PITFALLS IN EMERGENCY ROOM EVALUATION OF CHEST PAIN

Hussien H. Rizk, MD
Cairo University School of Medicine
The most common errors

- Failure to perform ECG
- Failure to interpret ECG
- Failure to record clinical data
Causes of chest pain in the ER

- Acute MI 15%
- USAP 35%
Emergency responses to acute chest pain in the office

- MI, PE, aortic dissection, & tension pneumothorax may result in sudden death.
- Any pt with recent onset chest pain who may be potentially unstable (history, appearance, vital signs): transported immediately to an ER in an ambulance with a defibrillator.
Stabilization in the pre-hospital setting

• supplemental oxygen
• IV access
• Cardiac monitoring
• ECG
• Blood sample for cardiac enzymes
• For ? MI, chew a 325 mg aspirin tablet.
• SL NTG should be withheld with low BP without IV access or recent sildenafil use.
Priorities in chest pain evaluation

• Exclude potentially life-threatening conditions
• Identify specific cause of symptoms
• **Begin treatment of MI quickly**
• Dx. of "non-cardiac" or "atypical" pain: of no use
• A diagnostic pattern will frequently emerge, based on risk factors, description of pain and associated symptoms.
Quality of the pain

• Typical: squeezing, tightness, pressure, constriction, strangling, burning, heart burn, fullness in the chest, a band-like sensation, knot in the center of the chest, lump in the throat, ache, heavy weight on chest, like a bra too tight, and jaw or toothache

• Sometimes undescribable, pt places the palm in the center of the chest.

• Dogmatism

• Singularity
Quality of the pain

- Sharp or Stabbing pain: low-risk only if pleuritic or positional, if it was fully reproducible by palpation, and without prior history of angina or MI.
- No pts who presented with these findings had a cardiac etiology of pain [Lee et al. Arch Intern Med 1985; 145:65].
Location of pain

- Diffuse, may be difficult to localize.
- Referred pain from visceral origin (GB, Stomach)
  - Sharply localised
  - No tenderness
Radiation of the pain

- Neck, throat, mandible, teeth, upper extremity, or shoulder.
- Wide extension increases the probability of MI.
- Radiation to the Rt or both arms is a more powerful predictor than Lt arm alone. [Panju et al. JAMA 1998; 280:1256]
- GB pain can present with rt shoulder pain.
- Chest pain that radiates between the scapulae may be due to aortic dissection.
Onset of pain

- Pneumothorax, aortic dissection or acute PE typically has an **abrupt** onset (greatest intensity at the beginning)
- Onset of ischemic pain is often **gradual** or **stuttering** with an increasing intensity over time.
- Early morning onset
- A crescendo pattern of pain can also occur in GERD
- "Functional" or non-traumatic musculoskeletal chest pain might have more vague onset
Duration of pain

- The duration of pain is also helpful:
- Chest discomfort for seconds or weeks is not ischemia.
- A span of years without progression: likely is functional.
- The pain from myocardial ischemia generally lasts for a few minutes; it may be more prolonged in the setting of MI.
Provocation of the pain

- Eating: upper GI.
- Post-prandial: GI or cardiac (Q: relation to effort)
- Exertion: classic of angina, also esophageal.
- Cold, emotional stress, coitus.
- Swallowing: esophageal.
- Body position, movement, deep breathing: musculoskeletal or pericardial.
- Pleuritic: PE, pneumothorax, pleurisy, pneumonia, pleuropericarditis.
<table>
<thead>
<tr>
<th>Type of Pain</th>
<th>Rule</th>
<th>Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing crushing severe substernal or similar to past MI pain</td>
<td>IV access. Oxygen. ECG. Monitor. ASA. Nitrate. Analgesia. Admission</td>
<td>Markers. CXR. Anticoagulation</td>
</tr>
<tr>
<td>Severe or pressure or substernal or radiates to arm, shoulder, or jaw</td>
<td>ECG</td>
<td>IV access. Oxygen. Monitor. Markers. CXR. Analgesia. Admit</td>
</tr>
<tr>
<td>Indigestion / burning epigastric</td>
<td>None</td>
<td>ECG</td>
</tr>
</tbody>
</table>
Associated symptoms

- Associated symptoms do not reliably distinguish cardiac and GI origin.
- Both can coexist in up to 35% of patients
  
- Belching, a bad taste, and dysphagia: more with GI
- Vomiting may occur in MI (transmural)
  
  [Ingram et al. MMJ 1980; 281:636]
- Other causes of pain + vomiting: as peptic ulcer, cholecystitis, pancreatitis. DKA
- Sweating is more frequently associated with MI than esophageal disease (forehead, with pallor).
Associated symptoms

- **Dyspnea + chest pain**: Myocardial ischemia, Lung (airways, parenchyma, vessels), Panic disorder.
- **Cough + chest pain**: infection, CHF, PE, GERD, neoplasm.
- **Syncope + chest pain**: severe ischemia, aortic dissection, massive PE, ruptured AAA, critical AS.
- **Palpitation + chest pain**: ectopy, AF, anxiety.
- **Psychiatric symptoms**: panic disorder, anxiety, depression, or somatization. Panic disorder may coexist with CAD.
- **Constitutional symptoms**:
  - MI presenting with profound fatigue
  - Collagen disease
  - Malignancy
  - Mediterranean fever.
RISK PROFILE

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Men</th>
<th>Women</th>
</tr>
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<tbody>
<tr>
<td>BP Systolic</td>
<td>120</td>
<td>160</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>HDL-C</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Diabetes</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Cigarettes</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>LVH by ECG</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>
The past history

- CAD, Risk factors
- Diabetes
- GERD, peptic ulcer, gallstones
- Panic disorder
- Bronchospasm
- Blunt trauma
- Cancer
- Similar episodes before? Diagnosis?
The physical examination

- General appearance
- Vital signs, Pulse & BP both arms.
- Palpation of chest wall may evoke pain.
- Cardiac examination: JVP, palpation, auscultation in a sitting & supine (rub, AR, AS, MR, S4 or S3, abnormal precordial movement)
- Breath sounds: symmetric? wheezes, crackles consolidation?
- Abdomen: Rt upper quadrant, epigastrium, abd aorta.
Features of Electrocardiogram That Increase the Probability of a Myocardial Infarction in Patients Presenting with Acute Chest Pain†

**ST-segment elevation**
- New (6-54)
- Any (11)

**Q-waves**
- New (5-25)
- Any (4)

**New conduction defect** (6)

**ST-segment depression** (3-5)

**T-wave inversion** (about 3)

Probability strengths expressed in parentheses as likelihood ratios.

†Adapted from Panju, AA, Hemmelgarn, BR, Guyatt, GH, Simel, DL, JAMA 1998; 280:1256.
ER algorithm based on clinical & ECG

Suspected myocardial infarction on electrocardiogram

Suspected ischemia on electrocardiogram

No

No risk factors

Very low risk (< 1%)

One risk factor

Low risk (approximately 4%)

Two or more risk factors

Intermediate risk (approximately 8%)

One risk factor or none

High risk (> 16%)

Two or more risk factors

Yes

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Very likely:
Known CAD
Definite angina in M>60, F>70
Hemodynamics altered:
  o Hypotension
  o MR
  o Pulmonary edema
•New diagnostic ST abnormality
•Evolving Q waves
•Elevated markers

Probable:
Definite angina in M<60, F<70
Age > 70
Male gender
Non-typical pain + Diabetes
Non-typical pain + > 2 RF
Extra-cardiac vascular disease
Fixed Q waves
•Non-diagnostic ST abnormality
•T wave inversion

Unlikely:
Non-angina pain
< 2 RF for CHD (Not in diabetic)
Non-typical pain + Diabetes
Flat or < 1 mm -ve T waves
Normal ECG
Extra-cardiac vascular disease