



## Appropriate Timing for Coronary Revascularization Post - MI

**Duke** Heart Center

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## Disclosures

- Interventional cardiologist
  - Clinical Cardiovascular MRI and Vascular Ultrasound
- Research Grants:
  - NHLB, AHRQ, AstraZeneca, Pleuristem, Johnson and Johnson, Maquet / Datascope
- Advisory Board/Consulting:
  - Genzyme, Bayer, Baxter Healthcare, Ortho McNeil Jansen, theHeart.org, Medscape, Maquet, CSI technologies
- Professional Society Roles:
  - Member ACC/AHA AUC Task Force
  - Chair of Writing Group for ACC/AHA Coronary Revascularization Appropriateness Criteria
  - Chair of AHA Diagnostic and Interventional Cath Committee



## Appropriate Time for Revascularization Post- MI..... So many questions

- **Timing on revascularization for patients with**
  - NSTEMI
  - STEMI (as soon as possible)
  - Shock
- **Timing for revascularization of Non-Culprit vessels**
  - Post STEMI – with IRA PCI
  - Post STEMI – with multi-vessel disease
- **Timing for CABG**
  - Post STEMI or NSTEMI



**‘When you come to a fork  
in the road..... take it’  
Yogi Berra**



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**American  
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Angiography and Interventions**

# 2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention (and Coronary Revascularization)



# UA/NSTEMI: Choice of Strategy\*

Recommendation	COR	LOE
An early invasive strategy** in patients who have refractory angina or hemodynamic or electrical instability (without serious comorbidities or contraindications to such procedures)	I	B
An early invasive strategy** in initially stabilized patients (without serious comorbidities or contraindications to such procedures) who have an elevated risk for clinical events	I	A
The selection of PCI or CABG as the means of revascularization in the patient with ACS should generally be based on the same considerations as those without ACS	I	B
A conservative strategy recommended (over an early invasive strategy) in women with low-risk features	I	B
An early invasive strategy (within 12 to 24 hours of admission) chosen over a delayed invasive strategy for initially stabilized <i>high-risk</i> patients***	IIa	B
An initial conservative (i.e., a selectively invasive) strategy in initially stabilized patients who have an elevated risk for clinical events (including troponin positive patients)***	IIb	C
An early invasive strategy** in patients with extensive comorbidities in whom the risks of revascularization and comorbid conditions are likely to outweigh the benefits of revascularization, in patients with acute chest pain and a low likelihood of ACS, or in patients who will not consent to revascularization regardless of the findings	III – No Benefit	C



\*UA/NSTEMI GL with additional and more comprehensive recommendations

\*\*Early invasive strategy = diagnostic angiography with intent to perform revascularization

\*\*\*Recs from the 2011 UA/NSTEMI focused update (not in PCI GL)

# Coronary Angiography in STEMI

Indications	COR	LOE
<b>Immediate coronary angiography</b>		
Candidate for primary PCI	I	A
Severe heart failure or cardiogenic shock (if suitable revascularization candidate)	I	B
Moderate to large area of myocardium at risk and evidence of failed fibrinolysis	IIa	B
<b>Coronary angiography 3 to 24 hours after fibrinolysis</b>		
Hemodynamically stable patients with evidence for successful fibrinolysis	IIa	A
<b>Coronary angiography before hospital discharge</b>		
Stable patients	IIb	C
<b>Coronary angiography at any time</b>		
Patients in whom the risks of revascularization are likely to outweigh the benefits or the patient or designee does not want invasive care	III: No Benefit	C





# PCI in STEMI\*

Indications	COR	LOE
<b>Primary PCI*</b>		
STEMI symptoms within 12 h	I	A
Severe heart failure or cardiogenic shock	I	B
Contraindications to fibrinolytic therapy with ischemic symptoms <12 h	I	B
Clinical and/or ECG evidence of ongoing ischemia between 12 and 24 h after symptom onset	IIa	B
Asymptomatic patient presenting between 12 and 24 h after symptom onset and higher risk	IIb	C
Noninfarct artery PCI at the time of primary PCI in patients without hemodynamic compromise	III: Harm	B
<b>Delayed or Elective PCI in Patients with STEMI (i.e. Non-Primary PCI)</b>		
Clinical evidence for fibrinolytic failure or infarct artery reocclusion	IIa	B
Patent infarct artery 3 to 24 h after fibrinolytic therapy	IIa	B
Ischemia on noninvasive testing	IIa	B
Hemodynamically significant stenosis in a patent infarct artery >24 hours after STEMI	IIb	B
Totally occluded infarct artery >24 h after STEMI in a hemodynamically stable asymptomatic patient without evidence of severe ischemia	III: No Benefit	B

\*Systems goal of performing primary PCI within 90 minutes of first medical contact when the patient presents to a hospital with PCI capability (Class I, LOE: B), and within 120 minutes when the patient presents to a hospital without PCI capability (Class I, LOE: B).

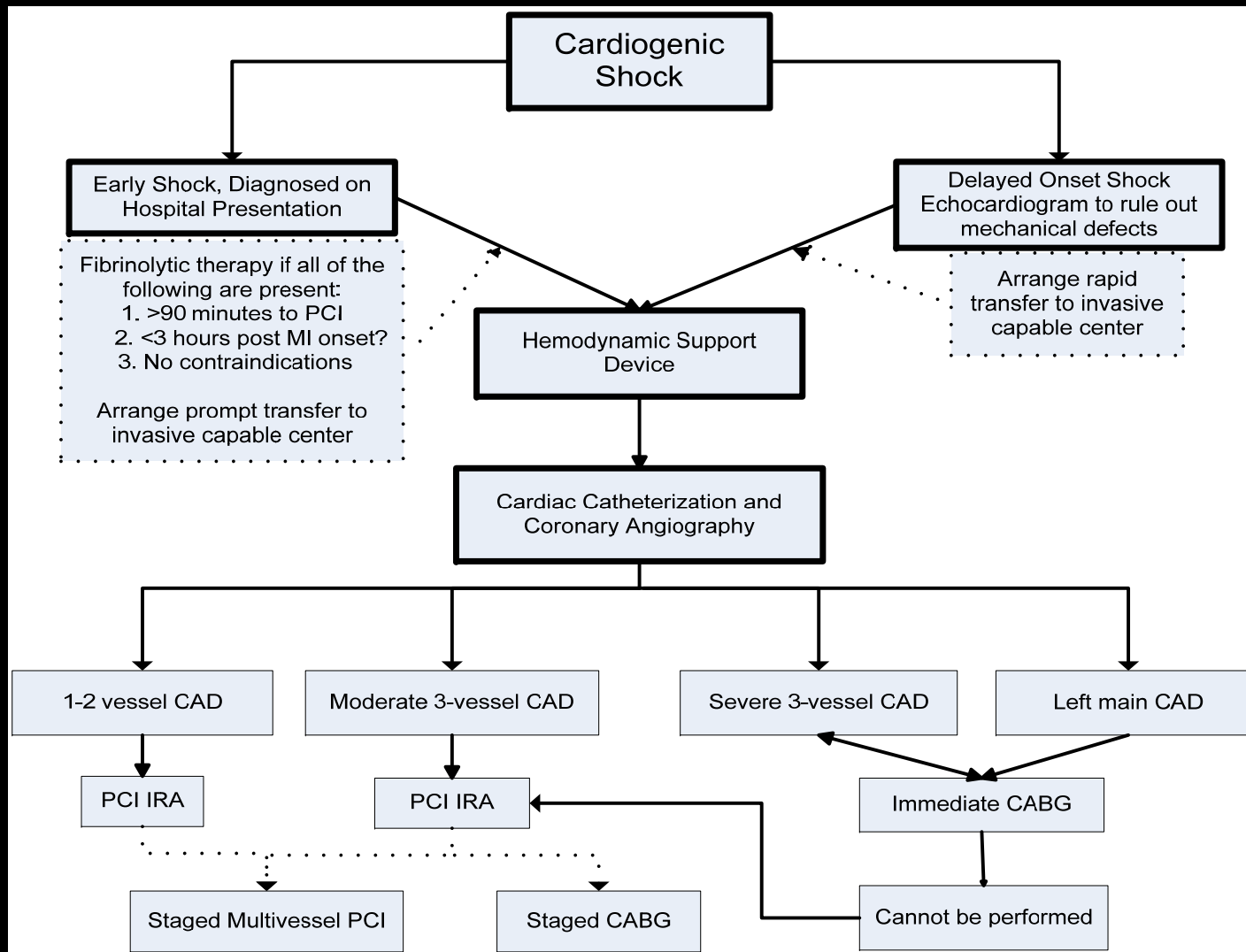


# Cardiogenic Shock

Recommendation	COR	LOE
Immediate coronary angiography in patients with STEMI with severe heart failure or cardiogenic shock who are suitable candidates for revascularization	I	B
PCI for patients with acute MI who develop cardiogenic shock and are suitable candidates	I	B
Hemodynamic support device for patients with cardiogenic shock after STEMI who do not quickly stabilize with pharmacological therapy	I	B



# Recommendations for Initial Reperfusion Therapy When Cardiogenic Shock Complicates STEMI



Dashed lines indicate that the procedure should be performed in patients with specific indications only

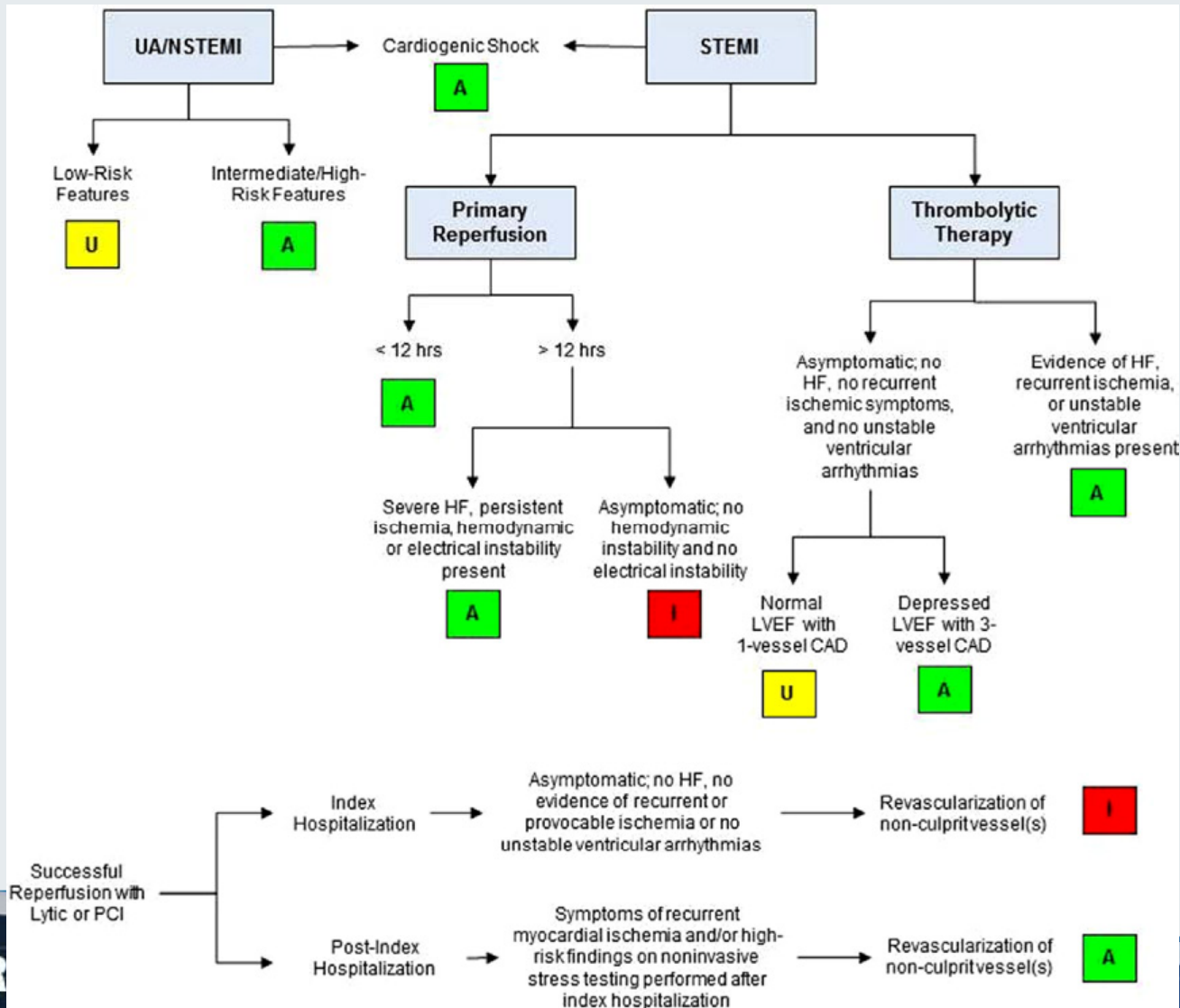


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# Reperfusion of non-culprit artery--





## Existing Evidence For CABG post MI

- We examined our experience retrospectively in 3,942 patients who underwent CABG between 1986 and 1993, including 2,296 patients after acute MI
- The operative mortality associated with increasing time intervals between MI and CABG were 9.1%, 8.3%, 5.2%, 6.5%, and 2.9%, for less than 6 hours, 6 hours to 2 days, 2 to 14 days, 2 to 6 weeks, and more than 6 weeks, respectively. In comparison, the operative mortality was 2.5% for patients with no history of acute MI.
- 2 days if possible had the stable lowest risk

Cresswell Journal Thoracic Surgery - 1997





## More observational Surgical Data

- The operative mortality rates associated with increasing time intervals between AMI and CABG were 17.4, 9.1, 4.0, and 5.8 per cent, for less than 6 hours, 6 to 24 hours, 1 to 7 days, and 7 to 21 days, respectively.
- Am Surg. 1997 Aug;63(8):710-5.



## 2.2.1. CABG in Patients With Acute MI: Recommendations Class I

1. Emergency CABG is recommended in patients with acute MI in whom
  - 1) primary PCI has failed or cannot be performed,
  - 2) coronary anatomy is suitable for CABG, and
  - 3) persistent ischemia of a significant area of myocardium at rest and/or hemodynamic instability refractory to nonsurgical therapy is present. **(Level of Evidence: B)**
  
2. Emergency CABG is recommended in patients undergoing surgical repair of a postinfarction mechanical complication of MI, such as ventricular septal rupture, mitral valve insufficiency because of papillary muscle infarction and/or rupture, or free wall rupture. **(Level of Evidence: B)**



## Class I - CABG

Emergency CABG is recommended in patients with cardiogenic shock and who are suitable for CABG irrespective of the time interval from MI to onset of shock and time from MI to CABG. **(Level of Evidence: B)**

Emergency CABG is recommended in patients with life-threatening ventricular arrhythmias (believed to be ischemic in origin) in the presence of left main stenosis greater than or equal to 50% and/or 3-vessel CAD. **(Level of Evidence: C)**

# Thienopyridines

**MODIFIED**

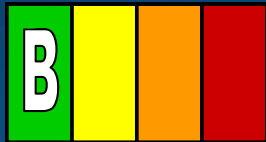
**Recommendation (prasugrel added)**

**I IIa IIb III**



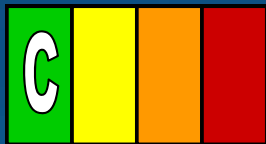
In patients taking a thienopyridine in whom coronary artery bypass surgery (CABG) is planned and can be delayed, it is recommended that the drug be discontinued to allow for dissipation of the antiplatelet effect.

**I IIa IIb III**



The period of withdrawal should be at least 5 days in patients receiving clopidogrel / **ticagrelor**

**I IIa IIb III**



and at least 7 days in patients receiving prasugrel,

**I IIa IIb III**



... unless the need for revascularization and/or the net benefit of the thienopyridine outweighs the potential risks of excess bleeding.



## Conclusions

- **Timing on revascularization for patients with**
  - NSTEMI – Invasive strategy
  - STEMI (as soon as possible)
  - Shock – PCI or CABG as soon as possible
- **Timing for revascularization of Non-Culprit vessels**
  - Post STEMI – with IRA if shock
  - Post STEMI – with multi-vessel disease – CABG or PCI not acutely unless unstable
- **Timing for CABG – 48 hours to 5 days**