Chest Pain with Normal ECG

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- Chest pain is a common presenting problem, and considered one of the most common and important causes for referral to ED.

- More than 50% of people presenting to ED with unexplained chest pain, will have CAD ruled out.
Chest pain with normal ECG

- Although in most cases chest pain is due to non-life threatening conditions, important concern should be given **NOT** to miss the diagnosis of other serious life threatening illnesses.

- Emergency department physicians have a difficult task, identifying which patients to admit and which patients to discharge.
Chest pain

Chest pain

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Differentiating causes of chest pain

**Cardiovascular:**
- ACS
- Aortic dissection
- Pericarditis
- Tamponade
- Pulm. Embolism, pulm hypertension
- Ao. stenosis
- HOCM
- SVC syndrome

**Gastrointestinal:**
- Esophageal rupture
- GERD
- Peptic ulcer
- Pancreatitis
- Cholecystitis

**Pulmonary:**
- Pneumothorax
- Pneumonia
- Pleurisy

**Musculoskeletal:**
- Costocondritis
- Trauma
- Cervical disc
- Arthritis of the shoulder & spine

**Psychiatric:**
- Panic reaction
- Anxiety

**Herpes Zoster:**

**Radiation:**

Chest pain with normal ECG

**Etiology of chest pain**

- Musculoskeletal: 36%
- Gastrointestinal: 19%
- None specific: 16%
- ACS: 11%
- Psychological: 7%
- Pulmonary: 5%
- Other causes: 4% (AS, AD, HOCM peric.)
Proper history and physical examination are the keys to *etiological* diagnosis in 80% of cases of chest pain.

**Scenario 1**

60 year - old, businessman

**Risk factors:** DM, HTN, smoker, +ve FH

**Complaint:** retrosternal severe chest pain radiates to Jaw, Lt arm & neck.

**Physical examination:** NAD

**ECG:** Minimal non specific changes
Chest pain with normal ECG

**Most likely diagnosis:** ?

**NSTE**

**Acute coronary syndrome**

- Work up for proper assessment of chest pain before hospital discharge is mandatory (serial ECG, Cardiac biomarkers)

- ECG is important but **history** is most important.

- **20% of patients having an MI will have normal ECG initially.**
Scenario 2

65 year-old male with long history of uncontrolled HTN presents with severe chest pain radiating to the back

Risk Factors: heavy Smoker, hypertensive
Physical examination: BP 210/100 mmHg, pulse 105/m
ECG: Minimal non specific changes

Most likely diagnosis?

Aortic dissection
Chest pain with normal ECG

**Aortic dissection**

- **Predisposing factors:**
  - HTN
  - Atherosclerosis
  - Collagen disease
  - Pregnancy
  - Coarctation
  - Trauma

- Generally **suspected** from history & physical examination.

- Variation in pulse & BP between L & R side is very helpful for suspected diagnosis.

- Missing or wrong diagnosis may be **fatal**.

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**Ao. dissection**

**Imaging**

**CXR:**
Scenario 3

52 year - old male
Risk factors: obese, hypertensive & heavy smoker.

Complaint: sudden onset of chest pain associated with & mild sweating. It is exacerbated by inspiratory effort.

Past history: fractured limb after car accident few weeks ago.


ECG: sinus tachycardia.

Most likely diagnosis: Pulm. embolism
Chest pain with normal ECG

**Pulm. Embolism**

**History** is very crucial for the diagnosis.

**Clinical presentation** depend upon size of the embolus

**Risk Factor:** Limb Fracture, immobility,
Post operative, underlying malignancy, hypercoagulable state, pregnancy, past history of DVT, oral contraceptive pills.

**ECG changes:** sinus tachycardia (**Most common**)  
The classic ECG changes (**S1Q3T3**) is **rare**  
and are seen mainly with large embolus.

**CXR:** Frequently normal.

(Pulm embolism cont.)

**Echo:** is a very useful bed side imaging modality.

**Blood gases:** may be of help

**D – dimer test** is sensitive but not specific.
DON NOT use it to rule out PE.

**CT pulmonary angiography:** is now the standard imaging modality in suspected pulmonary embolism.
CT pulmonary angiography

59 year old male, heavy smoker, mildly hypertensive.

Complaint: sudden onset of severe chest pain associated with severe dyspnea.

Physical examination: severe dyspnea (air hunger), agitation, hypotension, tachycardia, tachypnea.

Chest auscultation: diminished breath sounds on Lt side of the chest.

ECG: sinus Tachycardia.
Chest pain with normal ECG

Most likely diagnosis: ?

Tension Pneuomothorax
Scenario 5

40 year old male presents to ED
C/O severe chest pain after having heavy meal. This chest pain was preceded by severe repeated vomiting.
Vomitus contains streaks of fresh blood.

Physical examination: NAD
ECG: Normal

Most likely diagnosis: ?

Mediastinitis
Eosophageal sub mucosal tear
Mallory Weiss syndrome
Scenario 6

26 year old female presents to ED C/O severe central chest pain. She has had a recent flu like illness.

The pain is described as heavy or stabbing pain. It is made worse by deep breath & lying down & relieved by sitting forwards.

On examination: Pulse 95 bpn, Bp: 100/70 mmHg, JVP: Is raised 2cm above sternal angel, Heart sounds are obscured by prominent rubbing sound.

ECG: Non specific.

Most likely diagnosis: ?

Acute pericarditis
Life threatening causes of chest pain:

1) Acute coronary syndrome
2) Acute pulmonary embolism.
3) Acute aortic dissection
4) Tension pneumothorax
5) Esophageal rupture
6) Acute pericarditis with tamponade

Alarming signs with chest pain:

- Abnormal vital signs.
- Signs of hypo perfusion
- Hypoxemia on pulse oximetry.
- Asymmetric pulses or breath sounds.
- New heart murmur.
- Distended JVP.
Take Home Message

- Normal ECG does not rule out serious underlying etiology for chest pain.
- Chest pain in ED is NOT always due to ACS.
- ECG is important but history is most important.
- Proper history & physical examination are important keys to reach the diagnosis in 80% of cases.
- Abnormal findings in physical examination is an Alarm for the presence of underlying life threatening cause.
- Clinician should focus on the immediate recognition & exclusion of life threatening causes of chest pain.

THANK YOU