

Primary PCI In Elderly

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Predictors for reperfusion strategy in STEMI



Time Since
Symptom
Onset



Risk of STEMI



Risk of
Fibrinolysis



Time Required
for Transport to
a Skilled PCI
Lab

Reperfusion Strategies for STEMI

Pharmacologic



Widely available
Quickly administered
Less effective
Bleeding risk

?

← →

PCI



Limited availability
Treatment delay
More effective
Bleeding risk lower

Reperfusion Therapy for Patients with STEMI

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    graph TD
      Start[STEMI patient who is a candidate for reperfusion] --> A[Initially seen at a PCI-capable hospital]
      Start --> B[Initially seen at a non-PCI-capable hospital*]
      
      A --> A1[Send to cath lab for primary PCI  
FMC device or bare metal stent  
≤90 min  
Class I, LOE B]
      A1 --> A2[Diagnostic angiogram]
      A2 --> A3[Medical therapy only]
      A2 --> A4[PCI]
      A2 --> A5[CABG]
      
      B --> B1[D2D time ≤30 min]
      B --> B2[D2D time >30 min]
      
      B1 --> B1a[Transfer for primary PCI  
FMC device or bare metal stent  
as soon as possible and  
≤120 min  
Class I, LOE B]
      
      B2 --> B2a[Administer fibrinolytic agents within 30 min of arrival when anticipated FMC device ≤120 min  
Class I, LOE B]
      B2a --> B2b[Urgent transfer for PCI for patients with evidence of failed reperfusion or reocclusion  
Class III, LOE B]
      B2a --> B2c[Transfer for angiography and revascularization within 3-24 h for other patients as part of an invasive strategy*  
Class IIa, LOE B]
      
      B1a --> B2b
      B2b --> B2c
  
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*Patients with cardiogenic shock or severe heart failure initially seen at a non-PCI-capable hospital should be transferred for cardiac catheterization and revascularization as soon as possible, irrespective of time delay from MI onset (Class I, LOE: B). †Angiography and revascularization should not be performed within the first 2 to 3 hours after administration of fibrinolytic therapy.

Goals

- Chest pain to call: 5 minutes
- Ambulance arrival: 8 minutes
- Transfer time: 30 minutes
- Door to needle time: less than 30 minutes
- Door to balloon time: less than 90 minutes
- Door In Door Out(DIDO): less than 30 minutes
- Transfer from non PCI Hospital to balloon time: 120 minutes
- PCI related delay time: less than 60 minutes
- Total ischemic time: less than 120 minutes

Primary PCI

Primary PCI in STEMI



Primary PCI should be performed in patients with STEMI and ischemic symptoms of less than 12 hours' duration.



Primary PCI should be performed in patients with STEMI and ischemic symptoms of less than 12 hours' duration who have contraindications to fibrinolytic therapy, irrespective of the time delay from FMC.



Primary PCI should be performed in patients with STEMI and cardiogenic shock or acute severe HF, irrespective of time delay from MI onset.

Primary PCI in STEMI



Primary PCI is reasonable in patients with STEMI if there is clinical and/or ECG evidence of ongoing ischemia between 12 and 24 hours after symptom onset.



PCI **should not be performed** in a noninfarct artery at the time of primary PCI in patients with STEMI who are hemodynamically stable

Harm

Culprit Artery – Only Versus Multivessel PCI

COR	LOE	Recommendation
IIb	B-R	PCI of a noninfarct artery may be considered in selected patients with STEMI and multivessel disease who are hemodynamically stable, either at the time of primary PCI or as a planned staged procedure. ¹

1. Modified recommendation from 2013 Guideline (changed class from III: Harm to IIb and expanded time frame in which multivessel PCI could be performed).

Primary PCI vs fibrinolysis

- At any time from symptom onset, PCI is superior to fibrinolysis.
- 37% RR of mortality with PCI
- 65% RR of reinfarction
- 90% RR of stroke
- Higher LVEF
- Lower TVR
- Smaller infarct size
- Higher TIMI III flow
- Better healing

Reperfusion in the elderly

- It is estimated that 12% of STEMI patients are elderly.
- Scarce data about outcome of reperfusion strategies in elderly with STEMI
- Elderly were usually excluded from clinical trials
- Conflicting data about benefits of fibrinolysis
- PPCI still better than fibrinolysis even in elderly

PPCI VERSUS FIBRINOLYSIS

Table 4: Reperfusion therapy studies. Age limits for inclusion are specified. Efficacy refers to primary endpoint

STUDY	AGE LIMITS	Primary endpoint	MEAN AGE	TREATMENT	EFFICACY		COMPLICATIONS			
							STROKE		BLEEDING	
Zijta et al [31]	≥75 years	Recurrent ischemia before discharge	59±10 61±9	PTCA (n=70) SK (n=72)	9%	P<0.001	0%	NS	2%	NS
Rubero et al [83]	<75 years	Infarct related artery patency 48h posttreat	57±10 55±10	PTCA (n=50) SK (n=50)	74%	NS	0		0	NS
Geisfeld et al [84]	none	TIMI 3 flow infarct related artery pre-discharge		PTCA (n=54) SK (n=58)	55%	P<0.01				
Grines et al [30]	none	In hospital re-infarction	66±11 66±11	PTCA (n=195) t-PA (n=200)	2.6%	P=0.06	0%	P=0.09	12.3%	NS
Zijta et al [83]	none	Death/nonfatal stroke/reinfarction at 6m	63±11 59±12	PTCA (n=47) SK (n=51)	4%	P=0.02	2%	NS		
Eubach et al [88]	<80	Reinfarction/reinjection prior discharge		PTCA (n=24) t-PA (n=26)	4%	P<0.01				
Garcia et al [89]	>18 years	In hospital death	63(53-70) 60(51-74)	PTCA (n=100) t-PA (n=111)	9%	P<0.02	0%	P=0.08	2.8%	NS
OLISTO III[43]	14,14%>75	Recurrent ischemia before discharge	59±10 61±9	PTCA (n=573) t-PA (n=563)	9.8%	P=0.093	0.25% ^a 0.9% ^a	NS	40.3%	NS
Crimes et al [91]	≥70years	Death or disabling stroke	78±6 77±6	PTCA (n=232) Lytic (n=229)	11.3%	NS	0.8%	NS		
Guidberg et al [54]	≥70years	Composite of death, reinfarction, need for revascularization 6m	77±5 76±5	PTCA (n=44) t-PA (n=86)	19%	P=0.001	2%	NS	0% ^b	
De Boer et al [90]	>75 years	Composite of death, reinfarction or stroke at 1y	80 (77-83) 81 (78-84)	PTCA (n=66) SK (n=41)	20%	P=0.003	2.0%	P=0.34	11%	P=0.72
Bardaji et al [83]	≥70years	In hospital mortality	81.3±4.8 78.8±4 79.4±3.8	No treat (n=172) Lytic (n=146) PTCA (n=92)	26.7%	NS	1.2%	P=0.06	2.9%	P=0.01

^aPercentage of disabling strokes
^bStroke mortality

PPCI VS THROMBOLYSIS

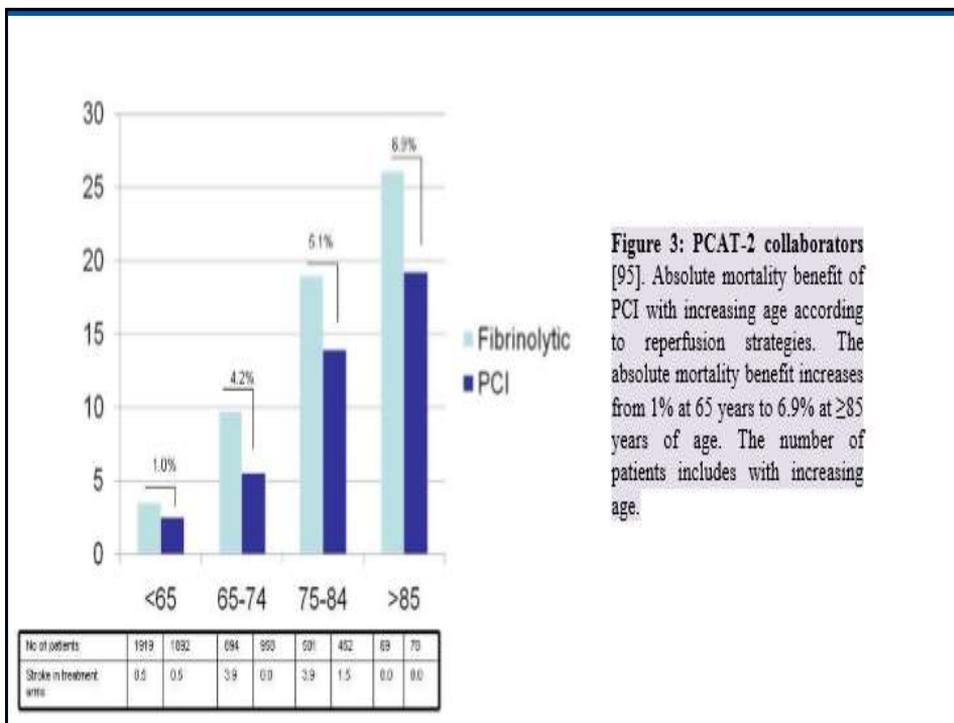
- Few small trials have been performed to specifically address the question of fibrinolytic therapy or PCI in elderly STEMI patients .
- One of these trial showed that patients >75 years treated with PCI had lower rates of death, MI, or stroke at 1 year (20% versus 44%; P=0.003) compared to streptokinase.
- The mortality difference was not a consistent finding across the studies , but PCI derived greater benefits both in terms of efficacy (lesser need for subsequent revascularization, reinfarction) and safety (lesser rates of stroke and bleeding) .

PPCI VS THROMBOLYSIS

- PCI advantages were confined to patients 70 to 80 years of age , among those >80 years, there was no advantage of one strategy over the other.
- A recent multicenter study evaluated the short and long term outcomes of nonagenarians with STEMI systematically treated with primary PCI .
- Their results on in-hospital mortality rate (19%) and predictors for 6 month mortality (cardiogenic shock at presentation, TIMI flow after PCI and abciximab , suggested that selected nonagenarians with AMI might also benefit from successful primary angioplasty.

PPCI VS THROMBOLYSIS

- Pooled trials analyses can provide statistical confirmation of the mortality advantage with PCI in individual trials.
- The PCAT-2 investigators included analysis of 22 randomized trials of PCI versus fibrinolytic therapy.
- There was a benefit with PCI, particularly if the patient arrived 2 hours after symptom onset or if the patient was ≥ 65 years of age .
- A subgroup analysis found that the absolute mortality advantage of PCI increased with age from 1% at 65 years to 6.9% at ≥ 85 years of age.



PPCI VS THROMBOLYSIS

Table 5. Considerations for selecting reperfusion therapy in the elderly

PCI	FIBRINOLYTICS	NO REPERFUSION
<ul style="list-style-type: none"> • Normal renal function • PCI can be performed without excessive delay (<1h) compared to fibrinolysis • Presentation >6h of symptom onset • Not known or suspected severe, diffuse vascular disease • Increased risk of ICH • Shock at presentation • Contraindications to fibrinolytic therapy • Absence ST elevation/pain 	<ul style="list-style-type: none"> • Diminished renal function • Delay to PCI would be excessive (>1h) compared to fibrinolysis • Can have the lytic within 2-3h from symptom onset 	<ul style="list-style-type: none"> • Too risky • Too late • Too small infarct (stable patient)
<i>Absolute benefits of PCI are greater in correlation to baseline risk</i>	<i>The greater benefit of fibrin specific agents may be offset by more ICH compared to SK</i>	

PCI: percutaneous coronary intervention. ICH: intracranial hemorrhage

Challenges of PPCI in elderly

- **General challenges**

- Prolonged time from symptom onset to admission.

- Atypical symptoms

(According to the National Registry of Myocardial Infarction, chest pain at presentation occurred in **89.9%** of STEMI patients <65 years of age versus **56.8%** of those ≥85 years of age)

Challenges of PPCI in elderly

- LBBB is more common in elderly (*1/3 of patients > 85 years*)
- Multiple comorbidities including chronic kidney disease, anemia and cancer, which increase the risks associated with PCI
- Higher risk of CIN, bleeding, cholesterol embolism

Challenges of PPCI in elderly

• *Technical challenges*

- Difficult puncture due to PVD
- Tortous iliofemoral, abdominal aorta
- Aortic aneurysm
- Severe coronary calcification.
- Complex multivessel disease
- Tortuous vascular anatomy which make coronary and vascular approaches difficult.
- Less likely to achieve TIMI III flow, MBG III, ST resolution
- More PCI related complications
- Poor collaterals

Outcomes of PPCI in elderly

• *Elderly versus young*

- In-hospital mortality (14.5% vs. 3.5%).
- *Heart failure (20.7% vs. 10.5%).*
- Major hemorrhage (9.5% vs. 3.3%).
- *Mechanical complications (3.4% vs. 0.7%).*
- *Contrast-induced nephropathy (CIN) (31.8% vs. 12.2%)*
- Stroke (4% vs 0.7%)

How to improve outcome of PPCI in elderly

- Early detection of anemia and kidney dysfunction
- Reduce volume of contrast during PPCI.
- Good hydration.
- Non ionic contrast
- Avoid access site bleeding(closure devices, Angioseal, Starclose)

How to improve outcome of PPCI in elderly

- **Radial approach** (RIVAL trial): reduced mortality, overcome peripheral VD problems during femoral approach, improve catheter support.
- Bivaluridin during intervention, avoid LMWH, Fondaparinux.
- ACT guided PPCI if UFH was used
- ACT guided sheath removal < 180 sec
- Avoid prasugrel if > 75 years or prior stroke

CONCLUSION

- CV care of elderly STEMI patients should take place within the context of their multidimensional health status.
- Physicians should be aware of the atypical clinical presentations, as well as altered pharmacokinetics and the often altered cognitive and functional status of elderly patients.
- Up to 85 years of age, studies suggest a benefit associated with reperfusion strategies.

CONCLUSION

- The choice between fibrinolytics or PCI is determined by the presence or absence of cardiogenic shock, time from presentation, and comorbidity, which often tip the balance towards PCI in the elderly.
- The safety and efficacy of reperfusion, specifically fibrinolytic therapy, in the very elderly (≥ 85 years of age) are issues that require further investigation.

Thank you