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Continuing Medical Education Case Presentation

Valid 9/3/2008-9/1/2009

A 57 year-old Female with Shortness of Breath...

BACKGROUND

Chronic obstructive pulmonary disease (COPD) is responsible for one death every four minutes in the US. While 12 million Americans have been diagnosed with the disease, it is estimated that at least that many have COPD but are undiagnosed.

Several COPD risk factors converge in East Texas, resulting in some of the highest rates of unnecessary hospitalizations in the state. Since primary care physicians, PAs and NPs in the region are the most likely to diagnose and manage COPD, they should be made aware of the most current information available on how to improve patient outcomes and overcome clinical barriers to diagnostic testing and treatment.

AUTHOR

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Dr. Dubin has no conflicts of interest to disclose.

HOW TO RECEIVE CREDIT

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LEARNING OBJECTIVES

Those completing this activity will receive information that should allow them to…

- Correctly make a diagnosis in a 57 year old female with shortness of breath;
- Evaluate the importance of smoking cessation in the treatment of COPD;
- Differentiate Emphysema, Asthma and Chronic Bronchitis; and
- Develop and implement a plan to treat an upper respiratory infection in patients with COPD.

A 57 year old female presents to your office with a history of increasing shortness of breath that is now affecting her daily activities. Your patient reports that she had episodes of dyspnea on and off for the past four to five years, but this is now becoming more frequent. For the past four years she has had shortness of breath with moderate exertion. Now she had difficulty breathing with the mildest of activities. She also describes a productive cough for the past three years each morning, producing about two teaspoons of clear sputum. Chest pain is not present.

Past medical history reveals a patient who smokes one pack of cigarettes daily for the past 40 years. She had an appendectomy at age 8 and is not allergic to any medication. She works as an accounting assistant. She has two brothers and one sister, all in good health. Her father died at age 64 from a myocardial infarction. Her mother is still alive and has a history of hypertension. Your patient is G2P2.

Examination

Vital Signs	T: 97.6 F BP: 150/70 HR: 96 RR: 15
Physical Exam	HEENT: unremarkable
Chest	She has an increased AP diameter on her chest x-ray with a prolonged expiratory phase noted, when asked to breathe deeply. Decreased breath sounds with mild expiratory wheezing is appreciated on auscultation.
Cardiac	A regular rate and rhythm is noted with no murmurs
Abdomen	Her abdomen is soft with no masses
Extremities	No edema, No masses and No clubbing

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RELEASE & REVIEW DATE

This activity was last reviewed and released on September 3, 2008 and expires September 1, 2009. Credit cannot be awarded after this date.

ACCREDITATION & CREDIT

PHYSICIAN ACCREDITATION

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The University of North Texas Health Science Center anticipates this program for 1 hour in Category 2A CME credit hours, pending approval from the AOA/CCME.

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COMMERCIAL SUPPORT

This activity is commercially supported by Boehringer Ingelheim and Pfizer. Great care has been exercised to ensure the content is fair and balanced.

Laboratory

QUESTION 1: You perform pulmonary spirometry studies (pre and post bronchodilator) in the office. Which of the following findings would be most compatible with this patient?

A. An FEV1 at 90% of predicted while asymptomatic.
B. An FEV1/FVC ratio of 98%
C. A DLCO (single breath carbon monoxide diffusion study at 90% of predicted)
D. An FEV1 below 60% of predictedwhile asymptomatic
E. A positive methacholine challenge as part of the routine spirometry

Diagnosis

QUESTION 2: The most probable diagnosis for this patient is?

A. Asthma (reversible obstructive airways disease)
B. Chronic Bronchitis
C. Chronic Obstructive Lung Disease/ Emphysema
D. Bronchiectasis
E. Alpha 1- Antitrypsin deficiency

You realize the importance of the diagnosis that you have reached based upon your patients history, physical examination, and pulmonary function tests.

QUESTION 3: You correctly know that:

A. This patient suffers from a reversible disorder in which her airflow obstruction is completely reversible.
B. Your patient suffers from a disorder that characteristically has progressive airflow obstruction that is not fully reversible.
C. Your patient suffers from a disorder characterized be a chronic persistent cough for three months out of the year for two consecutive years.
D. Your patient suffers from a disorder that is associated with dilated bronchi and foul smelling sputum.
E. Your patient suffers from a disorder that characteristically has airway hyperreactivity as an important component of the disorder.

Counseling, Treatment, Follow-up

After performing your spirometry and diagnostic studies on your patient, you decided on a course of therapeutic treatment.

QUESTION 4: The most important medical advice/treatment you can give your patient at this time is?

A. Work with your patient to develop a plan that will assist her in quitting smoking.
B. Place her on inhaled corticosteroids to reduce airway inflammation
C. Place her on an inhaled Beta-2 agonist as a bronchodilator
D. Prescribe home oxygen therapy twenty four hours a day
E. Administer pneumonia vaccine

Your patient does well with a rescue inhaler and other advice you have given her. Three months later she reports that she has developed an increased cough and a low grade fever. On exam, she has an increased respiratory rate and increased wheezing on examination. Her sputum has changed color and appears purulent. Her CBC reveals a leukocytosis.

QUESTION 5: You suspect she has developed an upper respiratory infection and prescribe?

A. A burst of oral steroids to assist her airway inflammation as the primary therapy
B. Oral Penicillin
C. Oral Theophylline as an adjunct to her current therapy
D. An oral macrolide antibiotic
E. An inhaled Anticholinergic bronchodilator

PLEASE COMPLETE THE RESPONSE FORM BEFORE PROCEEDING TO THE CASE DISCUSSION

UNIVERSITY of NORTH TEXAS HEALTH SCIENCE CENTER AT FORT WORTH

CME/CE Credit Request Form

Activity Title:	A 57 Year Old Female with Shortness of Breath
Dates Valid:	September 3, 2008 – September 1, 2009
Credits	1 *Category 1 PRA AMA Credits*™, 1 Hour Category 2A, AOA

Instructions: **Please complete this form and return it to the address or fax number below.**

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Question Responses

Q#	A	B	C	D	E
1	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
2	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
3	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
4	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ
5	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ

Please rate to what extent this activity achieved its objectives:

Scale: E=Excellent VG=Very Good G=Good F=Fair P=Poor

EVALUATION		**E**	**VG**	**G**	**F**	**P**
1	Please rate to what extent this activity is fair and balanced	⑤	④	③	②	①
	Please rate how well the following learning objectives were accomplished:					
2	Correctly make a diagnosis in a 57 year old female with shortness of breath	⑤	④	③	②	①
3	Evaluate the importance of smoking cessation in the treatment of COPD	⑤	④	③	②	①
4	Differentiate Emphysema, Asthma and Chronic Bronchitis	⑤	④	③	②	①
5	Develop and implement a plan to treat an upper respiratory infection in patients with COPD	⑤	④	③	②	①
6	What is the likelihood that you will implement a change in your practice based on information presented at this activity?	⑤	④	③	②	①
7	What is your OVERALL rating of this activity?	⑤	④	③	②	①

What is your greatest challenge when diagnosing or treating COPD?

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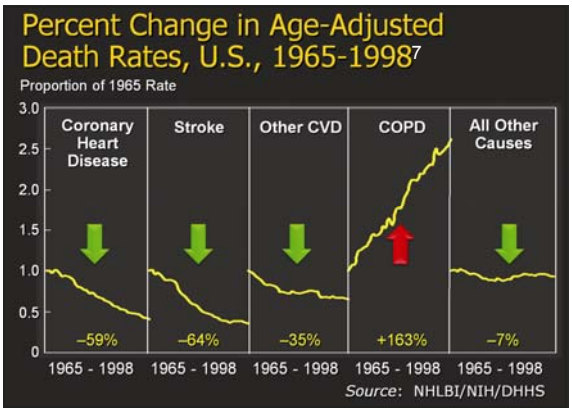
Discussion

This patient presents with the history and physical findings compatible with Chronic Obstructive Pulmonary Disease (COPD) of the emphysematous type. COPD is the leading cause of morbidity



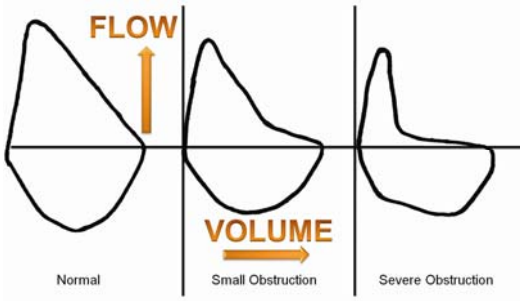
and mortality worldwide. There has been an increasing trend in the development of COPD in women over recent years. In 2000, more women then men died of COPD in the United States. In 2004, 123,884 Americans died from COPD, making it the fourth leading cause of death in the United States.[1] Eighty to ninety percent of COPD cases are caused by smoking, and a smoker is ten times more likely to die from COPD.[2]

The COPD category includes a broad group of diseases including Emphysema, Asthma, and Chronic Bronchitis. Often, there are overlapping components in each patient. In our patient, her history of long standing cigarette smoking and progressive dyspnea are all compatible with a diagnosis of emphysema. On her physical examination, her increased chest AP diameter, decreased breath sounds and prolonged expiratory phase are also characteristic of emphysema.

Discussion of Question One

Often, pulmonary function tests performed in the office can provide valuable information for the attending physician. Simple spirometry is the most important test for diagnosing and staging COPD.[3] In our patient, spirometry (pre and post bronchodilator) will help confirm the presence and reversibility of airflow obstruction. It will also help to quantify our patients' ventilatory function.

We would expect that our patient with chronic obstructive lung disease will have a decreased forced expiratory volume in one second (FEV1). The NICE guidelines suggest a reduction of FEV1 below 80% of predicted is indicative.[4] She will also have a decreased ratio of her FEV1 to her FVC (forced vital capacity). "The FEV1/FVC ratio is the FEV1 expressed as a percentage of the FVC (or VC if that is greater), i.e. the proportion of the vital capacity inhaled in the first second. It distinguishes between reduced FEV1 due to restricted lung volume and that due to obstruction." Although at times controversial, "… obstruction is defined as an FEV1/FVC ratio of <70%." [5] With her FEV1 at 60% of predicted, answer D is the correct answer. A methacholine challenge and a DLCO test are not part of routine spirometric pulmonary function tests. A methacholine challenge is done in asthmatics to measure airway hyper-reactivity.



Discussion of Question Two

The most probable diagnosis in our patient is Chronic Obstructive Lung Disease of the Emphysematous type. Answer C. Asthma is characterized by airway inflammation and reversibility of airway obstruction. This is often represented by episodic wheezing and improvement of pulmonary function tests with a bronchodilator. Chronic bronchitis is characterized by a chronic – persistent cough three months out of the year, for two consecutive years. Chronic bronchitis may (1) progress to chronic obstructive airway disease, (2) lead to cor pulmonale and heart failure, or (3) cause atypical metaplasia and dysplasia of the respiratory epithelium, providing a rich soil for cancerous transformation.[6]

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Discussion, continued

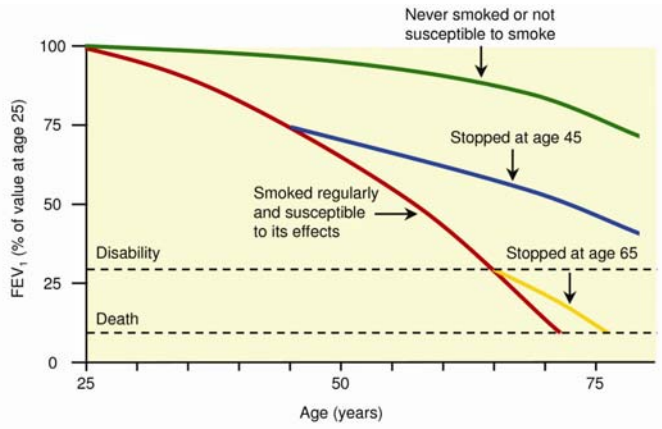
Bronchiectasis is characterized by permanent dilation of bronchi and bronchioles. It is frequently associated with chronic – suppurative infections and clinically is associated with large amounts of foul smelling sputum. Alpha 1 – Antitrypsin deficiency is a hereditary cause of emphysema, associated with patients who develop emphysema at a relatively young age (35 to 40 years of age) and have smoked perhaps five pack years.

Discussion of Question Three

Answer B is the correct answer. Answer A is characteristic of Asthma. Answer C is the definition of Chronic Bronchitis. Answer D is Bronchiectasis, associated with dilated bronhi and copious amounts of foul smelling sputum. Answer E is associated with Asthma. Our patient has emphysema, a disease that is characterized by permanent enlargement of airspaces distal to terminal bronchioles. This disorder has airflow limitation that is not fully reversible. The airflow limitation is usually progressive and is associated with an abnormal inflammatory response of the lung to noxious particles of gases. Worldwide, cigarette smoking is the most commonly encountered risk factor for COPD.[7]

Discussion of Question Four

The most important advice and therapy we can provide our patient at this time is to help her stop smoking, answer A. Eighty to ninety percent of COPD cases are caused by smoking.[8] A common misconception is that once lung damage has been done, smoking cessation isn't necessary anymore. **This is incorrect.** In fact, smoking cessation is the only treatment that has been shown to alter the course of COPD.[9] If we can help our patient stop smoking, we can reduce the severity of modify the course of her disease.



Adapted from Fletcher CM, Peto R (1977). The natural history of chronic airflow obstruction. BMJ, 1(6077): 1645–1648.

Discussion of Question Five

The facts in question five indicate a patient with COPD who has developed now developed an upper respiratory infection (URI). Patients with COPD who develop URI's must be treated early and correctly. Somewhere between 50% to 80% of exacerbations of COPD can be associated with recovery of relevant infections microorganisms.[10] For patients who were previously healthy and who have no risk for drug-resistant *S. pneumoniae*: A macrolide (azithromycin, clarithromycin, erythromycin, doxycycline) (strong recommendation; level 1 evidence) OR doxycycline (weak recommendation; level III evidence) is recommended.

For patients with risk factors for drug-resistant *S. pneumoniae*: A respiratory fluoroquinolone (moxifloxacin, gemifloxacin, or levofloxacin [750 mg]) (strong recommendation; level I evidence) OR a β-lactam (high-dose amoxicillin, amoxicillin-clavulanate, ceftriaxone, cefpodoxime, cefuroxime 500 mg bid) plus a macrolide (strong recommendation; level I evidence) is recommended.

In regions with a high rate of infection (>25%) with high-level (MIC ≥16 µg/mL) macrolide-resistant *S. pneumoniae*, consider use of the following agents: A respiratory fluoroquinolone (moxifloxacin, gemifloxacin, or levofloxacin [750 mg]) (strong recommendation; level 1 evidence) OR a β-lactam (high-dose amoxicillin, amoxicillin-clavulanate, ceftriaxone, cefpodoxime, cefuroxime 500 mg bid) plus a macrolide (strong recommendation; level I evidence).[11] Our patient falls into the category of a previously healthy patient with COPD, and no history of drug resistance. This a macrolide antibiotic answer D, is the correct answer.

Summary

We have presented a case of emphysematous chronic obstructive lung disease. The etiology is associated with her past history of heavy tobacco use. We have discussed the importance of screening pulmonary function tests and the aggressive treatment of upper respiratory infections, should they occur. The correct use of bronchodilator therapy and supplemental oxygen are, of course, important in these patients.

Maximal efforts must be entertained to help our patient's stop smoking. Patients must receive pneumonia vaccine and yearly flu shots to attenuate their risk for exacerbation of COPD. Clinicians must partner with their patients to treat COPD and stop the progression of these respiratory disorders.

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