

VII. Chest pain

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Specific Learning Objectives

1. Knowledge:

Subinterns should be able to describe and define:

- a) The historical, physical examination, electrocardiographic, laboratory and radiographic findings of serious cardiopulmonary etiologies of chest pain, including:

Serious and potentially life threatening causes:

- (1) Acute coronary syndromes (ST Elevation MI and non-ST Elevation MI)
- (2) Pulmonary embolism
- (3) Pneumothorax
- (4) Aortic dissection
- (5) Pericarditis
- (6) Pneumonia

Non-life threatening causes of acute chest pain including:

- (1) Esophageal reflux and spasm
- (2) Peptic ulcer disease
- (3) Musculoskeletal strain
- (4) Rib fracture
- (5) Costochondritis
- (6) Biliary colic
- (7) Pleurisy
- (8) Intercostal neuritis

- b) The role of laboratory testing in the diagnosis of chest pain
- c) The role of radiological studies in the diagnosis of chest pain
- d) Appropriate clinical situations in which a patient should be transferred to telemetry monitored unit or intensive care unit or require an immediate consult or intervention (PCI, thrombolytic therapy, etc)
- e) Situations in which it is necessary to seek support from supervising resident and/or faculty emergently
- f) Sensitivity and Specificity of findings and lab data in ruling in or out a diagnosis

2. Skills:

Subinterns should be able to:

- a) Conduct an appropriately focused history and physical exam
- b) Perform an appropriately focused chart review
- c) Acquire and interpret an electrocardiogram
- d) Create a differential diagnosis
- e) Develop a management plan
- f) Provide appropriate treatment and/or analgesia for patients without an acute coronary

syndrome

- g) Obtain timely input from supervising resident and/or faculty
- h) Plan the transfer of a patient to a telemetry-monitored unit or intensive care unit when appropriate
- i) Appropriately activate the emergency cardiac/respiratory arrest team when needed

3. Attitudes and professional behavior:

Subinterns should demonstrate:

Compassion towards patient's wishes with regards to resuscitation and mechanical support

Case I: Chest Pain

SCENARIO: You are on call for the general medicine team and are cross-covering for a colleague. A nurse from the stepdown unit (telemetry) calls you about Mr. Frasier, a patient of Dr. Nash's, who is complaining of chest pain.

1) Question: what additional immediate information would you like to obtain from the nurse over the phone?

Answers:

1. Questions to establish the stability of the patient and how rapidly you need to go see the patient.
 - a) Heart rate, BP, respiratory rate, presence of arrhythmia
 - b) Oxygen saturation
2. Additional symptoms to help you develop a differential diagnosis
3. Reason for admission to the hospital and treatment to date
4. Location and severity of chest pain and associated symptoms (SOB, diaphoresis, nausea, radiation, palpitations)
5. Length of episode of chest pain and factors that exacerbate or relieve it; what was he doing when pain came on
6. History of chest pain, cardiac disease, hypertension, recent blood loss or procedures
7. Current and recent medications (when did he receive what medications)

Mr. Frasier's heart rate is 62 and regular, his BP is 110/75, RR of 16, and O2 sat of 94% on room air. His chest pain is in the substernal region radiating to the back, started about 5 minutes ago while he was resting in bed and is a 6/10 in severity. He has some mild dyspnea but no diaphoresis, nausea, or palpitations. He is a 69-year-old man admitted for unstable angina to the CCU last night. He has ruled out for MI by serial cardiac markers and EKG's, has had no chest pain since admission, and after cardiac cath one hour ago was sent to the stepdown unit. He has a history of hypertension and diabetes but had no previous history of cardiac disease. His cath showed extensive triple vessel disease and he is awaiting bypass surgery. His current meds include atenolol, lisinopril, isosorbide dinitrate, ASA, insulin, IV NTG, and IV heparin.

2) Question: are there any telephone orders you would like to give the nurse?

Answers:

- STAT EKG and cardiac enzymes

- Supplemental O2 - how much depends upon history of COPD
- Increase the IV nitroglycerin drip rate and titrate to keep systolic BP > 100.

3) Question: What are your thoughts about a differential diagnosis as you proceed to the patient's room?

Answers:

Differential diagnoses for acute chest pain: unstable, crescendo angina or acute MI (must worry about acute coronary thrombus from cath, coronary artery dissection, acute retroperitoneal bleed or bleed into groin with anemia and accelerated angina), pulmonary embolus, arrhythmia, pericarditis, esophagitis/reflux/spasm, less likely aortic dissection.

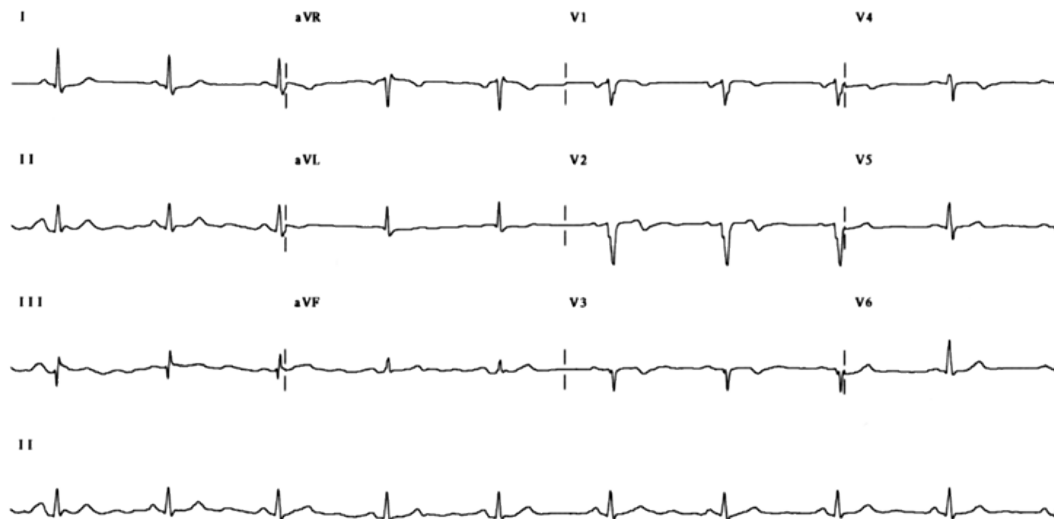
4) Question: What additional chart information do you want?

Answers:

- What does his original/baseline EKG look like?
- Does the patient have recent lab work (CBC, renal and hepatic function, drug allergies, cardiac enzymes)?
- Who is his cardiology fellow/attending?
- What are his wishes regarding advanced directives?

The patient's CBC this morning pre-cath was 12.5/38 (Hgb/Hct); his renal and liver functions are normal, and he has no drug allergies. He is a full code status.

Baseline EKG:



5) Question: What factors will influence your decision to call your resident right away?

Answers:

- Abnormal vital signs (hypotension or severe hypertension, bradycardia or tachycardia [HR>110] or significant respiratory distress [RR>20]); asymmetric pulses or blood pressure; severe hypoxia; significant arrhythmia (frequent PVC's, short runs of V-tach,

SVT, or A-fib); significant change(s) in EKG (new ST-T wave changes, new bundle branch block, or new Q waves).

- Altered mental status (patient disoriented, semiconscious or unresponsive).

6) Question: What specific information do you want to look for on exam?

Answers:

- How does the patient look - does he appear acutely distressed?
- What are his vital signs and does he have orthostatic changes?
- What is his mental status?
- Cardiovascular and lung exam (heart rate, rhythm--?both S1 and S2, murmurs, rubs, S3, S4, JVP, crackles, wheezes)
- Examination of peripheral pulses and extremities (symmetric or asymmetric pulses, cyanosis or edema), presence of bleeding/hematoma at wound site and size of the limb and groin compared to the other side

EXAM: On examination he is a middle-aged man in some distress. Vital signs: BP 110/60 supine, 105/58 sitting (equal in both arms); Pulse regular and 103 supine, 105 sitting; RR 18/minute; temperature 99°F. HEENT normal. There is questionable neck vein distention at 45° incline. Chest is clear to auscultation and percussion. Cardiac rhythm is regular with a normal S1 and S2; no audible murmurs, rubs, or gallops. Abdominal exam is normal. Extremity exam shows trace ankle edema and 1+ pulses throughout without palpable cords. His groin shows no evidence of oozing at the catheterization site with a minimal amount of ecchymosis and swelling.

7) Question: what should you do next?

Answers:

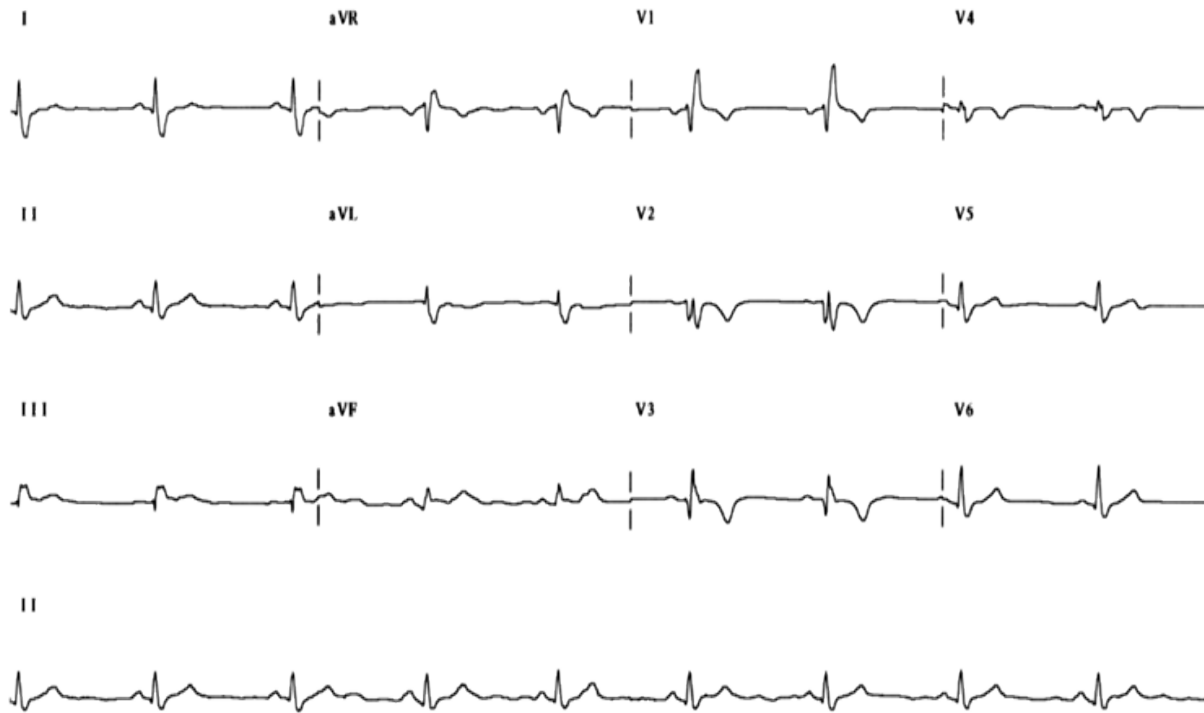
- Stabilize the patient and relieve his chest pain (cautiously increase IV NTG rate if initial increase didn't work, and consider giving morphine IV – all the while closely monitoring his BP)
- Review new EKG and compare to baseline EKG
- Get additional information from the chart
- Consider ordering additional tests to rule out serious causes of his chest pain: cardiac enzymes (if not yet done already), CXR, CBC, PT/INR and aPTT, electrolytes, ABG
- Call the resident and/or cardiology fellow to help you review the EKG's and other data

8) Question: what additional information are you looking for in the chart?

Answers:

- Compare his vital signs to recent vital signs pre- and post-cath. Is he relatively hypotensive now?
- Did he get his medications on schedule today?
- Interpret the current EKG in relation to the clinical findings and in relation to his previous EKG.
- Review today's cardiac cath report for more specific details of findings, recommendations, and any potential complications during or after the procedure.

Current EKG: Chest Pain



9) Question: what are possible explanations for the patient's presentation?

Answer:

The patient could have an acute thrombus, dislodged plaque, or coronary dissection from the catheterization. He could have accelerated angina from blood loss from the cath. He may not have gotten his medications on time (systems error) because of the procedure and/or change in floors (transfer from CCU to stepdown unit). He has a new RBBB, which may be rate-dependent or may be caused by new ischemia. With a RBBB, it is often difficult to detect new ischemic changes. And with this patient having known severe ischemic heart disease, it is better to err on the side of safety and assume that the new RBBB is ischemia-induced rather than rate dependency.

10) Question: What should you do now?

Answer:

The patient should be transferred back to the CCU and the cardiologist should be contacted immediately.

References:

1. 2011 ACCF/AHA Focused Update Incorporated Into the ACC/AHA 2007 Guidelines for the Management of Patients With Unstable Angina/Non-ST-Elevation Myocardial Infarction: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol.* 2011;57(19):e215-e367. Available at: <http://content.onlinejacc.org/article.aspx?articleid=1146460>

2. Chest Discomfort. *Harrison's Principles of Internal Medicine*. 17th edition. Thomas Lee. 2008. 87-91.
3. 2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions. *J Am Coll Cardiol*. 2011;58(24):e44-e122. Available at: <http://content.onlinejacc.org/article.aspx?articleid=1147816>
4. 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2013;61(4):e78-e140. Available at: <http://content.onlinejacc.org/article.aspx?articleid=1486115>