MECHANISMS OF HUMAN DISEASE
AND
PHARMACOLOGY & THERAPEUTICS

CASE-BASED SMALL GROUP DISCUSSION

SESSION VI
MHD I

October 15, 2014

Helpful Resources
McPhee, SJ, Hammer GD. Pathophysiology of Disease: An Introduction to Clinical Medicine, 6th edition.
Cardiovascular Disorders: Cardiovascular Disorders: Heart Disease, Coronary Artery Disease p. 275-277 (available as e-book though Loyola Health Science Library)

Robbins Basic Pathology, p 377-384
Case History 1

Three months following his first visit to his physician’s office (MHD I, Session V) Mr. Solomon presents to his local emergency department, in the early morning, with chest pain of 45 minutes duration. Mr. Solomon describes the pain as being severe (9/10) and “like someone was sitting on my chest.” The pain, located “in the lower part of my breast bone,” awakened him from his sleep. Although he tried to relieve the pain by changing positions in bed, sitting up and drinking water, it remained unchanged. He did not sleep well because he had an “upset stomach” and “an acid-burning feeling” in his chest. He attributed these symptoms to over eating and drinking at a party. He has no pain or discomfort in his arms but says he has an “achiness” in his left jaw which he attributes to “bad teeth.”

He has tried to eat more healthy over the past several months. He admits that he sometimes forgets to take the “heart medications” that were prescribed for him.

Physical examination reveals the patient to be anxious, pale, diaphoretic and in obvious discomfort. He is unshaven and accompanied by his wife. He tries to relieve his pain by belching.

Vital signs: BP in the right arm 130/90 mmHg, BP in left arm 128/96 mmHg; respiratory rate 20/minute; temperature 99º F, heart rate 110/minute. The lungs are clear to percussion. An occasional inspiratory crackle is heard on lung auscultation but is cleared with coughing. Examination of the cardiovascular system reveals an apical rate of 100/minute with occasional premature contractions. Neck veins are not distended. Auscultation reveals a normal S1 and S2. An S4 is heard best in the 5th intercostal space, midclavicular line. There are no murmurs or S3. There is no rub. There is no peripheral edema. His radial, femoral, and dorsalis pedis pulses are equal bilaterally on palpation.

Examination of the abdomen reveals the anterior wall to be protuberant and soft. There is no tenderness, organomegaly or palpable mass. Bowel sounds are normal. There are no abdominal bruits. The skin is cool and moist.

Rectal examination is done. The sphincter tone is normal. The prostate gland is enlarged; there are no nodules palpated. The stool is brown and is occult blood negative.

He is put on a continuous EKG monitor. He is given a 160mg chewable aspirin.

LABORATORY TESTS:

09/11/14 09:00 am
Complete Blood Count (Hemogram) with Differential

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>RBC</td>
<td>4.87</td>
<td>[4.5 - 6.0]</td>
<td>M/ML</td>
</tr>
<tr>
<td>WBC</td>
<td>14.0 H</td>
<td>[4.0 - 10.0]</td>
<td>X 10/MM</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>13.8</td>
<td>[14.0 - 17.0]</td>
<td>gm/dl</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>41.8</td>
<td>[40.0 - 54.0]</td>
<td>%</td>
</tr>
<tr>
<td>MCV</td>
<td>85.8</td>
<td>[85 - 95]</td>
<td>fl</td>
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<tr>
<td>MCH</td>
<td>28.3</td>
<td>[28.0 - 32.0]</td>
<td>pg</td>
</tr>
<tr>
<td>MCHC</td>
<td>33.0</td>
<td>[32.0 - 36.0]</td>
<td>gm/dl</td>
</tr>
<tr>
<td>RDW</td>
<td>13.6</td>
<td>[11.0 - 15.0]</td>
<td>%</td>
</tr>
<tr>
<td>Platelet Count</td>
<td>340</td>
<td>[150 - 400]</td>
<td>K/ML</td>
</tr>
<tr>
<td>Differential Type</td>
<td>AUTOMATED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Granulocytes</td>
<td>84 H</td>
<td>[45 - 70]</td>
<td>%</td>
</tr>
<tr>
<td>Granulocytes #</td>
<td>11.9 H</td>
<td>[2.0 - 7.0]</td>
<td>k/mm3</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>5 L</td>
<td>[20 - 45]</td>
<td>%</td>
</tr>
<tr>
<td>Lymphocytes #</td>
<td>0.7 L</td>
<td>[1.0 - 4.0]</td>
<td>k/mm3</td>
</tr>
<tr>
<td>Monocytes</td>
<td>7</td>
<td>[0 - 10]</td>
<td>%</td>
</tr>
<tr>
<td>Monocytes #</td>
<td>0.9</td>
<td>[0.0 - 1.0]</td>
<td>k/mm3</td>
</tr>
</tbody>
</table>
Eosinophils  3  [0 - 7]   %
Eosinophils #  0.4  [0.0 - 0.7]  k/mm3
Basophils  1  [0 - 2]   %
Basophils #   0.1  [0.0 - 0.2]  k/mm3

09/11/14  09:04 a

Basic Metabolic Panel
Glucose  101  [70 - 100]  mg/dl
Blood Urea Nitrogen 16  [7 - 22]  mg/dl
Creatinine  0.8  [0.6 - 1.4]  mg/dl
Calcium  8.9  [8.5 - 10.5]  mg/dl
Sodium  141  [136 - 146]  mmol/L
Potassium  4.2  [3.5 - 5.3]  mmol/L
Chloride  101  [98 - 108]  mmol/L
Carbon Dioxide 24  [20 - 32]  mmol/L

Myoglobin   91 H  [0 - 75]   ng/ml

Troponin I   0.42 H  [0.00- 0.04]   ng/ml
Comment 0.04 NG/ML IS THE 99TH PERCENTILE OF THE REFERENCE POPULATION FOR THIS CARDIAC TROPONIN I TEST. HIGHER LEVELS MAY BE CONSISTENT WITH A DIAGNOSIS OF MYOCARDIAL INFARCTION IF PRESENT WITH OTHER POSITIVE CLINICAL FINDINGS ACCORDING TO CURRENT PRACTICE GUIDELINES.
POSITIVE RESULT CALLED TO: TOM MANGOTANI, RN, 911/12 9:10a

09/11/14  10:42 a

Myoglobin   193 H  [0 - 75]   ng/ml

Troponin I   1.24 H  [0.00- 0.04]   ng/ml
Comment 0.04 NG/ML IS THE 99TH PERCENTILE OF THE REFERENCE POPULATION FOR THIS CARDIAC TROPONIN I TEST. HIGHER LEVELS MAY BE CONSISTENT WITH A DIAGNOSIS OF MYOCARDIAL INFARCTION IF PRESENT WITH OTHER POSITIVE CLINICAL FINDINGS ACCORDING TO CURRENT PRACTICE GUIDELINES.

09/11/14  12:53 p

Troponin I   1.98 H  [0.00- 0.04]   ng/ml
Comment 0.04 NG/ML IS THE 99TH PERCENTILE OF THE REFERENCE POPULATION FOR THIS CARDIAC TROPONIN I TEST. HIGHER LEVELS MAY BE CONSISTENT WITH A DIAGNOSIS OF MYOCARDIAL INFARCTION IF PRESENT WITH OTHER POSITIVE CLINICAL FINDINGS ACCORDING TO CURRENT PRACTICE GUIDELINES.
Troponin I   7.11 H  [0.00- 0.04]   ng/ml

Comment 0.04 NG/ML IS THE 99TH PERCENTILE OF THE REFERENCE POPULATION FOR THIS CARDIAC TROPONIN I TEST. HIGHER LEVELS MAY BE CONSISTENT WITH A DIAGNOSIS OF MYOCARDIAL INFARCTION IF PRESENT WITH OTHER POSITIVE CLINICAL FINDINGS ACCORDING TO CURRENT PRACTICE GUIDELINES.

Troponin I   5.55 H  [0.00- 0.04]   ng/ml

Comment 0.04 NG/ML IS THE 99TH PERCENTILE OF THE REFERENCE POPULATION FOR THIS CARDIAC TROPONIN I TEST. HIGHER LEVELS MAY BE CONSISTENT WITH A DIAGNOSIS OF MYOCARDIAL INFARCTION IF PRESENT WITH OTHER POSITIVE CLINICAL FINDINGS ACCORDING TO CURRENT PRACTICE GUIDELINES.

DATE OF EXAM: 09/11/14
EXAM: PA AND LATERAL CHEST
FINDINGS:
PA AND LATERAL CHEST EXAMS ARE NEGATIVE FOR CONSOLIDATION OR EDEMA. CARDIAC SILHOUTTE SIZE NORMAL. NEGATIVE EFFUSION. MEDIASTINAL AND HILAR CONTOURS WITHIN NORMAL LIMITS. NEGATIVE PNEUMOTHORAX.

IMPRESSION:
NORMAL 2 VIEWS OF THE CHEST.

EKGs – Admission and Baseline EKGs included – at end of cases
EDUCATIONAL OBJECTIVES

1. Define all unknown terms.

2. Cite the primary clinical problem (not the diagnosis).

3. Develop a general differential diagnosis of this clinical problem.

4. Develop a limited differential diagnosis of the clinical problem for this patient.

5. Explain the laboratory test results. Compare and contrast the enzyme patterns if the pathologic process was of 3 hours duration, or 24 hours duration, or 72 hours duration?

6. Interpret the EKGs.

7. What is your diagnosis? Why?
8. Explain the probable mechanisms for Mr. Solomon’s chest pain during this admission and three months ago when he was seen in the office.

9. What effect would each of the following treatment have on the oxygen supply/demand ratio of the myocardium?
   - Oxygen via nasal canula
   - Morphine
   - Metoprolol
   - Nitroglycerin

10. The emergency medicine physician is cautious about initially administering nitroglycerin to Mr. Solomon. Explain why. (think about the blood supply to this region of the myocardium).

11. The physician goes on to order a “right sided EKG”. Why?

12. What is the role, if any, for aspirin and/or heparin in Mr. Solomon’s treatment?

13. The emergency medicine physician consults with the cardiologist on call. The cardiologist states that the cardiac catheterization team will not be available for another 4 hours. What is the rationale, if any, for the use of intravenous t-PA in treating Mr. Solomon?
14. How would the latency from the onset of symptoms to the start of t-PA therapy influence the effectiveness of therapy?

15. What are the major risks associated with the use of thrombolytic therapy? List contraindications to thrombolytic therapy.

16. During morning rounds three days after admission to the hospital, Mr. Solomon is dyspneic. On auscultation of Mr. Solomon’s heart, his physician hears a 3/6 holosystolic murmur heard best at the apex and radiating into the axilla. What would be a likely pathogenesis for this problem?
Case 2
CASE HISTORY

CC: “My right ankle hurts me today”

A 6-year-old-girl awoke with pain and swelling in the right ankle. She is otherwise healthy. About four weeks ago she had several days of a sore throat, headache, and fever which resolved. She got better without seeing her pediatrician. She takes no medications. She has had all of her immunizations. On physical exam the patient is alert and appropriate. She is protective of her right leg, however she is able to ambulate. She has a temperature of 100°F. Lung exam is normal. On heart exam the PMI is in the fifth intercostal space, midclavicular line. S1 and S2 are normal. There is a new II/VI holosystolic murmur heard best at the apex which radiates to the axilla. There is a soft rub heard over the apex. Abdominal exam is normal. The patient’s right ankle is warm, swollen, and tender. Her left knee appears to have mild swelling and warmth.

Laboratory Data

Micro – Beta Strep Culture (Final)
Specimen Description – throat swab
Special Requests – none
Direct Screen – direct screen negative for beta hemolytic streptococcus group A
Report Status – final 04221999
Culture – no beta hemolytic streptococcus group A isolated

Micro – Blood Culture (Final) F9676
Specimen Description – blood
Special Requests – none
Culture Results – no growth after 5 days
Report Status – final 09112003

Micro – Blood Culture (Final) F9675
Specimen Description – blood
Special Requests – none
Culture Results – no growth after 5 days
Report Status – final 09112003

Spec Chem (Final) F9835
Anti-streptolysin O 512 IU/ml
Reference Range
Age <6 <100 IU/ml
6-18 <250
>18 <116
Learning Objectives

1. Develop a problem list for this patient.

   Problems include:
   - Ankle/knee arthritis
   - New murmur of mitral regurgitation
   - Pericardial friction rub
   - Fever
   - History of pharyngitis 4 weeks prior
   - Elevated anti-Streptolysin O

   Remainder of questions (2-7) will be provided to students by faculty during the small group session.

   Be prepared to explain the lab results, a differential diagnosis, a most likely diagnosis, and come prepared to discuss the disease process.