Difficult ECG interpretation during ACS

Kid Bhumimuang, MD
Cardiology Unit and Thammasat Heart Center, Faculty of medicine, Thammasat University, Thammasat University Hospital
STEMI of anterior wall
- STE-ACS
  - (L)BBB
    - Ventricular paced rhythm
    - Hyperacute T wave
  - Isolated posterior wall
  - LM equivalent ECG
- NSTE-ACS

ECG?

Ongoing symptom of myocardial ischemia

Coronary intervention

PROMPT
# Table 3  Atypical electrocardiographic presentations that should prompt a primary percutaneous coronary intervention strategy in patients with ongoing symptoms consistent with myocardial ischaemia

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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</thead>
</table>
| Bundle branch block | Criteria that can be used to improve the diagnostic accuracy of STEMI in LBBB:<sup>35</sup>  
- Concordant ST-segment elevation ≥1 mm in leads with a positive QRS complex  
- Concordant ST-segment depression ≥1 mm in V₁–V₃  
- Discordant ST-segment elevation ≥5 mm in leads with a negative QRS complex  
The presence of RBBB may confound the diagnosis of STEMI |
| Ventricular paced rhythm | During RV pacing, the ECG also shows LBBB and the above rules also apply for the diagnosis of myocardial infarction during pacing; however, they are less specific |
| Isolated posterior myocardial infarction | Isolated ST depression ≥0.5 mm in leads V₁–V₃ and ST-segment elevation (≥0.5 mm) in posterior chest wall leads V₇–V₉ |
| Ischaemia due to left main coronary artery occlusion or multivessel disease | ST depression ≥1 mm in eight or more surface leads, coupled with ST-segment elevation in aVR and/or V₁, suggests left main-, or left main equivalent- coronary obstruction, or severe three vessel ischaemia |

ECG = electrocardiogram; LBBB = left bundle branch block; RBBB = right bundle branch block; RV = right ventricular; STEMI = ST-segment elevation myocardial infarction.
CRBBB

RBBB

- Criteria for Diagnosis of RBBB
  - QRS >= 120 ms
  - Wide S in I, aVL, V6
  - Delay intrinsicoid deflection of the latter part of QRS > 40-50 ms
  - RSR' in V1 with amplitude and width of R'>R

- ST segments are not usually deviated except for frequent J-point depression (1mm) in right precordial lead esp. V1
RBBB

• Criteria for Diagnosis of RBBB
  – QRS >/= 120 ms
  – Wide S in I, aVL, V6
  – Delay intrinsicoid deflection of the latter part of QRS > 40-50 ms
  – RSR’ in V1 with amplitude and width of R’>R

• ST segments are not usually deviated except for frequent J-point depression (1mm) in right precordial lead esp. V1
LBBB
• Criteria for Diagnosis of LBBB
  – QRS> 120 msec
  – Lead I: wide monomorphic R
  – Delay intrinsicoid deflection in V5-6

• DDx: chronic ischemic and non ischemic cardiomyopathy
Paced rhythm

Total occlusion distal LCX and mid LAD
Posterior wall STEMI

- Persist ST depression V1-3 (may extend to V5-6)
- Max V2-3
- Upright T waves
Posterior chest lead
LCX occlusion

- 1/3 : ST-segment elevation in any
- 1/3 : no ST-segment deviation
- 1/3 : isolated ST-segment depression.

Am J Cardiol 1997;80:512-513
LM/Multivessel disease

ST depression
1 mm >= 6 surface leads (inferolateral ST depression),
+ ST-segment elevation in aVR and/or V
• 36 year old women with 40 minutes chest pain

CAG: LM occlusion

Widespread ST-segment depressions, esp in leads V4-V6 with inverted T waves
ST elevation: anterior precordial leads & lateral extremity leads I and aVL
How about Q wave

CP 2 hours
Q wave

- Q waves are present or R wave are absent after only 1 hour of coronary occlusion
- Q waves may disappear with reperfusion
- Never let Q waves alone prohibit you from initiating reperfusion strategies
De Winter ST-T complex

- 1- 3 mm upsloping depression ST at the J point in V1–V6
- tall, positive symmetrical T waves
- often combined with a 1–2 mm elevation ST in aVR
• 2% of LAD occlusion
• Transient phenomenon
• If persist occlusion -> turn to ST elevation ECG
Hyperacute T waves

tall, often asymmetrical, broad-based T waves in the anterior leads, J point elevation
Difficult interpreted inferior lead
ECG diagnosis of inferior AMI

• ST elevation ≥ 0.5 mm in inferior leads should be considered abnormal until proven otherwise by any or all of the following:
  – No change from previous ECG
  – No change in serial ECGs or ST segment monitoring
  – No ST depression in aVL
Difficult interpreted inferior lead
If in doubt regarding the possibility of acute evolving MI -> emergency Imaging.

If echocardiography is not available or if doubts persist after echo -> primary PCI strategy (including immediate transfer to a PCI if the patient is being treated in a non-PCI centre)

Clinical follow up and serial ECG may help to diagnosis.
1. Atrial fibrillation with slow ventricular response
2234 Possible 3rd degree AV block
2320 Non-specific intraventricular conduction delay
40166 Marked ST depression, possible subendocardial injury or digitalis effect
5211 Minimal voltage criteria for LVH, may be normal variant
9150 ** abnormal ECG **

Unconfirmed Report
Reviewed by:

12-Jan-2019 10:17
2. Name:  
Sex: Male  
Birth Date:  
Years:  

Medication:  
Symptoms:  
History:  

<table>
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<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
<td>Vent rate</td>
<td>138 bpm</td>
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<td>PR int</td>
<td>158 ms</td>
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<tr>
<td>QRS dur</td>
<td>92 ms</td>
</tr>
<tr>
<td>QT/QTc int</td>
<td>320/401 ms</td>
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<tr>
<td>P/QRS/T axis</td>
<td>12/-46/69</td>
</tr>
<tr>
<td>RV5/SV1 amp</td>
<td>0.460/0.930 mV</td>
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<tr>
<td>RV5/SV1 amp</td>
<td>1.390 mV</td>
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<td>50.0 d 100 Hz</td>
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</table>

1120 Sinus tachycardia  
1574 with frequent ventricular premature complexes  
4012 Moderate ST depression  
40303 Early repolarization  
4564 T wave abnormality, possible lateral ischemia  
7200 Abnormal left axis deviation  
9150 ** Abnormal QRS **

Unconfirmed Report  
Reviewed by:
3.
1100 Sinus rhythm
2231 First degree AV block
36322 Inferior myocardial infarction with posterior extension, probably recent
4016 Marked ST depression, possible subendocardial injury
4164 T wave abnormality, possible anterior ischemia
9150 ** abnormal ECG **
4.

Unconfirmed Report
Reviewed by:

1100 Sinus rhythm
2231 First degree AV block
36322 Inferior myocardial infarction with posterior extension, probably recent
4016 Marked ST depression, possible subendocardial injury
4164 T-wave abnormality, possible anterior ischemia
9150 ** abnormal ECG **
<table>
<thead>
<tr>
<th>Name:</th>
<th>ID:</th>
<th>Sex: cm</th>
<th>Birth date: kg</th>
<th>Years mmHg</th>
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<td>Medication:</td>
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<td>Symptoms:</td>
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<tr>
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<tr>
<td>HR: 74 bpm</td>
<td>PR Int: 180 ms</td>
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<td>QRS dur: 94 ms</td>
<td>QT/QTc int: 382/410 ms</td>
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<tr>
<td>P/QRS/T axis:</td>
<td>RVS/SV1 amp: 0.70/0.87 mV</td>
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<td>Unconfirmed Report (R + S 1.57 mV)</td>
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<tr>
<td>10 mm/mV 25 mm/s Filter: H50 d 25 Hz</td>
<td>10 mm/mV</td>
<td>Rhythm [ II ] 10 mm/mV</td>
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<td></td>
<td>Reviewed by:</td>
<td></td>
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</tbody>
</table>

1100 Sinus rhythm
4016 Marked ST depression, possible subendocardial injury
4137 Anterior injury or acute infarct
8102 Low QRS voltage in chest leads
9150 ** abnormal ECG **
Fatigue 1 week
Hypokalemia: K 2.4
Cardiac arrest

Hyperkalemia: K 6.7
<table>
<thead>
<tr>
<th>Rate</th>
<th>117</th>
<th>Sinus Tachycardia</th>
<th>Rate &gt; 99</th>
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<tbody>
<tr>
<td>PR</td>
<td>68</td>
<td>Consider right atrial enlargement</td>
<td>P &gt; 0.24mV limb lead</td>
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<tr>
<td>QRS</td>
<td>124</td>
<td>Non-specific IVCD with LAD</td>
<td>QRS &gt; 120ms &amp; LAD</td>
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<tr>
<td>QTc</td>
<td>403</td>
<td>Left ventricular hypertrophy</td>
<td>multiple LVH criteria</td>
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<tr>
<td>QTC</td>
<td>563</td>
<td>Anterolateral infarct, acute (LAD)</td>
<td>ST &gt; 0.05mV, V2-V6, I, aVL</td>
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**--AXIS--**

<table>
<thead>
<tr>
<th>P</th>
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<tr>
<td>QRS</td>
<td>-55</td>
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<tr>
<td>T</td>
<td>265</td>
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</table>

12 Lead: Standard Placement

**ABNORMAL ECG**

>> Acute MI <<

Unconfirmed Diagnosis
12. ST elevation III, ST depression I, aVL, V2-6
13. Diffuse ST depression with ST elevation of aVR, V1

15 min later with ongoing CP
Take home message

If in doubt regarding the possibility of acute evolving MI -> emergency Imaging.

If echocardiography is not available or if doubts persist after echo -> primary PCI strategy (including immediate transfer to a PCI if the patient is being treated in a non-PCI centre)

Clinical follow up and serial ECG may help to diagnosis.
Once you stop learning, you start dying

Albert Einstein

Thank you.....