Primary PCI in Egypt when, where and how?

By

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Agenda

- review of what was written
- Primary PCI in Egypt
The concept

Coronary revascularization is appropriate when the expected benefits, in terms of survival or health outcomes (symptoms, functional status, and/or quality of life) exceed the expected negative consequences of the procedure.


What?!

Definition: Primary PCI consists of

1. urgent balloon angioplasty (with or without stenting),
2. without the previous administration of fibrinolytic therapy or platelet glycoprotein IIb/IIIa inhibitors,
3. to open the infarct-related artery during an acute myocardial infarction with ST-segment elevation.
Pathogenesis of coronary atherosclerosis

- Endothelial injury and dysfunction
- Adhesion and transmigration of leukocytes into the arterial intima
- Migration of smooth-muscle cells from the media into the intima
- Formation of an atheroma or atherosclerotic plaque
- Abrupt rupture, erosion, or fissuring of a previously minimally obstructive plaque creates a potent stimulus for platelet aggregation and thrombus formation.

Circulation 2005;112:2725-2734

Most Myocardial Infarctions Are Caused by Low-Grade Stenosis

Coronary stenosis severity prior to MI

- >70% Stenosis: 14%
- 50%-70% Stenosis: 18%
- <50% Stenosis: 68%

On occlusion of the infarct-related artery,

- all the myocardium that is supplied by the artery becomes ischemic, resulting in
  
1. chest pain
2. electrocardiographic evidence of transmural (full-thickness) ischemia (ST-segment elevation) in the leads reflective of that region of the heart.
3. Subsequently, necrosis begins within minutes and progresses during several hours in a "wavefront" fashion from the endocardial surface to the epicardial surface.

Am J Cardiol 2006;97:Suppl 10A:13F-25F

Symptomatic, electrocardiographic, morphologic, and anatomical findings in a patient with a myocardial infarction with ST-segment elevation are shown before onset (Panel A) and during the infarction (Panel B), and after primary PCI with balloon angioplasty (Panel C) or stent placement (Panel D).
When?

- The 1st medical contact is within 90 min was determined as the golden time for performance of primary PCI in a suitable facility
- or when the transferable time to that facility will not exceed that time.


A delay more than 90 min is acceptable in some trials with the recognition that in certain patients, the mortality advantage of primary PCI compared with fibrinolytic therapy is maintained with more prolonged door-to-balloon times.

Circulation. 2006
If ischemia persists for several hours, transmural infarction results.

- **In contrast,** if blood flow is restored during the period of progressive necrosis the ischemic myocardium is salvaged and the size of the infarct is reduced.

Am J Cardiol 2006;97:Suppl 10A:13F-25F

**Risk of delay**

- in a study of 43,801 patients with STEMI
- undergoing primary PCI
- within the National Cardiovascular Data Registry, any delay in time to reperfusion after arrival at the hospital was associated with a higher adjusted risk of in-hospital mortality in a continuous, nonlinear fashion

<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>Risk (%)</th>
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<tbody>
<tr>
<td>30</td>
<td>3.0%</td>
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<tr>
<td>90</td>
<td>4.3%</td>
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<td>150</td>
<td>7.0%</td>
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<td>60</td>
<td>3.5%</td>
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<td>120</td>
<td>5.6%</td>
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<tr>
<td>180</td>
<td>8.4%</td>
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</tbody>
</table>

Rathore SS et al. Association of door-to-balloon time and mortality in patients admitted to hospital with ST elevation myocardial infarction: national cohort study. BMJ. 2009
Where and by Whom?

- It is obviously that it is done for ST segment elevation myocardial infarction patients in a PCI capable center.
- The 1st question is Where and Who?
- **Operator:** - 75+ elective PCI procedures per year
  - 11+ primary PCI cases per year
- **Center:** - 200+ overall PCI cases per year
  - 36+ primary PCI procedures per year

So it is not just passing the wire through a lesion in the cath lab!

The Cardiac Society of Australia and New Zealand Guidelines on the Performance of and Support Facilities for a Primary Percutaneous Coronary Intervention (PCI) Service

How?

Primary PCI is not always about stenting the culprit lesion, **the choice of:**
- balloon dilatation,
- thrombus aspiration
- or stenting the artery

This is done according to
- the type of lesion,
- its extent
- and the further plane whether it is PCI or urgent CABG in cases of severe multi vessel affection or left main artery disease
Trials design: Patients with STEMI were randomized to aspiration thrombectomy plus PCI (n = 102) versus primary PCI alone (n = 94). Follow-up was 6 months.

Results
- ST-resolution at 60 minutes: 50% with thrombectomy vs. 41% with primary PCI (p = 0.28)
- Myocardial blush grade of 3: 76% vs. 59% (p = 0.023), respectively
- 6-month mortality: 4.0% vs. 3.1% (p = 0.74), respectively

Conclusions
- Among STEMI patients, a strategy of aspiration thrombectomy
  1-failed to improve ST-resolution after PCI,
  2-although it did enhance myocardial blush grade of 3
  3-Mortality was similar between the groups

Presented by Dr. Dariusz Dudek at ESC 2008

Primary PCI restores angiographically normal flow in the previously occluded artery in more than 90% of patients, whereas fibrinolytic therapy does so in only 50 to 60% of such patients.

Bare-metal stenting

- Those who undergo bare-metal stenting of the infarct-related artery, the rates of restenosis and the frequencies of recurrent angina and repeated revascularization procedures are lower.

- Stenting of the infarct-related artery is usually preferred.

- However, balloon angioplasty is preferred for patients in whom clopidogrel is contraindicated (because of thrombocytopenia or the presence of left main or extensive multivessel coronary artery disease, who may require bypass surgery within days after successful primary PCI).

- Balloon angioplasty is also preferred when the size of the infarct-related artery is insufficient for the placement of a stent.


Drug-eluting stents

- As compared with bare-metal stents, drug-eluting stents appear to reduce further the rates of restenosis within 12 months after primary PCI.

Pharmacologic therapy

- In addition to oral aspirin and intravenous unfractionated heparin, clopidogrel (JAMA 2005;294:1224-1232) after it has been determined that emergency bypass surgery is not required.

- **Beta-adrenergic blockers** J Am Coll Cardiol 2004 and ACEI should be initiated, provided that the patient has no contraindications and is stable hemodynamically. Circulation 2004;110:588-636.

- Platelet glycoprotein IIb/IIIa inhibitors often are given to patients undergoing primary PCI. N Engl J Med 2002;346:957-966.

- Treatment with a **high dose of (statin)** is recommended for all patients with acute myocardial infarction. N Engl J Med 2004;350:1495-1504

Complications and adverse effects
Abrupt vessel closure

- occurs in up to 3% of patients

- Stenting of the infarct-related artery decreases the incidence of abrupt closing to about 1%.

- Therefore, stenting is the preferred primary intervention if the coronary anatomy is suitable.

- As noted, stents also reduce the risk of restenosis, in less than 1.5% of patients receiving either a bare-metal stent or a drug-eluting stent within the first year.

  N Engl J Med 2006;355:1093-

In the report of 4366 procedures,
- the rates of emergency cardiac surgery and in-hospital death were 4.3% and 2.5%, respectively.
- Such events occur much more frequently among patients in whom perfusion is not restored.

  Circulation 2005;112:3520-3532
Primary PCI in Egypt

REPERFUSION STRATEGY

**Goals**

- **EMS on-scene**
  - Encourage 12-lead ECGs
  - Consider prehospital fibrinolytic if capable and EMS-to-needle within 30 min

- **EMS transport**
  - EMS to-hospital within 30 min

- **EMS Triage Plan**

- **Not PCI capable**

**Onset of symptoms of STEMI**

- Call 9-1-1

- EMS Dispatch

- **EMS on-scene**

- **EMS transport**

- **EMS Triage Plan**

**Total ischemic time:** Within 120 min**

*Golden Hour = First 90 minutes
The Early Glycoprotein IIb–IIIa Inhibitors in Primary Angioplasty (EGYPT) cooperation aimed at performing a comprehensive meta-analysis of randomised trials based on individual patient data to evaluate the benefits of pharmacological facilitation with Gp IIb–IIIa inhibitors in patients undergoing primary angioplasty for STEMI.

De Luca G et al. Heart 2008;94:1548-1558
• early Gp IIb–IIIa inhibitors did translate into non-significant benefits in survival, except for abciximab, explained by the improved myocardial perfusion and less distal embolisation.

• *Heart* 2008;94:1548-1558

• **Therefore**, until the results of additional large randomised trials with long-term follow-up data become available, pharmacological facilitation with Gp IIb–IIIa inhibitor administration, particularly abciximab, may be considered in patients undergoing primary angioplasty for STEMI
Primary PCI at cardiovascular department
Cairo University
February 2009 to February 2010 performed by staff members

- Total number of cardiac and vascular catheterizations performed at Catheterization unit Cardiovascular department Cairo university and New El Kasr El Eini Teaching Hospital (February 2009 – February 2010) were 2112
  - 43.65% (921 cases) at New El Kasr El Eini Teaching Hospital
  - 56.3% (1191 cases) at catheterization unit cardiovascular department
Primary PCI total number of cases (111)

- **Primary PCI without stenting**: 10 cases (9%)
- **Bare metal stents** were used in 33 cases (32.6%)
- **Drug eluting stents** (paclitaxel or sirolimus) were used in 68 cases (67.3%)

Complications and Outcome

18 out of 111 cases of primary PCI were complicated by:

- No reflow
- Dissection
- Spasm
- Shock
- Residual stenosis
- Plaque prolapse
- Groin hematoma

- However, 86 cases out of 111 (77.4%) achieved satisfactory results (TIMI flow III)
problem

- Administrative
- Financial
- Organization
Conclusion

- Several randomised trials have shown that primary angioplasty is superior to thrombolysis in terms of survival in the treatment of ST-segment elevation myocardial infarction (STEMI).

- The attempts to extend primary angioplasty to the vast majority of STEMI patients may, however, be associated with longer delays to treatment, with a negative impact on survival.


THANK YOU