

Internal Medicine Clerkship
Case Discussions

Chronic Obstructive Pulmonary Disease
Student Guide

Objectives:

1. Identify characteristics and relevant review of systems that characterize COPD including progressive shortness of breath, chronic cough, and sputum production.
2. Assess for risk factors that contribute to COPD including smoke exposure, indoor air pollution, and occupational exposure.
3. Assess for risk factors in family history that contribute to COPD including alpha-1 antitrypsin deficiency.
4. Identify key physical exam findings to assess severity of COPD including air flow, pursed lip breathing, and wheezing.
5. Identify and interpret key laboratory and imaging tests and list indications, benefits, test characteristics, risks, and costs of testing that help establish diagnosis and severity (including spirometry, pulmonary function studies, and arterial blood gas) and assess for alternate and concomitant disorders (including chest radiography).
6. Describe a rational and evidence-based approach to treating a patient with COPD:
 - a. List treatment that improves mortality including oxygen in hypoxemic patients.
 - b. List treatment that improves symptoms, functional status, and reduces exacerbations including bronchodilators, inhaled anti-inflammatory drugs, and pulmonary rehabilitation.
 - c. List treatment of acute exacerbations including bronchodilators, corticosteroids, and antibiotics.
 - d. List treatment that improves lung function including lung reduction surgery.
7. Describe possible respiratory and cardiac complications including chronic respiratory failure and cor pulmonale.
8. Identify factors that slow the decline of respiratory function including oxygen therapy and smoking cessation.
9. Use a framework to assess tobacco use including Fagerstron Test for Nicotine Dependence and address smoking cessation including the 5A's (Ask, Advise, Assess, Assist, Arrange).
10. Describe a rational and evidence-based approach to treating a patient who is ready to quit smoking:
 - a. Describe how to encourage cessation including offering brief advice to quit smoking.
 - b. Describe how to assist patients ready to quit including helping develop a quit plan and social support plan.
 - c. Describe effective medical therapies to treat nicotine withdrawal including nicotine replacement, varenicline, and bupropion.

Clinical Case:

A 65 year old was admitted with the chief complaint of increased shortness of breath and a cough productive of yellow sputum for three weeks. The patient states that he has had "bronchitis" and "asthma" for several years resulting in a chronic cough, usually productive of one to two tablespoonfuls of mucoid sputum daily, as well as persistent mild to moderate dyspnea on exertion. Overall, while he describes

having “some good days and some bad days”, he always experiences some shortness of breath with activities. He uses a beta-agonist inhaler occasionally, with some mild relief of dyspnea, and is prescribed antibiotics once or twice a year. For the past several days, however, his inhalers have failed to relieve his dyspnea, he has been sleeping poorly, and he complains of having increasing difficulty coughing up his sputum. He denies fever, night sweats, or weight loss. He admits to a 100-pack year smoking history, although he has recently cut down to 1/2 pack per day.

Questions:

1. How do you define COPD? Do you accept this patient's diagnosis of "asthma"? Compare the classic characteristics of patients suffering from emphysema and chronic bronchitis.
2. Discuss the pathogenesis of COPD.
3. What is the significance of the change in sputum color?
4. What probably happened to this man to necessitate this hospitalization? Could this possibly have been prevented?

Physical Exam:

Vitals: T = 98F; P = 85; BP = 120/85; RR = 30

Gen: Cachectic, anxious male in acute respiratory distress with rapid respirations, marked supraclavicular and intercostal retractions, using his accessory muscles to breath

HEENT: Cyanotic lips

Neck: Neck veins distended to the mandible but collapse with inspiration

Resp: Limited expansion, increased A-P diameter, hyperresonance and a fixed diaphragm on percussion, marked inspiratory and expiratory wheezing, and a prolonged expiratory phase

CV: Distant but regular heart sounds

Ext: No clubbing or edema

Questions:

5. Why is this patient cachectic?

6. What is responsible for the oscillation in neck vein distention?

7. Discuss the expected physical examination findings in COPD. What is Hoover's sign and the abdominal-thoraco paradox, and what do each signify?

Laboratory Data:

CBC: Hgb = 16.5; WBC = 8.4 (65% polys, 35% lymphs)

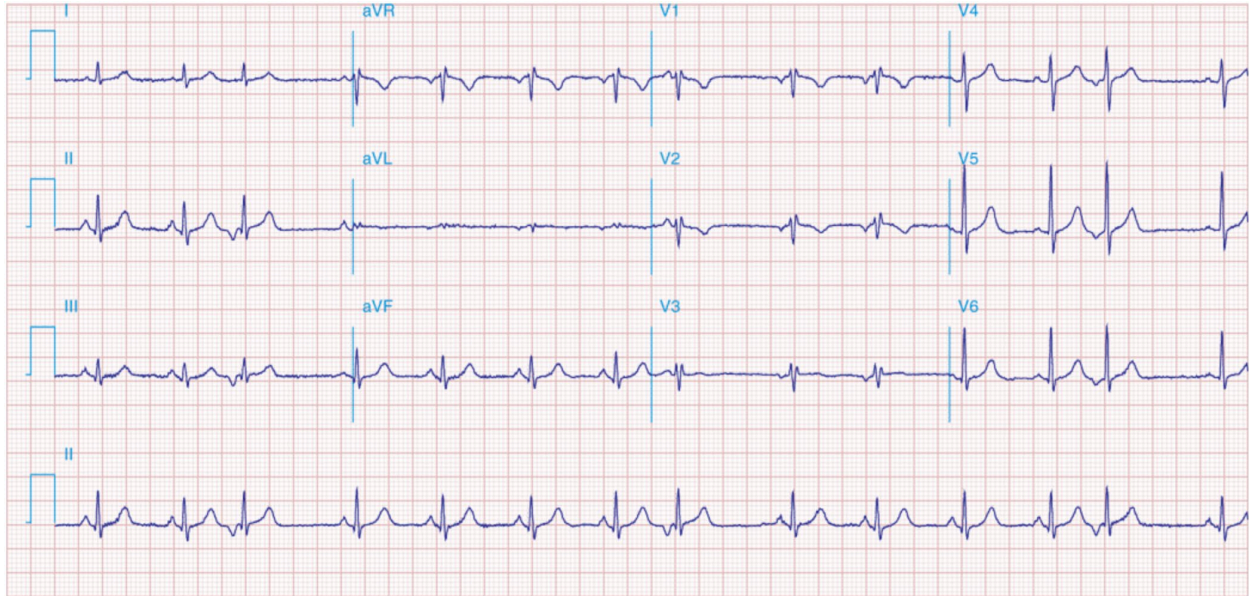
BMP: normal except HCO₃ 31

Sputum Gram Stain: lots of PMNs; Culture: Pending.

ABG: pH = 7.32; PaCO₂ = 68 (baseline 58); PaO₂ = 48; 78% saturated

Patient's chest x-ray and EKG are below:





The patient was given albuterol and ipatropium bronchodilator therapy, IV levofloxacin, solumedrol, and supplemental oxygen.

Questions:

8. Describe the typical CXR features in patients with COPD as show in his x-ray.
9. Describe the EKG findings that are consistent with his diagnosis of severe COPD.
10. Do you think the hemoglobin of 16.5 is of any significance?
11. What bacteria are often implicated in COPD exacerbations, and what antibiotics should be used for an acute exacerbation of COPD? Should these be started before cultures are back?
12. What acid-base abnormality is present?
13. What is the primary mechanism of hypoxia in patients with COPD? Discuss the concern regarding the use of supplemental oxygen during an acute exacerbation of COPD.

14. Discuss the data for and against the use of oral corticosteroids in patients with COPD as part of chronic management, for acute outpatient exacerbations, and for exacerbations requiring hospitalization.

The patient gradually improved and was changed to oral antibiotics, given a pneumococcal vaccine. He was recommended to stay updated on his COVID and influenza vaccines and to receive the RSV vaccine as an outpatient. He was counseled on smoking cessation and discharged on a triple therapy inhaler (LABA + LAMA + ICS) as well as supplemental oxygen.

The following PFT's were obtained six weeks later as an outpatient:

	Pre-Bronchodilator	(% Predicted)	Post-Bronchodilator
FVC	2.6 L	(71%)	2.6 L
FEV1	1.3 L	(35%)	1.4 L
FEV1/FVC	.50		
TLC	7.3 L	(125%)	
RV	3.5 L	(150%)	
DLCO	12.3	(52%)	

Questions:

15. Describe the characteristic changes in the following pulmonary function tests in patients with COPD: FEV1/FVC, TLC, RV, DLCO.
16. What is the expected rate of decline in FEV1 per year in non-smokers, current smokers, and ex-smokers?
17. Why do patients with COPD use pursed lip breathing?
18. Define the GOLD groups A, B and E and describe a step-wise approach to the medical management of outpatients with COPD based on these groups.
19. Should antibiotics be used for stable COPD?
20. What is the role for long-term oxygen therapy in patients with COPD? What pO₂/saturation cutoff qualifies the patient for home O₂.

21. Which patients should be screened for alpha-1 anti-trypsin deficiency?

22. Describe the role of pulmonary rehabilitation in the management of patients with COPD.

23. Describe two surgical procedures that are possible options for select patients with end stage lung disease secondary to COPD?

24. How would you counsel him regarding smoking cessation? Discuss the 5A's of smoking cessation. If he was interested in stopping, what would you offer him for treatment?

25. Would you screen him for lung cancer? What are the current screening recommendations?

References:

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