

**CASE STUDY****13****BACTERIAL PNEUMONIA**

For the Disease Summary for this case study, see the CD-ROM.

**PATIENT CASE****Chief Complaints**

Provided by patient's home caregiver: "Mrs. I. is confused and very sick. She was up most of last night coughing."

**HPI**

Mrs. B.I. is an 84-year-old white female, who is widowed and a retired bank manager. She owns her own home and has a 45-year-old female caregiver who lives in the home. Currently, Mrs. I. uses a walker and takes daily strolls to the park with her caregiver. She is able to perform most activities of daily living; however, the caregiver prepares all meals.

The patient presents to the clinic accompanied by her caregiver, who reports that Mrs. I. has a one-week history of upper respiratory symptoms and a two-day history of increasing weakness and malaise. Approximately three days ago, the patient developed a cough that has gradually become worse and she now has difficulty catching her breath. The caregiver also reports that the patient was confused last night and nearly fell while going to the bathroom. The patient has been coughing up a significant amount of phlegm that is thick and green in color. She has no fever. The caregiver has become concerned by the patient's reduction in daily activities and an inability to get rid of her "cold."

**Patient Case Question 1.** Based on the patient's history of illness, is this type of infection considered *community-acquired* or *nosocomial*?

**PMH**

- Tobacco dependence × 64 years
- Chronic bronchitis for approximately 13 years
- Urinary overflow incontinence × 10 years
- HTN × 6 years, BP has been averaging 140/80 mm Hg with medication

- Mild left hemiparesis caused by CVA 4 years ago
- Depression × 2 years
- Constipation × 6 months
- Influenza shot 3 months ago

## **FH**

- (+) for HTN and cancer
- (–) for CAD, asthma, DM

## **SH**

- Patient lives with caregiver in patient's home
- Smokes 1/2 ppd
- Some friends recently ill with “colds”
- Occasional alcohol use, none recently

## **ROS**

- Difficult to conduct due to patient's mental state (lethargy present)
- Caregiver states that patient has had difficulty sleeping due to persistent cough
- Caregiver has not observed any episodes of emesis but reports a decrease in appetite
- Caregiver denies dysphagia, rashes, and hemoptysis

**Patient Case Question 2.** Provide a clinical definition for *lethargy*.

## **Meds**

- Atenolol 100 mg po QD
- HCTZ 25 mg po QD
- Aspirin 325 mg po QD
- Nortriptyline 75 mg po QD
- Combivent MDI 2 puffs QID (caregiver reports patient rarely uses)
- Albuterol MDI 2 puffs QID PRN
- Docusate calcium 100 mg po HS

## **All**

PCN (rash)

**Patient Case Question 3.** Match the pharmacotherapeutic agents in the left-hand column directly below with the patient's health conditions in the right-hand column.

- |                     |                          |
|---------------------|--------------------------|
| a. atenolol         | _____ depression         |
| b. HCTZ             | _____ constipation       |
| c. nortriptyline    | _____ HTN                |
| d. albuterol        | _____ chronic bronchitis |
| e. docusate calcium |                          |

## PE and Lab Tests

### Gen

The patient's age appears to be consistent with that reported by the caregiver. She is well groomed and neat, uses a walker for ambulation, and walks with a noticeable limp. She is a lethargic, frail, thin woman who is oriented to self only. The patient is also coughing and using accessory muscles to breathe. She is tachypneic and appears to be uncomfortable and in moderate respiratory distress.

### Vital Signs

See Patient Case Table 13.1

|    |                                      |                           |                 |
|----|--------------------------------------|---------------------------|-----------------|
| BP | 140/80, no orthostatic changes noted | HT                        | 5' 10½"         |
| P  | 95 and regular                       | WT                        | 124 lbs         |
| RR | 38 and labored                       | BMI                       | 17.6            |
| T  | 98.3°F                               | O <sub>2</sub> saturation | 86% on room air |

### Skin

- Warm and clammy
- (–) for rashes

### HEENT

- NC/AT
- EOMI
- PERRLA
- Fundi without lesions
- Eyes are watery
- Nares slightly flared; purulent discharge visible
- Ears with slight serous fluid behind TMs
- Pharynx erythematous with purulent post-nasal drainage
- Mucous membranes are inflamed and moist

### Neck

- Supple
- Mild bilateral cervical adenopathy
- (–) for thyromegaly, JVD, and carotid bruits

### Lungs/Thorax

- Breathing labored with tachypnea
- RUL and LUL reveal regions of crackles and diminished breath sounds
- RLL and LLL reveal absence of breath sounds and dullness to percussion
- (–) egophony

## Cardiac

- Regular rate and rhythm
- Normal S<sub>1</sub> and S<sub>2</sub>
- (-) for S<sub>3</sub> and S<sub>4</sub>

## Abd

- Soft and NT
- Normoactive BS
- (-) organomegaly, masses, and bruits

## Genit/Rect

Examination deferred

## MS/Ext

- (-) CCE
- Extremities warm
- Strength 4/5 right side, 1/5 left side
- Pulses are 1+ bilaterally

## Neuro

- Oriented to self only
- CNs II–XII intact
- DTRs 2+
- Babinski normal

## Laboratory Blood Test Results

See Patient Case Table 13.2

| Patient Case Table 13.2 Laboratory Blood Test Results |           |              |                        |                 |           |
|---|-----------|--------------|------------------------|-----------------|-----------|
| Na  | 141 meq/L | Glu, fasting | 138 mg/dL              | • Lymphs        | 10%       |
| K   | 4.5 meq/L | Hb           | 13.7 g/dL              | • Monos         | 3%        |
| Cl  | 105 meq/L | Hct          | 39.4%                  | • Eos           | 1%        |
| HCO <sub>3</sub>                                      | 29 meq/L  | WBC          | 15,200/mm <sup>3</sup> | Ca              | 8.7 mg/dL |
| BUN   | 16 mg/dL  | • Neutros    | 82%                    | Mg              | 1.7 mg/dL |
| Cr  | 0.9 mg/dL | • Bands      | 4%                     | PO <sub>4</sub> | 2.9 mg/dL |

## Arterial Blood Gases

See Patient Case Table 13.3

| Patient Case Table 13.3 Arterial Blood Gases |      |                  |                      |                   |          |
|--|------|------------------|----------------------|-------------------|----------|
| pH   | 7.50 | PaO <sub>2</sub> | 59 mm Hg on room air | PaCO <sub>2</sub> | 25 mm Hg |

## Urinalysis

See Patient Case Table 13.4

|                                   |       |           |     |                    |     |
|-----------------------------------|-------|-----------|-----|--------------------|-----|
| Appearance: Light yellow and hazy |       | Protein   | (-) | Nitrite            | (-) |
| SG                                | 1.020 | Ketones   | (-) | Leukocyte esterase | (-) |
| pH                                | 6.0   | Blood     | (-) | 2 WBC/RBC per HPF  |     |
| Glucose                           | (-)   | Bilirubin | (-) | Bacteria           | (-) |

## Chest X-Rays

- Consolidation of inferior and superior segments of RLL and LLL
- Developing consolidation of RUL and LUL
- (-) pleural effusion
- Heart size WNL

## Sputum Analysis

Gram stain: TNTC neutrophils, some epithelial cells, negative for microbes

## Sputum and Blood Cultures

Pending

**Patient Case Question 4.** Determine the patient's Pneumonia Severity of Illness score.

**Patient Case Question 5.** Should this patient be admitted to the hospital for treatment?

**Patient Case Question 6.** What is this patient's 30-day mortality probability?

**Patient Case Question 7.** Identify *two* clinical signs that support a diagnosis of "double pneumonia."

**Patient Case Question 8.** Identify *five* risk factors that have predisposed this patient to bacterial pneumonia.

**Patient Case Question 9.** Identify a minimum of *twenty* clinical manifestations that are consistent with a diagnosis of bacterial pneumonia.

**Patient Case Question 10.** Propose a likely microbe that is causing bacterial pneumonia in this patient and provide a strong rationale for your answer.

**Patient Case Question 11.** Identify *two* antimicrobial agents that might be helpful in treating this patient.

**Patient Case Question 12.** The patient has no medical history of diabetes mellitus, yet her fasting serum glucose concentration is elevated. Propose a reasonable explanation.

**Patient Case Question 13.** Why is this patient afebrile?

**Patient Case Question 14.** Is there a significant probability that bacterial pneumonia may have developed from a urinary tract infection in this patient?

**Patient Case Question 15.** Explain the pathophysiologic basis that underlies the patient's high blood pH.

**Patient Case Question 16.** The chest x-ray shown in Patient Case Figure 13.1 reveals pneumonia secondary to infection with *Mucor* species in a patient with poorly controlled diabetes mellitus. Where is pneumonia most prominent: right upper lobe, right lower lobe, left upper lobe, or left lower lobe?



**PATIENT CASE FIGURE 13.1**

Chest x-ray from a patient with pneumonia due to infection with *Mucor*. See Patient Case Question 16. (Reprinted with permission from Crapo JD, Glassroth J, Karlinsky JB, King TE Jr. *Baum's Textbook of Pulmonary Diseases*, 7th ed. Philadelphia: Lippincott Williams & Wilkins, 2004.)