Clinical Evaluation of Acute CAD

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Disclosures

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Objectives

- This presentation will review the clinical evaluation of acute coronary syndromes including acute MI (STEMI and NSTEMI), unstable angina and suspected unstable cardiac chest pain. At the end of this presentation the audience should be familiar with the various clinical presentations of acute coronary syndromes

Acute Coronary Syndromes (ACS)

- ST-elevation myocardial infraction (STEMI)
  - 25-40% of all acute MI
  - Mortality 5-6% in hospital and 7-18% at 1 year.
  - Community incidence rates for STEMI have declined over the past decade, whereas those for non–ST-elevation ACS have increased
- Non-ST-elevation MI (NSTEMI)
- Unstable Angina (UA)
  - Rates for non–ST-elevation ACS have increased

Diagnosis of Acute MI

- New persistent significant ST-T changes or new LBBB (in conjunction with other evidence for acute MI)
- Rise and fall of biomarkers, (preferably troponin cTn, but might include CK, CK-MB, other troponins) PLUS
- Symptoms of ischemia

- Development of Q waves
- Imaging evidence
  - New wall motion abnormality OR
  - Loss of viability

Acute MI
New significant ST-T changes or new LBBB

Choose 1 of the following:

- New ST-segment elevation at the J point in 2 contiguous leads with the cutpoints ≥0.1 mV in all leads other than leads V2 through V3, where the following cutpoints apply: ≥0.2 mV in men age ≥40 y, ≥0.25 mV in men age <40 y, or ≥0.15 mV in women
- New isolated ST-segment depression ≥0.1 mV in at least 2 contiguous leads of V1 through V3 with upright T waves
- New ST-segment elevation ≥0.05 mV in leads V7 through V9 or ≥0.1 mV in men age <40 y (inferobasal/posterior] infarction)
- New ST-segment elevation ≥0.05 mV (≥0.1 mV in men age <30 y) in leads V3R, V4R (right ventricular infarction)
- New ST-segment elevation ≥0.1 mV in lead aVR with concomitant ST-segment depression ≥0.05 mV in at least 2 contiguous leads

Management of Acute MI

- Early diagnosis
- Rapid revascularization
  - Primary coronary intervention

    OR

    Thrombolytic therapy

Risk Factors affecting Outcome

- Age
- Time to restoration of flow (including door to needle time)
- Killip class, Hypotension, tachycardia
- Prior MI
- Anterior MI
- Diabetes (no-reflow is more common)
- Renal function
- Smoking
- Cardiac arrest

Factors Influencing Risk Post MI

1. Degree of LV dysfunction

Combination of prior damage, acute infarction and stunning of myocardium that was salvaged with reperfusion

2. Amount of jeopardized myocardium (extent of CAD)

Factors Influencing Risk Post MI
Degree of LV dysfunction

Ejection Fraction by any method is the usual measurement but may not stabilize until 3 months at which time need for additional therapy such as ICD placement can be assessed

EF is one of the strongest predictors of mortality

Balancing Risk and Benefits of Intervention

What is high risk?

- A variable can be described as a high risk marker when the risk to the patient on medical therapy alone is greater than the risk of intervention
- Different variables carry different degrees of risk
- For example
  - A high risk duke score on a treadmill test predicts 5.25% of adverse event per year
  - A low EF may carry a risk of 10% or more mortality per year

Indications for Early Angiographic Assessment of Extent of CAD
(amount of jeopardized myocardium)

- At the time of Primary PCI

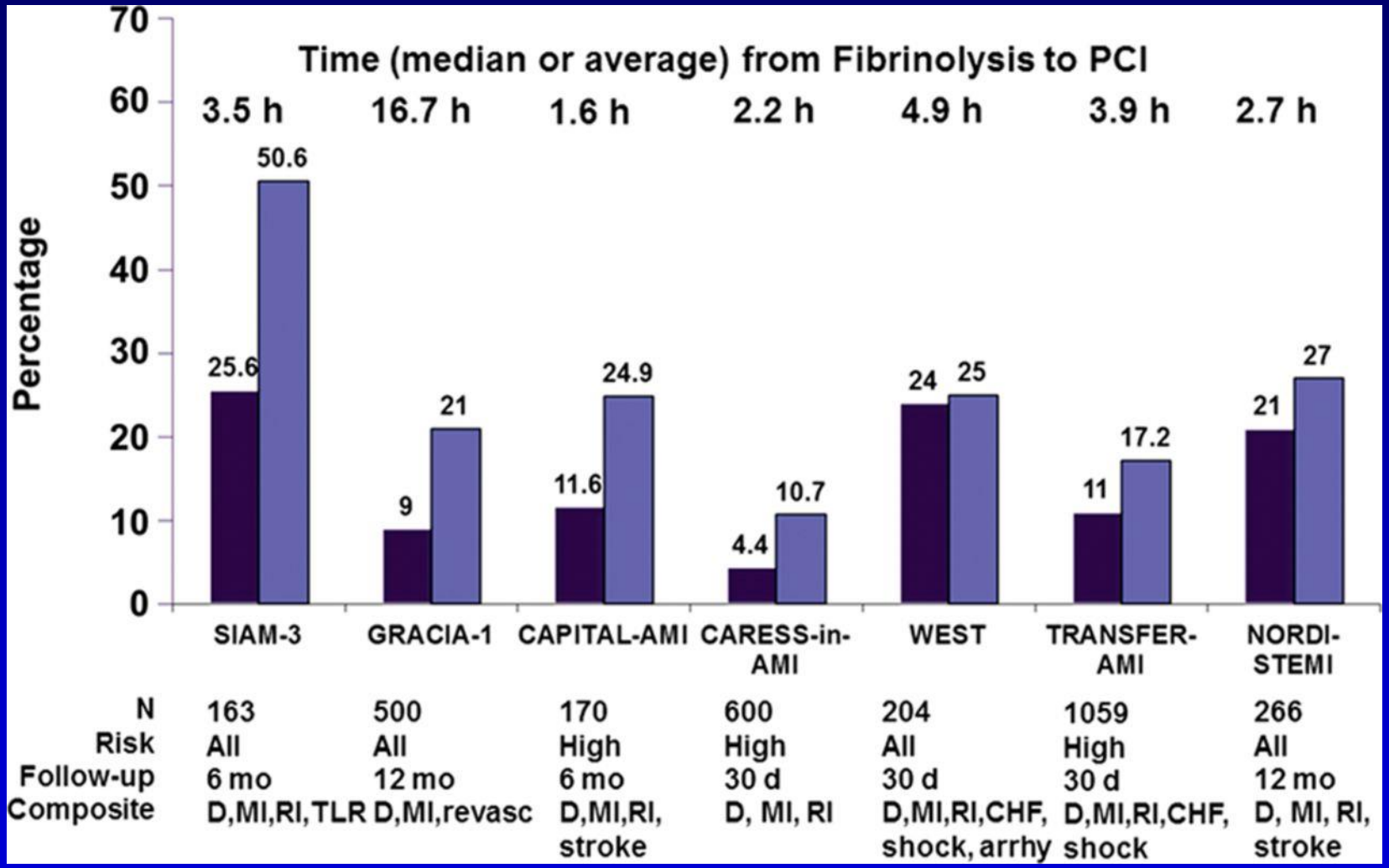
  OR

- Acute severe CHF or cardiogenic shock
- Ongoing myocardial ischemia

Indications for Early Angiographic Assessment of Extent of CAD

- Post Thrombolysis, prior to discharge
  - Trials comparing routine PCI after thrombolytic versus ischemia driven intervention
  - Lower risk of recurrent MI and lower 2 year mortality with PCI
- Intermediate or high risk finding on non-invasive assessment

Primary outcome of trials of routine versus ischemia-driven (or delayed) catheterization and PCI after fibrinolytic therapy.



et al. Circulation 2013;127:e362-e425

American Heart Association

Factors Influencing Risk Post MI
Amount of jeopardized myocardium (extent of CAD)

Non-invasive risk stratification post MI is primarily done in those who have not had primary PCI and there is increased risk from angiography

Evidence of ischemia post MI, even on a low level stress test is associated with increased risk

Those few studies doing imaging for ischemia post MI (perfusion imaging or stress echo) showed improved outcomes with intervention

Unstable Angina and NSTEMI

Chest pain syndromes

Presence or absence of ECG changes and/or biomarkers

Classification of Chest Pain

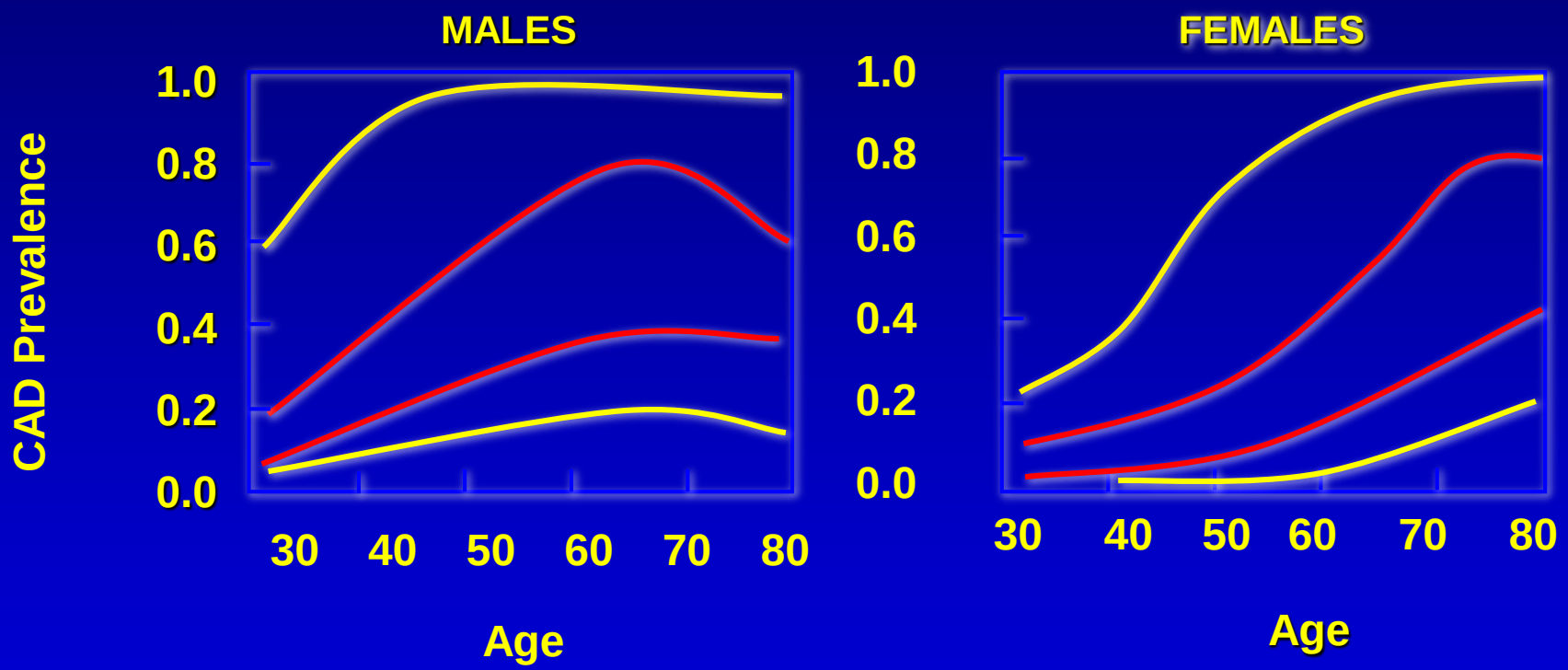
Features of Typical Pain

- Substernal chest discomfort, squeezing, burning, heavy
- Exertional or precipitated by emotion
- Promptly relieved by rest or nitroglycerin

Atypical only 2 out of 3 features

Non-Cardiac only 1 out of 3 variables

Relationship Of CAD Prevalence To Age, Sex And Symptoms



Adapted from Diamond, New Engl J Med 1979;300:1350-1358

Initial Assessment

- History, examination, ECG, Biomarkers
  - Repeated
- Classify
  - a noncardiac diagnosis,
  - chronic stable angina,
  - possible ACS, and
  - definite ACS.

Initial Assessment

Definite ACS

- ongoing ischemic symptoms,
- positive cardiac biomarkers,
- new ST-segment deviations,
- new deep T-wave inversions, hemodynamic abnormalities

Initial Assessment

- Those with positive biomarkers are classified as NSTEMI
- The rest of this high risk group is classified as ACS or unstable angina

TIMI Risk Score

- Age ≥ 65
- ≥ 3 CAD Risk Factors
- Known CAD (Stenosis ≥ 50%)
- ASA Use in Past 7 days
- Severe angina (≥ 2 episodes in 24 hrs)
- EKG ST changes ≥ 0.5mm
- Positive Cardiac Marker

TIMI Risk Score

- Each positive risk factor increases risk
- 5-41% risk at 14 days of:

all-cause mortality, new or recurrent MI, or severe recurrent ischemia requiring urgent revascularization.

Initial Assessment

Those with no ECG changes and normal biomarkers

- can be discharged as possible ACS with early outpatient testing
- Stress testing if suitable
  - Suitable resting ECG
  - Capable of exercising

Urgent “Chest Pain Clinic” Assessment

- If not suitable for stress testing consider a diagnostic imaging modality such as perfusion imaging or stress echo
- If, after your assessment, the pre-test probability seems low, options include CT modalities
- If the pre-test probability of CAD is high, consider an imaging modality that combines diagnosis with prognostic information
  - Prognostic power of myocardial perfusion imaging

High Risk ACS and NSTEMI
2 possible strategies

- Early invasive evaluation (<24 hours) or a period of medical “cool-down”?

- Early invasive if refractory pain, or instability

High Risk ACS and NSTEMI
In those who stabilize on therapy

Early invasive evaluation (<24 hours)

- 10-20% may in fact have no coronary artery disease
- 20% will have have high grade disease (LM, 3VD, reduced EF) best treated with CABG
- For the rest, early PCI may reduce future hospitalizations and need for anti-anginals

High Risk ACS and NSTEMI
2nd possible strategy

- Conservative strategy with invasive evaluation only if there is on-going symptoms despite appropriate medical therapy OR
- If there is objective evidence of ischemia

- An early echocardiogram is often done to identify significant LV dysfunction
- An exercise or pharmacological stress test is recommended prior to discharge

High Risk
(greater than 3% annual mortality rate)

- Severe resting LV dysfunction (LVEF less than 0.35)
  High-risk treadmill score (score 11 or less)
  Severe exercise LV dysfunction (exercise LVEF less than 0.35)
- Stress-induced large perfusion defect (particularly if anterior)
- Stress-induced multiple perfusion defects of moderate size
- Large, fixed perfusion defect with LV dilation or increased lung uptake (thallium-201)
- Stress-induced moderate perfusion defect with LV dilation or increased lung uptake (thallium-201)

High Risk
(greater than 3% annual mortality rate)

- Echocardiographic wall-motion abnormality (involving more than 2 segments) developing at low dose of dobutamine (10 mg per kg per min or less) or at a low heart rate (less than 120 beats per min)
- Stress echocardiographic evidence of extensive ischemia

Intermediate risk
(1% to 3% annual mortality rate)

- Mild/moderate resting LV dysfunction (LVEF 35-49%)
- Intermediate-risk treadmill score (11 to 5)
- Stress-induced moderate perfusion defect without LV dilation or increased lung intake (thallium-201)
- Limited stress echocardiographic ischemia with a wall-motion abnormality only at higher doses of dobutamine involving less than or equal to 2 segments

Low risk
(less than 1% annual mortality rate)

- Low-risk treadmill score (score 5 or greater)
- Normal or small myocardial perfusion defect at rest or with stress
- Normal stress echocardiographic wall motion or no change of limited resting wall-motion abnormalities during stress

Thank you

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