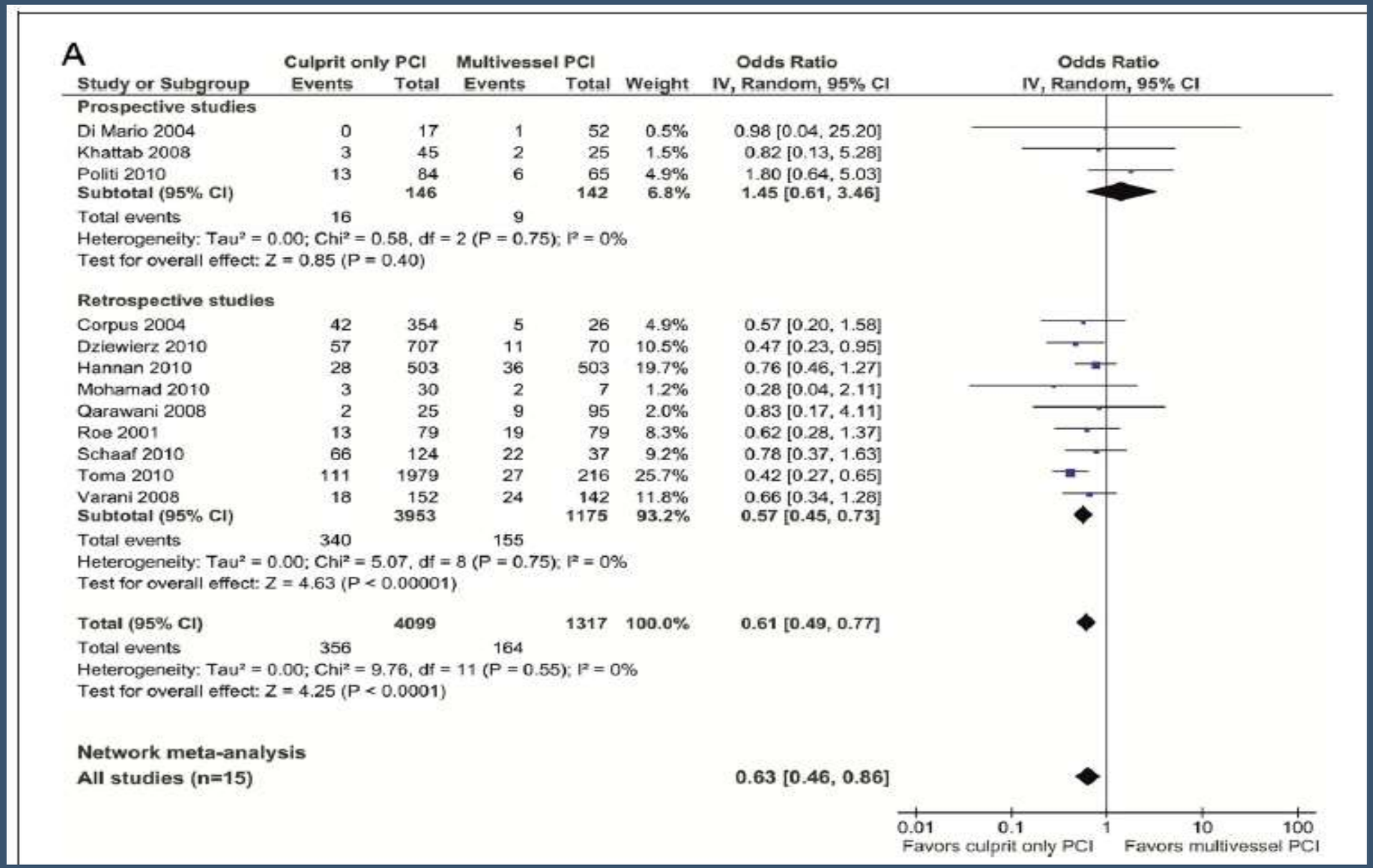
	MV PCI	IRA PCI
Age (years)	65 ± 8,3	67 ± 7,9
Men	35 (72,9%)	33 (75,0%)
Hyperlipidaemia	39 (81,2%)	40 (90,9%)*
Diabetes mellitus	15 (31,2%)	15 (34,1%)
Current smoking	18 (37,5%)	19 (43,1%)*
History of hypertension	25 (52,1%)	21 (47,7%)*
Prior MI	14 (29,1%)	10 (22,7%)*
Prior PCI	8 (16,6%)	7 (15,9%)

*- p<0,05



Ochala A, Smolka GA, Wojakowski W J Invasive Cardiol. 2004 Dec;16(12):699-702.

MV vs. staged PCI



Vlaar et al. J Am Coll Cardiol 2011;58:692–703

MV vs. staged PCI

Primary Author, Year Published (Ref. #)	Setting	Symptom–Time, h*	Culprit PCI	MV-PCI	Staged PCI	Timing of Staged PCI	Exclusion Criteria	Maximum Follow-Up
Prospective studies								
Di Mario, 2004 (5)	Multicenter	12	17	52	—	—	LM, shock,† CTO, lesions located in graft or previously treated with PCI, thrombolytic therapy before PCI. No culprit vessel lesion suitable for stenting; diffuse calcification, severe tortuosity, risk of side branch occlusion.	1 yr
Ochala, 2004 (6)	Single-center	12	—	48	44	27.3 ± 12.8 days	LM, shock,† previous CABG, severe valvular disease, no PCI possible in nonculprit vessel (diffuse >4 cm, diameter <2.5 mm, severe tortuosity, lesion within orifices of large side branch), renal insufficiency or 1 kidney, contraindications for antiplatelet therapy, pregnancy	6 months
Politi, 2010 (7)	Single-center	24	84	65	65	56.8 ± 12.9 days	LM, shock,† previous CABG, severe valvular disease, unsuccessful culprit vessel PCI	2.5 ± 1.4 yrs
Khattab, 2008 (8)	Single-center	12	45	28	—	—	LM, CTO, previous MI, nonculprit vessel diameter <2.5 mm, extensive calcification	1 yr
Retrospective studies								
Cavender, 2009 (9)	Multicenter	All	25,802	3134	—	—	LM, thrombolytic therapy before PCI, staged PCI	In-hospital
Corpus, 2004 (10)	Single-center	12	354	26	126	In-hospital	LM, PCI in vein graft or for acute occlusion after coronary angioplasty, staged PCI after hospital discharge	1 yr
Dziewierz, 2010 (11)	Multicenter		707	70	—	—	Previous CABG	1 yr
Han, 2008 (12)	Single-center		149	—	93	7–15 days	LM, shock,† pulmonary edema, cardiac rupture	1 yr
Hannan, 2010 (13)‡	Multicenter	24	3,262	503	259	In-hospital	LM, shock,† previous open heart surgery, thrombolytic therapy before PCI, missing ejection fraction	3.5 yrs
Kong, 2006 (14)	Multicenter	24	1,350	632	—	—	LM, shock or hemodynamic instability, cardiopulmonary resuscitation, previous MI/PCI/CABG	In hospital
Mohamad, 2010 (15)	Single-center	12	30	7	12	N/A	Unable to undergo CABG <3 h hospital presentation	1 yr
Poyen, 2003 (16)	Single-center	12	81	86	—	—	Shock†	2.5 yrs
Qarawani, 2008 (17)	Single-center	12	25	95	—	—	LM, shock†	1 yr
Rigattieri, 2007 (18)	Single-center	12	46	—	64	In-hospital	LM, shock,† previous CABG, severe valvular disease	1 yr
Roe, 2001 (19)	Multicenter		79	79	—	—	LM, PCI of side branch	
van der Schaaf, 2010 (20)	Single-center	6	124	37	—	—	Patients without shock†	1 yr
Toma, 2010 (21)	Multicenter	6	1,984	217	—	—	LM, second PCI in culprit vessel, rescue PCI, isolated inferior MI, serious comorbidity, pregnancy or breastfeeding	3 months
Varani, 2008 (22)	Single-center	24	156	147	96	In-hospital	PCI for acute occlusion after coronary angioplasty	1.7 ± 1.0 yr

COMPLETE Trial: On-going Multi-National Trial of Staged Non-culprit Lesion PCI vs Medical Rx

STEMI with successful culprit lesion PCI (primary, rescue or pharmacoinvasive) +
≥ 70% stenosis or ≥ 50% with FFR < 0.80

RANDOMIZED
Within 72 h of index
Primary PCI

COMPLETE REVASC
Staged PCI of all suitable non-culprit lesions
N=1950

CULPRIT LESION-ONLY REVASC
No further revsac of non-culprit lesions (OMT Alone)
N=1950

ALL patients receive OMT (ASA, Ticagrelor, Statin, Beta Blocker, RF Modification)

Follow-up: Discharge, 30 Days, 6 mos, then Annually (avg. duration = 4 yrs)

Primary Outcome: CV Death / MI
Key Secondary Outcome: CV Death/MI/Ischemia driven revascularization

Clinicaltrials.gov NCT0174049

Funded by CIHR, AstraZeneca and Boston Scientific

Mehta S, ESC Hotlne 2014

CONCLUSIONS

Complete PCI: Easy and Effective,
Go for PRAMI and CvLPRIT Style!

- Multivessel PCI in STEMI safe and feasible (but not neccessarily easy)
- (In relatively small trials) it improved outcomes
- As an operator I would choose in-hospital vs. single procedure

- Should non-IRA PCI be performed simultaneously with pPCI or later on during the same hospitalization?
- Possible role of functional testing?
- Adequately powered trials to assess the effects on reinfarction and mortality
- OMT and rehabilitation mandatory