

## Case number 2

### COPD

#### Case History

##### History of Present Illness:

A 65 year old male comes to the ED because of shortness of breath. He notes that over the last 2-3 years he has had gradual worsening of his ability to exert himself without feeling out of breath, and it has been acutely worse for the past week, including a worsening productive cough. On questioning, he reveals that he coughs almost every morning as well, and this has been going on for even longer, perhaps 4-5 years. The cough is now productive of yellowish-brownish sputum. He denies chest pain, fevers, chills or night sweats. He has no history of lower extremity edema. The rest of his review of systems is negative.

Other than an appendectomy when he was in his 20's, the patient denies any significant past medical history. He denies taking any medications, but does state that a year ago he went to a walk-in clinic for cough and got some kind of inhaler, which he used over the course of a month or two until it was gone. He lives in an apartment with his wife, and has smoked a pack of cigarettes a day for 40 years.

##### Physical Examination:

*General appearance:* sitting up in the ED bed, leaning forward. He appears uncomfortable with labored breathing and his lips are bluish. There is no cervical lymphadenopathy, JVD or carotid bruits.

*Vital Signs:* BP is 144/88 mmHg, HR is 98, RR is 28 bpm. His

temp is 97.6. Oxygen saturation is 93% on 4 L.

*Chest exam:* shows mild intercostal retractions seen around the anterolateral costal margins. Wheezes and rhonchi are present bilaterally, without crackles.

*Heart exam:* unremarkable, though the heart sounds are distant.

*Lower extremities:* show no cyanosis, clubbing or edema.

### TESTS:

*Chest X-Ray:* shows only hyperinflation, without acute infiltrates.

- **Q. What is the most likely diagnosis?**

COPD with acute exacerbation.

- **Q. What is the most appropriate next diagnostic step?**

Given the patient's respiratory difficulty seen on exam and possible hypoxia, an ABG would be helpful to measure adequacy of oxygenation ( $\text{PaO}_2$ ) and ventilation ( $\text{PCO}_2$ ). In this case, the ABG was taken and found to be:  $\text{PH}:7.32$  /  $\text{Pco}_2:58$  /  $\text{Po}_2:86$  /  $\text{HCO}_3:30$ . It was done while the patient was on room air.

- **Q. What is the interpretation of this ABG?**

This ABG shows marked respiratory acidosis with a partial compensatory metabolic alkalosis.

- **Q. What should your target  $\text{O}_2$  saturation be for this patient?**

Target oxygen saturation should be 90-92%. Hypercapnia *can* accompany the aggressive use of supplemental oxygen. While



decreased alveolar ventilation caused by suppression of the hypoxic drive does not appear to play a major role by itself, this O<sub>2</sub> target can help maximize hemoglobin saturation, and lessen the likelihood of hypercapnia from ventilation/perfusion mismatches. Placing patients with chronic COPD and acute respiratory failure on 100% O<sub>2</sub> has been shown to increase CO<sub>2</sub> levels, by 23 +/- 5 mmHg in one study.

- **Q. What are the mainstays of treatment of acute COPD Exacerbations?**

Routine treatment includes use of bronchodilators, systemic corticosteroids and antibiotics. For patients sick enough to be hospitalized, oxygen and possibly mechanical ventilation are often used.

A.           1. Bronchodilators

a. Inhaled Beta Adrenergic Agonists: the mainstay of therapy for acute exacerbations. Rapid onset of action and efficacy in producing bronchodilation.

b. Anticholinergic Bronchodilators: May be used in combination with beta adrenergic agonists to produce bronchodilation in excess of that achieved with either agent alone.

- 2. Systemic Corticosteroids

Oral steroids have been shown to be effective for outpatient therapy, while serious COPD exacerbations requiring hospitalization and starting intravenous steroids.

## Discussion:

COPD is a chronic inflammatory lung disease that causes obstructed airflow from the lungs.

Emphysema and chronic bronchitis are the two most common conditions that contribute to COPD. Chronic bronchitis is inflammation of the lining of the bronchial tubes. It's characterized by daily cough and mucus (sputum) production. Emphysema is a condition in which the alveoli at the end of the smallest air passages (bronchioles) of the lungs are destroyed as a result of damaging exposure to cigarette smoke and other irritating gases and particulate matter.

### Symptoms

- Shortness of breath, especially during physical activities
- Wheezing
- Chest tightness
- Having to clear your throat first thing in the morning, due to excess mucus in your lungs
- A chronic cough that may produce mucus (sputum) that may be clear, white, yellow or greenish
- Blueness of the lips or fingernail beds (cyanosis)
- Frequent respiratory infections
- Lack of energy
- Swelling in ankles, feet or legs

People with COPD are also likely to experience episodes called exacerbations, during which their symptoms become worse than usual day-to-day variation and persist for at least several days.

### Risk factors

- Exposure to tobacco smoke. The most significant risk factor for COPD is long-term cigarette smoking.
- People with asthma who smoke. The combination of asthma, a chronic inflammatory airway disease, and smoking increases the risk of COPD even more.



- Occupational exposure to dusts and chemicals. Long-term exposure to chemical fumes, vapors and dusts in the workplace can irritate and inflame lungs.
- Exposure to fumes from burning fuel. In the developing world, people exposed to fumes from burning fuel for cooking and heating in poorly ventilated homes are at higher risk of developing COPD.
- Age. COPD develops slowly over years, so most people are at least 40 years old when symptoms begin.
- Genetics. The uncommon genetic disorder alpha-1-antitrypsin deficiency is the cause of some cases of COPD.

### **Complications:**

- Respiratory infections. People with COPD are more likely to catch colds, the flu and pneumonia. Any respiratory infection can make it much more difficult to breathe and could cause further damage to lung tissue. An annual flu vaccination and regular vaccination against pneumococcal pneumonia can prevent some infections.
- Heart problems. For reasons that aren't fully understood, COPD can increase risk of heart disease, including heart attack.
- Lung cancer. People with COPD have a higher risk of developing lung cancer. Quitting smoking may reduce this risk.
- High blood pressure in lung arteries. COPD may cause high blood pressure in the arteries that bring blood to lungs (pulmonary hypertension).