Diminished and impaired myocardial reperfusion despite successful opening and patency of infarct related artery (IRA) in STEMI following PCI.
No reflow phenomenon

- It may set in and manifest soon after ballooning or stenting during PCI in the cath lab (or ICCU).

- No reflow is a multifactorial phenomenon.

1. Micro-embolization

2. Ischemia

3. Reperfusion injuries.

- Recognition of no reflow is essential if it occurs in the catheterization laboratory (cath lab).

- Ideally the patient should not leave the cath lab unless no reflow has been satisfactorily managed.
Clinically no reflow may present with:

- The recurrence of chest pain
- Cardiogenic shock with hypotension
- Malignant arrhythmias
- Acute dyspnea due to pulmonary edema secondary to heart failure.

Angiographic no reflow after PCI is associated with reduced myocardial salvage, larger infarct size and increased long term 5 year mortality.
Treating and Preventing No Reflow in the Cardiac Catheterization Laboratory

No one clear definite approach

• Two different scenarios (cases)
### Thrombus Grade Classification

<table>
<thead>
<tr>
<th>Thrombus Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrombus grade 0 (G0)</td>
<td>No angiographic characteristics of thrombus are present</td>
</tr>
<tr>
<td>Thrombus grade 1 (G1)</td>
<td>Possible thrombus is present, with such angiography characteristics as: Reduced contrast density, haziness, irregular lesion contour, or a smooth convex meniscus at the site of total occlusion suggestive but not diagnostic of thrombus; in thrombus</td>
</tr>
<tr>
<td>Thrombus grade 2 (G2)</td>
<td>There is definite thrombus, with greatest dimensions &lt; 1/2 the vessel diameter</td>
</tr>
<tr>
<td>Thrombus grade 3 (G3)</td>
<td>There is definite thrombus but with greatest linear dimension &gt;1/2 but &lt; 2 vessel diameters</td>
</tr>
<tr>
<td>Thrombus grade 4 (G4)</td>
<td>There is definite thrombus with greatest linear dimension &gt; 2 vessel diameters</td>
</tr>
<tr>
<td>Thrombus grade 5 (G5)</td>
<td>There is total occlusion (unable to assess thrombus burden due to total vessel occlusion).</td>
</tr>
</tbody>
</table>

### Case 1

**RCA**
- Proximal to mid Grade 4 large thrombus burden.
Thrombus burden: clinical implications

- Thrombus grade 1
- Thrombus grade 2
- Thrombus grade 3
- Thrombus grade 4

- Small Thrombus Burden
- Large Thrombus Burden

A graph showing the cumulative MACE rate (%) over months of follow-up, with LTB and STB groups compared. The graph indicates a statistically significant difference (p=0.001).
• Routine use of thrombus aspiration is not recommended.  
  (class III – LOE A)
• Routine use of deferred stenting is not recommended.  
  (class III – LOE B)
**Pharmacological treatment of no-reflow**

- Calcium channel blockers
- Epinephrine
- Glycoprotein IIb/IIIa inhibitors

• GP IIb/IIIa inhibitors should be considered for bailout if there is evidence of no-reflow or a thrombotic complication. (class IIa – LOE C)
**Calcium channel blockers**

• Verapamil, diltiazem and nicardepine have been studied for their beneficial effects in no reflow.

• Thus all three calcium channel blockers have produced good results in the treatment of no reflow.

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**Epinephrine!!**

Epinephrine has been administered for the treatment of noreflow, when all other drugs have failed and the patient remains critically unstable.
**Glycoprotein IIB/IIIa inhibitors**

The intracoronary or intravenous abciximab did not result in any difference in the combined end point of death, reinfarction or congestive heart failure.

Since IC abciximab bolus is safe, it may be preferred if abciximab is indicated.

ESC guidelines (2017) recommends use of GpIIb/IIIa as a bailout procedure in no-reflow patients.

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**Pharmacological treatment of no-reflow**

- Adenosine
- Nicorandil
- Sodium nitroprusside
**Conclusion of case 1**

- Manual aspiration thrombectomy or deferred stenting may have a rule in patients with large thrombus burden (*not following the guidelines*).

- No-reflow may prove resistant to pharmacological therapy in 5–10% cases, with adverse short term and long term outcomes.

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**Case 2**

**LAD**

- Proximal to mid *Grade 4 large thrombus burden.*

- TIMI flow II III
• Routine use of thrombus aspiration is not recommended.  
  (class III – LOE A)

• Routine use of deferred stenting is not recommended.  
  (class III – LOE B)

• GP IIb/IIIa inhibitors should be considered for bailout if there is evidence of no-reflow or a thrombotic complication.  
  (class IIa – LOE C)
Safety and efficacy of immediate vs. deferred stenting in stable patients with acute coronary syndromes and intracoronary thrombi

Thesis

Submitted for partial fulfillment of M.D degree in Cardiovascular Medicine

By
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Study design:

- The study included 53 patients with TIMI flow II or III (obtained either spontaneously or after manual aspiration and/or balloon dilatation of an occluded coronary artery) subjected to either immediate or deferred stenting according to discretion of the operator;
- Immediate stenting (IS) group: included thirty patients with the stent implanted immediately in presence of thrombotic burden,
- Deferred stenting (DS) group: twenty three patients with the stent implanted after period of intense antithrombotic therapy.
• Results:
  • Stenting was performed less frequently in the delayed stenying group than in the immediate stenting group, because of the angiographic improvement in lesion characteristics (100% vs. 70%, P = 0.001). Specially male, smokers, less than 40y
  • Stent diameter was more and stent length was less in delayed stenting group, however, this is not statistically significant

• The thrombus-related angiographic events (no or slow flow or distal embolization) was observed more in the IS group in comparison with the DS group; (33% vs. 13%, P = 0.089).
  • Patients who develops slow or no flow had certain angiographic features;
    i) initial higher thrombus burden
    ii) there was initial abrupt cutoff pattern without taper before the occlusion
    iii) Less TIMI II flow before stent implantation.
In high-risk STEMI patients undergoing PCI with LTB, *deferred stenting* could be a helpful rescue technique.

**Take Home Message**

*prevention is always better than treatment.*
There is *no one clear definite approach*

for dealing with high-risk STEMI patients

undergoing PCI with LTB.

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**Take Home Message**

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**Thank You**