MECHANISMS OF HUMAN DISEASE
AND
PHARMACOLOGY & THERAPEUTICS

CASE-BASED SMALL GROUP DISCUSSION

SESSION XVI

MHD I

December 8, 2014

STUDENT COPY
CASE NO. 1

CHIEF CONCERN: Cough and fever for four days

HISTORY:
The patient is a 64 year old man who developed a harsh, productive cough four days prior to being evaluated. The sputum is thick and yellow with streaks of blood. He developed a fever, shaking, chills and malaise along with the cough. He has developed pain in his right chest that intensifies with inspiration. He had a bowl of chicken soup and some soda for dinner the night before but has not felt like eating anything since.

He has had a chronic “smoker's cough” for 10 years which he describes as being mild, non-productive and occurring most often in the early morning. He smokes 2 packs of cigarettes per day and has for the past 50 years. He does not drink alcohol.

The patient’s perspective of illness is that he has “the flu”.

The patient has been treated for “mild” hypertension and bronchitis in the past. He had an appendectomy for acute appendicitis as a young adult. He sustained a femur fracture and underwent splenectomy at the age of 22 after a motorcycle accident.

He takes cough syrup when his smoker’s cough gets particularly bothersome. He takes no other medication regularly.

He has no known drug allergies.

The patient is a retired truck driver. He lives alone and has no immediate family in the area.

PHYSICAL EXAMINATION: The patient appears fatigued. He coughs continuously. Sitting in a chair, he leans to his right side, holding his right chest with his left arm. Vital signs are as follows: blood pressure 152/90, apical heart rate 112/minute and regular, respiratory rate 24/minute and somewhat labored, axillary temperature 100.9°F. Pulse oximetry-0₂ saturation 85% on room air. Height 5’8’’; weight 186 pounds

Both lungs are resonant by percussion with one exception: the right mid-anterior and right mid-lateral lung fields are dull. Auscultation reveals bilateral diminished breath sounds. Bronchial breath sounds and rhonchi are heard in the area of the right mid-anterior and right mid-lateral lung fields as are bronchophony, egophony, and whispered pectoriloquy. There is increased tactile fremitus in the right mid-anterior and right mid-lateral lung fields as well. The remainder of the lung fields are clear.

Auscultation of the heart reveals no significant abnormality.

Examination of the fingers shows cyanosis of the nail beds. There is no clubbing of the digits.
**Complete Blood Count (Hemogram) with Differential**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC</td>
<td>3.89</td>
<td>L</td>
<td>[4.5 - 6.0]</td>
<td>M/ML</td>
</tr>
<tr>
<td>WBC</td>
<td>22.4</td>
<td>H</td>
<td>[4.0 - 10.0]</td>
<td>X 10/MM</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>11.6</td>
<td>L</td>
<td>[14.0 - 17.0]</td>
<td>gm/dl</td>
</tr>
<tr>
<td>Hematocrit</td>
<td>38.7</td>
<td>L</td>
<td>[40.0 - 54.0]</td>
<td>%</td>
</tr>
<tr>
<td>MCV</td>
<td>86.6</td>
<td>[85 - 95]</td>
<td>fl</td>
<td></td>
</tr>
<tr>
<td>MCH</td>
<td>29.8</td>
<td>[28.0 - 32.0]</td>
<td>pg</td>
<td></td>
</tr>
<tr>
<td>MCHC</td>
<td>34.5</td>
<td>[32.0 - 36.0]</td>
<td>gm/dl</td>
<td></td>
</tr>
<tr>
<td>RDW</td>
<td>14.4</td>
<td>[11.0 - 15.0]</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Platelet Count</td>
<td>379</td>
<td>[150 - 400]</td>
<td>K/ML</td>
<td></td>
</tr>
<tr>
<td>Differential Type</td>
<td>MANUAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bands</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bands#</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Granulocytes</td>
<td>80</td>
<td>H</td>
<td>[45 - 70]</td>
<td>%</td>
</tr>
<tr>
<td>Granulocytes #</td>
<td>17.9</td>
<td>H</td>
<td>[2.0 - 7.0]</td>
<td>k/mm3</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>11</td>
<td>L</td>
<td>[20 - 45]</td>
<td>%</td>
</tr>
<tr>
<td>Lymphocytes #</td>
<td>2.4</td>
<td>[1.0 - 4.0]</td>
<td>k/mm3</td>
<td></td>
</tr>
<tr>
<td>Monocytes</td>
<td>0</td>
<td>[0 - 10]</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Monocytes #</td>
<td>0.0</td>
<td>[0.0 - 1.0]</td>
<td>k/mm3</td>
<td></td>
</tr>
<tr>
<td>Eosinophils</td>
<td>0.0</td>
<td>[0 - 7]</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Eosinophils #</td>
<td>0</td>
<td>[0.0 - 0.7]</td>
<td>k/mm3</td>
<td></td>
</tr>
</tbody>
</table>

**Micro - Blood Culture** (Accessioned) – F3412

**Micro - Blood Culture** (Accessioned) – F3413

**Micro - Sputum Culture** (Accessioned) – F’1352

**EXAM: CHEST AP**

**HISTORY:**    PATIENT WITH COUGH AND FEVER

**FINDINGS:**

THE CARDIAC SILHOUTTE IS SLIGHTLY PROMINENT.

THERE IS INCREASED DENSITY IN THE RIGHT MIDDLE LOBE WHICH IS CONSISTENT WITH INFILTRATE. FOLLOW-UP TO RESOLUTION IS RECOMMENDED.

THERE IS BLUNTING OF THE RIGHT COSTOPHRENIC ANGLE

*THIS EXAMINATION AND REPORT HAVE BEEN REVIEWED BY THE ATTENDING RADIOLOGIST WHOSE NAME APPEARS ON THIS REPORT *
Educational Objectives

1. Define and explain all clinical terms.

2. What is the most likely diagnosis? Are there other possible diagnoses that should be considered?

3. Define “pneumonia”. Summarize the “pneumonia” syndromes as listed in Robbins Basic Pathology, table 12-6. Which is the most likely in this patient?

4. What organisms are likely to be causing this process?

5. What host factors may have predisposed this patient to developing this process?

6. Does the patient warrant admission to the hospital or can he be treated as an outpatient?
7. Explain whether you agree or disagree with each of the following empiric antibiotic regimens for this patient: (students should note that they will have 1-2 questions on their upcoming MHD exam testing their knowledge of antibiotic treatment of pneumonia)

- Penicillin
- Moxifloxacin
- Ciprofloxacin
- Ceftriaxone
- Ceftriaxone + azithromycin
- Aztreonam

8. Expectorated sputum Gram stain results are available six hours after admission:

   Specimen description – sputum
   Gram stain – moderate gram positive diplococci in pairs
     few squamous epithelial cells (<10 epithelial cells/lpf)
     Moderate white blood cells (>25 wbc/lpf)

   How do these results aid in the diagnosis and treatment of this patient?
9. Develop hospital admitting orders.

10. Explain the pathogenesis of pneumococcal pneumonia. What virulence factors are important? What pathologic changes are produced in the lungs because of pneumonia?

11. What is the role of immunization in this disease process?

12. Review Case Image.
   Chest Radiographs – Set 5
CASE 2:
CC: Cough x 2 months

History: A 60 year-old man presents to the emergency department with a two month history of a cough that is productive of yellow, blood-tinged sputum. He has also noted a 20 lb. weight loss, loss of appetite, low grade fever and night sweats. The patient denies shaking chills or chest pain.

Past Medical History:
Alcoholic liver disease, hospitalization 1 year ago with alcoholic hepatitis and alcohol withdrawal. Has cut down drinking since then
Emphysema

Medications: Albuterol and ipratropium inhalers

Allergies: No known drug allergies

Social History:
ETOH: Drinks 2-3 beers / day
Tobacco: Smokes 2 packs of cigarettes per day for the past 40 years
Currently lives at a YMCA, had previously been homeless and lived in a shelter for two years

Patient Perspective of Illness – “I just can’t seem to shake this cough. It’s really bothering me and I hope you can fix it”

PE: Wasted and malnourished appearing patient, T: 37.5° C orally, HR 80, R 20, BP 110/60.
Height 5’9”, weight 157 pounds
Bilateral wasting of temporal muscles
Lymph Nodes: none palpable in the cervical, supraclavicular regions
Chest: increased AP diameter
Lungs: diminished breath sounds, rales in right upper lung field
Cardiovascular: S1, and S2 Normal, no S3 or S4, no murmurs
Abdomen: Scaphoid, liver span 13 cm firm, no spleen felt, no masses or ascites, normal bowel sounds.
Extremities: Within normal limits
Neuro: Within normal limits

LABORATORY DATA

<table>
<thead>
<tr>
<th>COMPLETE METABOLIC PANEL</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>139</td>
<td>[136-146] mm/l</td>
</tr>
<tr>
<td>Potassium</td>
<td>3.9</td>
<td>[3.3-5.1] mm/l</td>
</tr>
<tr>
<td>Chloride</td>
<td>96</td>
<td>[98-108] mm/l</td>
</tr>
<tr>
<td>CO2</td>
<td>26</td>
<td>[20-32] mm/l</td>
</tr>
<tr>
<td>Bun</td>
<td>8</td>
<td>[7-22] mg/dl</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.0</td>
<td>[0.7-1.4] mg/dl</td>
</tr>
<tr>
<td>Glucose</td>
<td>73</td>
<td>[70-100] mg/dl</td>
</tr>
<tr>
<td>Albumin</td>
<td>2.7 L</td>
<td>[3.6-5.0] gm/dl</td>
</tr>
</tbody>
</table>
Protein, Total 6.8  [6.5-8.3] gm/dl
Calcium 8.9  [8.9-10.3] mg/dl
Alkaline Phosphatase 99  [30-110] iu/l
ALT (SGPT) 16  [7-35] iu/l
AST (SGOT) 20  [5-40] iu/l
Bilirubin, Total 0.5  [0.2-1.4] mg/dl

CBC w/ DIFF
WBC 15.1 H  [4.0-10.0] k/ul
RBC 3.59 L  [3.60-5.50] m/ul
Hgb 11.2 L  [12.0-16.0] gm/dl
Hct 33.6 L  [34.0-51.0] %
MCV 83.2 L  [85-95] fl
MCH 27.4 [28.0-32.0] pg
MCHC 32.3 [32.0-36.0] gm/dl
RDW 15.1 H  [11.0-15.0] %
Plt Count 250  [150-400] k/ul
Diff Type Automated
Gran 60  [45-70] %
Gran # 9.1 H  [2.0-7.0] k/mm3
Lymph 35  [20-45] %
Lymph # 5.3  [1.0-4.0] k/mm3
Mono 3  [0-10] %
Mono # 0.4  [0.0-1.0] k/mm3
Eo 1  [0-7] %
Eo # 0.1  [0.0-0.7] k/mm3
Baso 1  [0-2] %
Baso # 0.1  [0.0-0.2] k/mm3

EXAM:  DXCPA - CHEST, PA AND LAT
SIGNED BY:  AGEE, JOHN MD

HISTORY:  COUGH, WEIGHT LOSS, NIGHT SWEATS

FINDINGS:

THE CARDIAC SILHOUETTE IS NORMAL.

THE LUNGS ARE HYPERINFLATED. THE DIAPHRAGMS ARE FLATTENED. THERE IS A CAVITARY LESION IN THE RIGHT UPPER LOBE. NO PLEURAL EFFUSION.

*THIS EXAMINATION AND REPORT HAVE BEEN REVIEWED BY THE*
*ATTENDING RADIOLOGIST WHOSE NAME APPEARS ON THIS REPORT*

Learning Objectives:

1. Develop a problem list.
2. While he does have a long problem list, at this time the physician is particularly concerned with the patient’s cough, constitutional symptoms, and chest X-ray findings. Formulate a differential diagnosis for this group of problems.

The patient is hospitalized. Induced sputum is sent for acid fast smear and Mycobacterial culture. There are many acid fast bacilli on smear.

3. Does a positive sputum smear with acid fast organisms imply that the patient has a *Mycobacterium tuberculosis* infection?

4. Amplified DNA probe of the direct specimen is positive for *Mycobacterium tuberculosis*. Interpret this test result.

5. What is the pathogenesis of *M. tuberculosis* infection in this patient? Is this a primary or reactivation infection? How might the patient have acquired the primary infection?
6. How is this infection spread? How do you prevent the spread of this infection while the patient is hospitalized?

7. An HIV test is performed on this patient and is negative. Propose a first-line oral treatment regimen for him for *Mycobacterium tuberculosis*.

8. What is “direct observation of therapy” (DOT)?

9. What does a positive PPD skin test mean?

10. Review the Case Images: Bacteriology, Set 9

Two unknown cases will be presented during the small group session