Management of patients with NSTEMI and unstable angina: an overview

Professor Jennifer Adgey
Colum Owens
Conflicts of interest

- Conflict of Interest - Professor Adgey
- Speaker's Forum
- Sanofi-Aventis, Schering-Plough, Glaxo Smyth Kline, Eli Lilly
- Conflicts of interest - Dr Colum Owens: None
Algorithm for Evaluation and Management of Patients Suspected of Having ACS

A. SYMPTOMS SUGGESTIVE OF ACS

B1. Noncardiac Diagnosis
   - Treatment as indicated by alternative diagnosis

B2. Chronic Stable Angina
   - See ACC/AHA Guidelines for Chronic Stable Angina

B3. Possible ACS
   - Nondiagnostic ECG Normal Initial serum cardiac biomarkers

B4. Definite ACS
   - C2. No ST-Elevation
     - ST and/or T wave changes
     - Ongoing pain
     - Positive cardiac biomarkers
     - Hemodynamic abnormalities
   - C3. ST-Elevation
     - Evaluate for reperfusion therapy
     - See ACC/AHA Guidelines for ST-Elevation Myocardial Infarction

C1. Observation
   - 12 hours or more from symptom onset
   - F1. No recurrent pain; negative follow-up studies
   - F2. Recurrent ischemic pain or positive follow-up studies
     - Diagnosis of ACS confirmed

D1. C2. Observation
   - G1. Stress study to prove ischemia
     - Consider evaluation of LV function if ischemia is present (tests may be performed either prior to discharge or as outpatient)
   - H1. Potential diagnoses: nonischemic discomfort; low-risk ACS
   - H2. Positive
     - Diagnosis of ACS confirmed or highly likely
     - Admit to hospital
     - Manage via acute ischemia pathway
   - H3. Negative
     - Arrangements for outpatient follow-up

ACC/AHA Guidelines 2007. JACC 50; e1-157
Acute ischaemia management
## TIMI risk score

<table>
<thead>
<tr>
<th>RISK FACTOR</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HISTORICAL</strong></td>
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<tr>
<td>Age $\geq 65$</td>
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</tr>
<tr>
<td>$\geq 3$ CAD risk factors</td>
<td>1</td>
</tr>
<tr>
<td>Family history, hypertension,</td>
<td></td>
</tr>
<tr>
<td>elevated cholesterol,</td>
<td></td>
</tr>
<tr>
<td>DM, active smoker</td>
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<tr>
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<tr>
<td>Aspirin use in past 7 days</td>
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<tr>
<td><strong>PRESENTATION</strong></td>
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<tr>
<td>Severe angina within 24h</td>
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<tr>
<td>Elevated cardiac markers</td>
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</tr>
<tr>
<td>$ST$ deviation $\geq 0.5$mm</td>
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<tr>
<td><strong>TOTAL SCORE</strong></td>
<td>0-7</td>
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Antman et al, JAMA 2000;284:835-842
Case 1

- 69 year old male
- Increasing frequency of anginal pain: 2 episodes last 24 hrs
- Past history: MI 1998
- ↑BP, ↑cholesterol, current smoker
- On aspirin, betablocker, statin
ECG on admission
Second ECG: 30 mins, pain free
Risk Assessment

What is the risk assessment at this point?

Current summary

- 69 year old male
- Increasing frequency of anginal pain: 2 episodes last 24 hrs
- Past history: MI 1998
- ↑BP, ↑Cholesterol, current smoker
- On aspirin, betablocker, statin
- ECG changes?
Current TIMI risk score

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<tr>
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<tr>
<td>ST deviation ≥0.5mm</td>
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<td>CURRENT TOTAL</td>
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12 hour cardiac troponin 2.8 ng/ml
Treatment

What treatment options should be considered?

- Aspirin
- Clopidogrel
- β-blockers
- UFH / LMWH
- GP IIb/IIIa inhibitors
- Other: Fondaparinux/Bivalirudin/other

Antiplatelet agents i.e. Prasugrel
Urgent coronary angiography
Case 2

• 83 year old female
• Chest pain 4 hours
• Previous NSTEMI 2002
ECG on admission
Risk Assessment

What is the risk assessment at this point?

Current summary

- 83 year old female
- Chest pain 4 hours
- Previous NSTEMI 2002
- ECG changes?
### TIMI risk score

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<td>TOTAL KNOWN FACTORS</td>
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12 hr cardiac troponin: 22ng/ml
What treatment options should be considered?

- Aspirin
- Clopidogrel
- β-blockers
- UFH / LMWH
- GP IIb/IIIa inhibitors
- Other: Fondaparinux/Bivalirudin/other

Antiplatelet agents i.e. Prasugrel
Urgent coronary angiography
Case 3

- 52 year old male
- Chest pain for 6 hours
- First presentation IHD
Initial ECG
Risk Assessment

What is the risk assessment at this point?

Current summary

- 52 year old male
- Chest pain for 6 hours
- First presentation IHD
- ECG changes?
## TIMI risk score

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<tr>
<td><strong>TOTAL KNOWN FACTORS</strong></td>
<td><strong>2</strong></td>
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12 hr cardiac troponin: 12.4 ng/ml
Treatment

What treatment options should be considered?

- Aspirin
- Clopidogrel
- ß-blockers
- UFH / LMWH
- GP IIb/IIIa inhibitors
- Other: Fondaparinux/Bivalirudin/other

Antiplatelet agents i.e. Prasugrel
Urgent coronary angiography
Case 4

- 55 year old female
- No history of IHD
- 4 hour history of jaw/left arm pain
- Breathless ++
- SpO2 88% room air
- RR 28
- BP 110/60
ECG on admission
Risk Assessment
What is the risk assessment at this point?

Current summary
- 55 year old female
- No history of IHD
- 4 hour history of jaw/ Left arm pain
- Breathless ++
- SpO2 88% room air
- RR 28
- BP 110/60
- ECG changes?
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<tr>
<td>TOTAL KNOWN FACTORS</td>
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12 hr cardiac troponin: 22 ng/ml
Treatment

What treatment options should be considered?

- Aspirin
- Clopidogrel
- ß-blockers
- UFH / LMWH
- GP IIb/IIIa inhibitors
- Other: Fondaparinux/Bivalirudin/other

Antiplatelet agents i.e. Prasugrel

Next steps?
Urgent coronary angiography
12-lead ECG and acute ischaemia

• Currently, the 12-lead ECG remains key in the initial assessment of patients presenting with ischaemic type chest pain as:
  
  – The current markers of myocardial necrosis, though sensitive and specific do not reliably increase until 12-hours post symptom onset
  
  – Other diagnostic tools such as CT, MRI and radionuclide SPECT are not available pre-hospital.
Problems with the 12-lead ECG

• The standard 12-lead ECG has only a 50-60% sensitivity at diagnosing AMI as
  – The commonest mode of presentation of AMI is NSTEMI i.e. ST-depression, T-inversion, LBBB, LVH or normal ECG
  – Absence of leads facing the posterior, high right anterior, lateral wall of the left ventricle and the anterior portion of the right ventricle
Body surface Mapping

- To improve the diagnostic capability of the 12-lead ECG, additional non-standard leads are applied directly over the right ventricle, high right anterior, high left lateral and posterior regions i.e. body surface potential mapping
Electrode positions sampled by the body surface map, including 3 proximal limb leads (Mason-Likar) (RA=right arm, LA=left arm, LL=left leg) Yellow: standard precordial leads
Definition of abnormal 80-lead ECG features for AMI detection

<table>
<thead>
<tr>
<th>80-lead ECG feature</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ST0 (J point) maxima</td>
<td>ST elevation measured at the J point</td>
</tr>
<tr>
<td>using ST0 isopotential map</td>
<td>Anterior territory: ≥ 2mm</td>
</tr>
<tr>
<td></td>
<td>Lateral territory: ≥ 1mm</td>
</tr>
<tr>
<td></td>
<td>Inferior territory: ≥ 1mm</td>
</tr>
<tr>
<td></td>
<td>Right ventricular: ≥ 1mm</td>
</tr>
<tr>
<td></td>
<td>High right anterior: ≥ 1mm</td>
</tr>
<tr>
<td></td>
<td>Posterior territory: ≥ 0.5mm</td>
</tr>
<tr>
<td>LBBB MI criteria</td>
<td>Change of angle from QRS isointegral to STT</td>
</tr>
<tr>
<td></td>
<td>isointegral vectors outside 180 ± 15°</td>
</tr>
</tbody>
</table>
Normal ST0 isopotential map from anterior and posterior surface of chest

ST0 Isopotential (mm)

Anterior
Lateral
Posterior
Inferior

Anterior surface
Posterior surface
Normal ST0 isopotential map from anterior and posterior surface of chest-torso view

- High right anterior
- Inferior surface
- Anterior surface
- Posterior surface

Color scale:
- Red: 1.41
- Green: 0.00
- Blue: -0.27
Case examples
cTnT 2.2 ng/mL. Echo showed posterior wall hypokinesis. Cardiac Catheterisation: culprit marginal circumflex: PCI x 1
67 year old female. Hypertension, +ve family history IHD. Unstable angina 2 months and rest pain for 45 minutes
cTnT 0.22 ng/mL. Body surface map shows high right anterior MI. Cath revealed 99% distal LMS, moderate RCA disease. Preserved LV function. IABP inserted and proceeded to emergency CABG on GpIIb/IIIa infusion.
RCA lesion, PDA branch
LV diastole

LV systole
64 year old male. First presentation of ACS. Rest pain for 4 hours, angina for 6 weeks.
cTnT 12.98 ng/mL. Cardiac Catheterisation 90% LMS With thrombus in LMS extending to LAD
70 year old female, first presentation of ACS. Rest chest pain for 3 hours
cTnT 4.98 ng/mL. Cardiac catheterisation 3-vessel disease. Thrombus in LCX
Summary

• Early triage:
  – history (e.g. rest pain etc)
  – 12-lead ECG, 80-lead BSM
  – TIMI risk assessment
  – Cardiac markers (12 hrs for troponin)

• Early pharmacotherapy (Pre-hospital if possible)

• Urgent investigations (coronary angiography, echocardiogram)