FAKULTNÍ NEMOCNICE® OLOMOUC

Lékařská fakulta
Univerzita Palackého v Olomouci

KOMPLEXNÍ KARDIOVASKULÁRNÍ CENTRUM
FAKULTNÍ NEMOCNICE OLOMOUC

Comparison of angiographic estimation and invasive hemodynamic measurement of the significance of non infarct-related residual stenoses in STEMI patients - single center experience

Miloslav SPACEK, Jan VACHA, Radomir NYKL, Jan PRECEK, Martin HUTYRA, Martin SLUKA, Milos TABORSKY

Czech Cardiovascular Research & Innovation Day 2022

Rationale

- Primary PCI is the preferred method for reperfusion in STEMI patients ..
- Up to (30% -) 50% of STEMI patients have at least one residual stenosis other than culprit lesion*
- Usual definition: ≥ 50% in major epicardial artery.

- Optimal management strategy still under evaluation…

* Sorajja P, et al. EHJ 2007, Dziewierz A, et al. Am J Cardiol 2010

Historical perspective

- Historically, conservative management due to increased rate of adverse events advocated *
- Paradigm questioned with increased safety and efficacy of PCI procedures.
- 2008 -> present days several RCTs designed.

* Rigattieri et al. J Inter Cardiol 2008 / Hannah EL et al. JACC Cardiovasc Interv / Toma M et al. Eur Heart J 2010

Trial	Inclusion period	Culprit only (n)	Complete - index (n)	Complete - staged (n)	Lesion criteria	Timing of complete revascularization	Primary endpoint	FUP months	Outcome(s)
PRAMI	2008-2013	231	234	0	≥50 %	**Immediate** only	Composite: death from cardiac cause, myocardial infarction, refractory angina	23	65 % relative risk reduction in primary endpoint due to complete revascularization, **no significant difference in death**
CvLPRIT	2011-2013	146	97	42	≥70 %	Immediate (recommended) or during index admission	All-cause mortality, myocardial infarction, heart failure, ischemia-driven revascularization	12	55 % relative risk reduction in primary endpoint in the complete revascularization group, **no significant difference in death**
DANAMI-3 PRIMULTI	2011-2014	313	0	314	≥90 % or ≥50 % + FFR ≤0.80	Staged FFR guided before discharge (2 days after index procedure)	Composite: all-cause death, myocardial infarction, ischemia-driven revascularization	27	44 % relative risk reduction in primary endpoint due to reduction in **ischemia-driven revascularization** in complete revascularization group
COMPARE ACUTE	2011-2015	590	246	49	≥50 % + FFR ≤0.80	Immediate or before discharge	Composite: all-cause mortality, myocardial infarction, any revascularization, cerebrovascular events	12	65 % relative risk reduction of primary endpoint in complete revascularization **(revascularization driven)**
COMPLETE	2013-2017	**2025**	1420	596	≥70 % or 50-69 % + FFR ≤0.80	Index during hospital admission or **staged** after discharge (no later than 45 days after randomization)	Coprimary outcomes: First: death or myocardial infarction; Second: death, myocardial infarction or ischemia-driven revascularization	**36**	26 % relative risk reduction in first coprimary outcome and 49 % relative risk reduction in second coprimary outcome

Trial	Inclusion period	Culprit only (n)	Complete - index (n)	Complete - staged (n)	Lesion criteria	Timing of complete revascularization	Primary endpoint	FUP months	Outcome(s)
PRAMI	2008-2013	231	234	0	≥50 %	**Immediate** only	Composite: death from cardiac cause, myocardial infarction, refractory angina	23	65 % relative risk reduction in primary endpoint due to complete revascularization, **no significant difference in death**
CvLPRIT	2011-2013	146	97	42	≥70 %	Immediate (recommended) or during index admission	All-cause mortality, myocardial infarction, heart failure, ischemia-driven revascularization	12	55 % relative risk reduction in primary endpoint in the complete revascularization group, **no significant difference in death**
DANAMI-3 PRIMULTI	2011-2014	313	0	314	≥90 % or ≥50 % + FFR ≤0.80	Staged FFR guided before discharge (2 days after index procedure)	Composite: all-cause death, myocardial infarction, ischemia-driven revascularization	27	44 % relative risk reduction in primary endpoint due to reduction in **ischemia-driven revascularization** in complete revascularization group
COMPARE ACUTE	2011-2015	590	246	49	≥50 % + FFR ≤0.80	Immediate or before discharge	Composite: all-cause mortality, myocardial infarction, any revascularization, cerebrovascular events	12	65 % relative risk reduction of primary endpoint in complete revascularization **(revascularization driven)**
COMPLETE	2013-2017	**2025**	1420	596	≥70 % or 50-69 % + FFR ≤0.80	Index during hospital admission or **staged** after discharge (no later than 45 days after randomization)	Coprimary outcomes: First: death or myocardial infarction; Second: death, myocardial infarction or ischemia-driven revascularization	**36**	26 % relative risk reduction in first coprimary outcome and 49 % relative risk reduction in second coprimary outcome

RCT highlights

PRAMI / DANAMI / CvLPRIT / COMPARE

- Hundreds of patients - follow-up 12-27months
- PCI immediate or prior discharge
- AG guided (≥50% / ≥70%) / FFR

- No difference in death or MI, reduced need for future revascularization

Trial	Inclusion period	Culprit only (n)	Complete - index (n)	Complete - staged (n)	Lesion criteria	Timing of complete revascularization	Primary endpoint	FUP months	Outcome(s)
PRAMI	2008-2013	231	234	0	≥50 %	**Immediate** only	Composite: death from cardiac cause, myocardial infarction, refractory angina	23	65 % relative risk reduction in primary endpoint due to complete revascularization, **no significant difference in death**
CvLPRIT									sk reduction oint in the culariza**tion** ficant eath
DANAMI-3 PRIMULTI									sk reduction oint due to hemia-**larization** in culariza**tion**
COMPARE ACUTE	2011-2015	590	246	49	≥50 % + FFR ≤0.80	Immediate or before discharge	mortality, myocardial infarction, any revascularization, cerebrovascular events	12	65 % relative risk reduction of primary endpoint in complete revascularization **(revascularization driven)**
COMPLETE	2013-2017	**2025**	1420	596	≥70 % or 50-69 % + FFR ≤0.80	Index during hospital admission or **staged** after discharge (no later than 45 days after randomization)	Coprimary outcomes: First: death or myocardial infarction; Second: death, myocardial infarction or ischemia-driven revascularization	**36**	26 % relative risk reduction in first coprimary outcome and 49 % relative risk reduction in second coprimary outcome

Non-IRA strategy

Routine revascularization of non-IRA lesions should be considered in STEMI patients with multivessel disease before hospital discharge.[167–173]

IIa | A

RCT highlights

COMPLETE (2019)*

- ≥ 2000 patients, follow-up **36 months**
- PCI during or after hospitalization (within 45 days; prespecified)
- FFR 50-70%/ AG ≥70%

- No difference in death, lower risk of NSTEMI (unknown significance) and reduced need for future ischemia driven revascularization.

ARR: MI 2.5% / IDR 5.1% over 3yrs.

Mehta SR et al., NEJM 2019.

Comparison of angiographic estimation and invasive hemodynamic measurement of the significance of non infarct-related residual stenoses in STEMI patients - single center experience

Inclusion / Exclusion

- STEMI as a first manifestation of CAD
- PCI of infarct related artery
- Residual non-IRA lesion in major epicardial artery (50-90%, ≥ 2,5mm)
- Hemodynamic instability
- Vulnerable lesions
- Residual >90% non-IRA lesion in major epicardial artery
- Left main stenosis
- Small vascular bed

Protocol - STEMI

- Estimation of stenosis significance following dPCI

  -> likelihood of positive FFR

- Underlining relevant indicators for decision making

-> stenosis severity ± diameter of arterial segment ± localization/proximity ± size of the vascular bed

Protocol - FFR

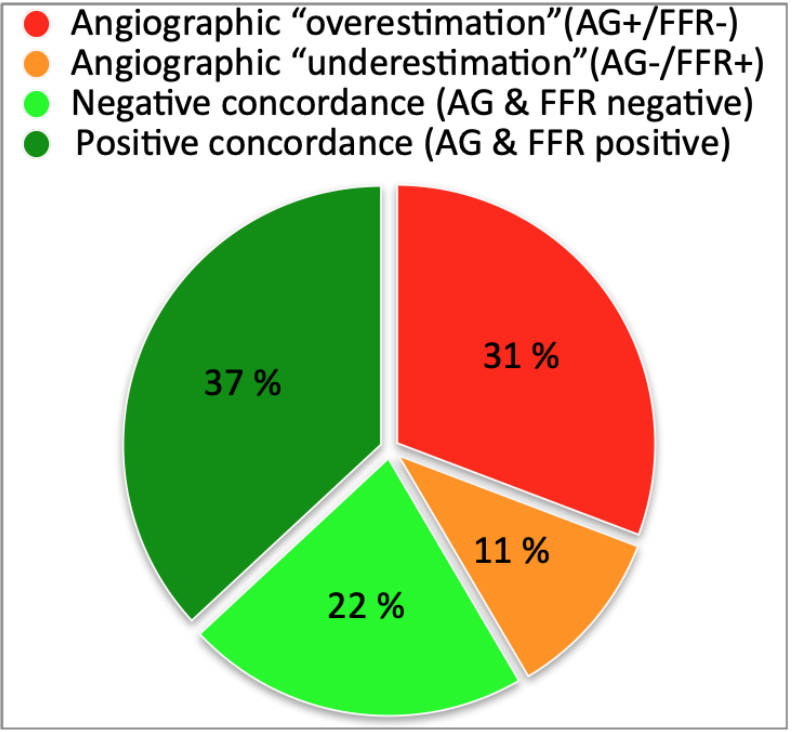
- FFR of all indicated stenoses 4-8 weeks after STEMI
- Revascularization based on FFR (≤ 0.8) - PCI/CABG

Results

- **51** patients (62.7 ± 10.2 years, 82% male)
- **65** stenoses (67.9 ± 10.7%, 2.98 ± 0.32mm)
- 39 single - / 10 double - / 2 triple - vessel disease

- 44 (67.7%) stenoses estimated significant (70.6 ± 10.6%)
- 21 estimated non-significant (62.4 ± 9.0%)
- No adverse event reported prior to FFR

Results



Positive concordance (AG & FFR positive)	24/65	74.16 ± 9.96
Angiographic “overestimation” (AG+/FFR-)	20/65	66.25 ± 9.85
Angiographic “underestimation” (AG-/FFR+)	7/65	63.57 ± 14.06
Negative concordance (AG & FFR negative)	14/65	61.79 ± 5.40

- 44 vs. 31 stents AG vs. FFR
- 27/65 (41.5%) discrepant

(sensitivity 77.5% / specificity 41.2%)

Results

vascular bed (66.2%) > stenosis (64.6%) >>> localization >> proximity

Distribution of AG relevant indicators				
	Stenosis	Diameter	Localization (proximity)	Vascular bed
Estimated significant (44 of 65)	59.1%	**29.5%**	**50.0%**	**70.5%**
Estimated non-significant (21 of 65)	**76.2%**	0 %	4.8 %	57.1%
Concordance related distribution				
	Stenosis	Diameter	Localization (proximity)	Vascular bed
Concordance (38 of 65)	**73.6%**	15.8%	**36.8%**	**65.8%**
Discordance (27 of 65)	51.9%	**25.9%**	**33.3%**	**66.7%**

Results

- **LADs vs. non-LADs:**

29/35 LADs **(82.8%)** estimated significant **-> 62.9% FFR+**

15/30 non-LADs **(50%)** est. significant **-> 30% FFR+**

31.4% vs. 53.3% discrepancy rate, resp.

- **50-70% vs. 71-90%:**

47.7% vs. 30.4% discrepancy rate, resp.

RCT highlights

FLOWER-MI (2021)

- ≥ 2000 patients, follow-up **12 months**
- PCI (preferentially immediate) AG vs. FFR guided
- ≥50% / ≥2mm

- **NO** benefit of FFR over AG with respect to death/non-fatal MI/urgent revascularization.
- **1.50** vs. **1.01** stents per patient in AG vs. FFR, resp.

	AG	FFR
Death	1.7%	1.5%
MI	1.7%	3.1%
IDR	1.9%	2.6%

Puymirat E et al., NEJM 2021

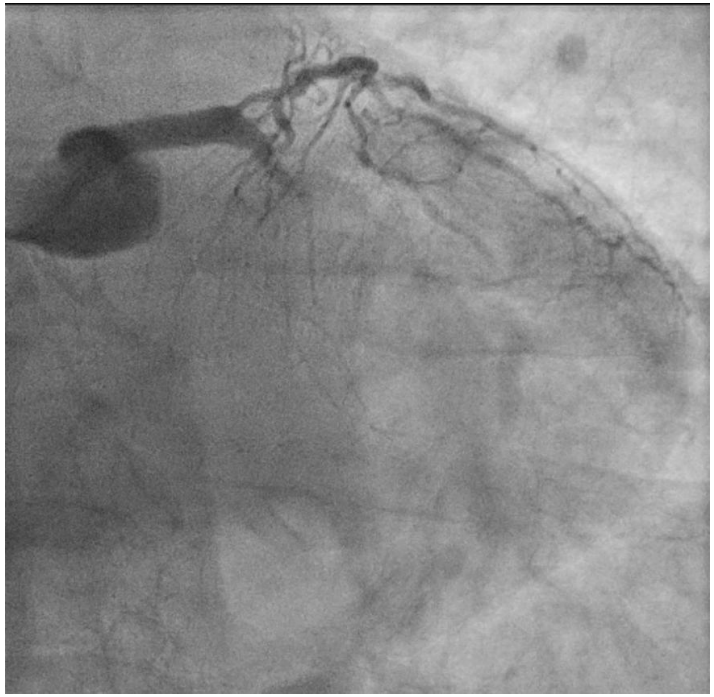
Suggested approach…

- **Staged/delayed** PCI likely safe in patients with “incidental” residual CAD (exclusive of LM stenosis and tight >90% lesions) in case of the absence of morphological signs of vulnerability.
- Have “**low” threshold for PCI in > 70% LAD stenosis** and for FFR guided PCI in case of 50-70% LAD stenosis.
- In case of **non-LAD stenosis**, the benefit of (FFR guided) PCI should always be **individually evaluated** with respect to patient's overall status.

Key messages

- **More data needed** in the management of (non-left main) residual stenoses in STEMI patients.
- **“**Current" GL (2017/2018) suggest revascularization prior to discharge - revision needed (**COMPLETE ??).**
- **Individual approach** advocated.
- **High-discrepancy rate** even in high-volume PCI center**.**

Thank you for your attention

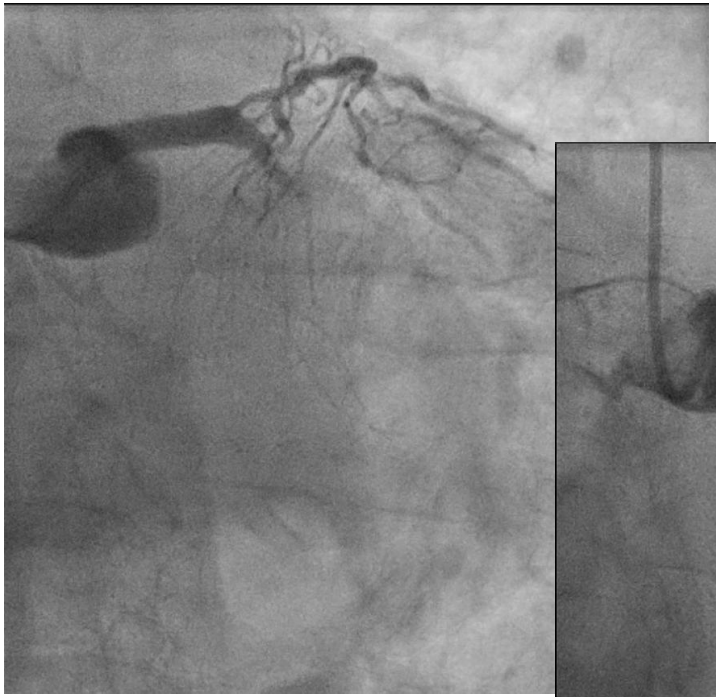


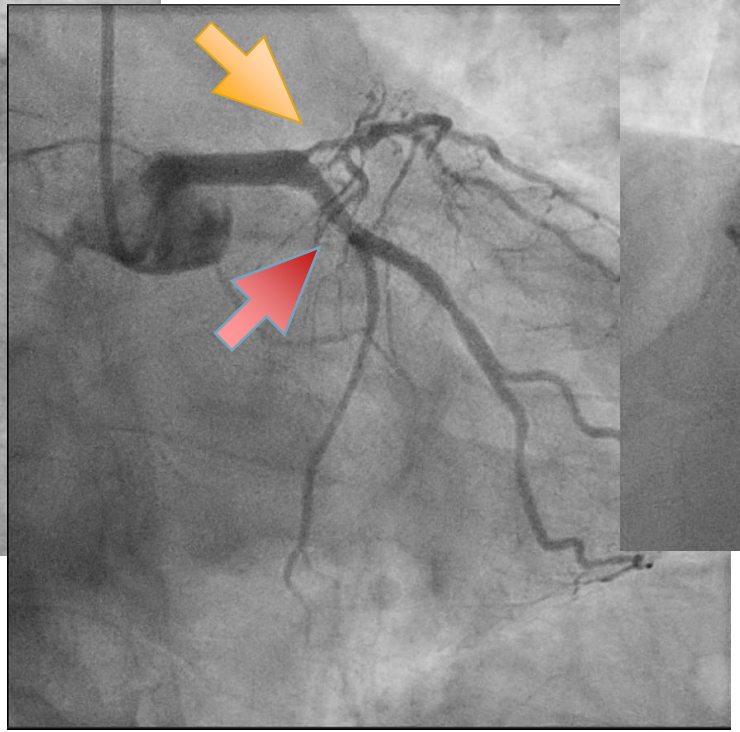
Introduction

- 70-yrs old male
- 8/2022 inferolateral STEMI
- AH, DSL,

- = LCx directPCI + DES
- -> scheduled LAD PCI

Introduction





6 weeks later …