Challenging Cases in Pulmonary (and Critical Care)

Richard M. Schwartzstein, MD

Associate Chief
Division of Pulmonary and Critical Care Medicine
Beth Israel Deaconess Medical Center

Ellen and Melvin Gordon Professor of Medicine
Harvard Medical School

Boston, MA

Education is at the heart of patient care.
Case 1

A 21 year old college student comes to see you about a positive PPD. One of her roommates was diagnosed with M. Tuberculosis eight weeks ago. A third roommate had a negative PPD with a positive control. She wants to know what the positive skin test means and what she needs to do about it.
Case 1 - continued

The patient feels completely well. Her physical exam is normal. The CXR is normal.
You tell the patient that:

1. She was exposed to TB and needs to be treated prophylactically with INH.
2. She was infected with TB and needs to be treated with INH to cure the infection.
3. She was exposed to TB and does not need to be treated.
4. She was infected with TB and needs to be treated with three drugs.
Case 2

A 20 year old college student presents 6 hours after ingesting an unknown quantity of “extra-strength Tylenol” tablets. She is complaining of mild nausea.

On exam she is somnolent but can be aroused. Vital signs are notable for: BP=110/70, HR=110, RR=14. The abdomen is soft and without guarding or tenderness.
Case 2 - Continued

• There is a concern that she may have also taken valium prescribed for a friend. The patient is not being very cooperative re: answering questions. She just broke up with her boyfriend and keeps muttering that she “wants to die.”

• Electrolytes and LFT’s are normal
Your approach at this time should be:
1. Send toxic screen and await acetaminophen level before proceeding further
2. Lavage stomach with Ewald tube
3. Administer Ipecac
4. Administer activated charcoal
5. Administer N-acetylcysteine
Case 3

A 40 year old “weekend warrior” injures his knee playing basketball with his son. He collided with his son driving to the basket and hit the ground hard. He has right-sided chest wall tenderness and a swollen left knee that hurts when he walks on it.
Case 3 - Continued

- He is brought to the emergency department of his local hospital where a CXR is taken and shows bilateral hilar adenopathy. A CT scan of the chest and abdomen reveals no other abnormalities.

- On physical exam, there are no enlarged peripheral nodes. Blood chemistries, LFT’s and CBC are all within the normal range.

- Until today’s game, the patient states he was in “perfect health.”
You should advise:
1. Observation with repeat CXR in three months
2. Bronchoscopy
3. Mediastinoscopy
4. PPD
A 28 year old man comes to the emergency department with a complaint of 1 week of shortness of breath and mild pleuritic chest pain. He has a history of asthma, but denies chest tightness. He figured he had pulled a muscle.

On exam, there are diminished breath sounds on the right, but no wheezes. CXR shows a large right pneumothorax. O2 sat is 97% without supplemental oxygen.

A chest tube is inserted to re-expand the lung.
Case 4 - Continued

Thirty minutes after the lung is re-expanded, the patient develops acute dyspnea; O2 sat is 85%. On physical exam, there are diminished breath sounds on the right, although better than before the chest tube was inserted. CXR shows the right lung is re-expanded but has a diffuse alveolar opacity. The hematocrit is 39. There is no blood coming from the chest tube, and no apparent air leak.
At this point, you should:

1. Intubate the patient and start mechanical ventilation
2. Get the pulmonologist to do a bronchoscopy to assess for pulmonary hemorrhage
3. Give supplemental oxygen and observe the patient
4. Check cardiac enzymes and administer a diuretic to the patient
Case 5

A 62 year old man with COPD presents to the emergency department with increasing shortness of breath for two days. During this time he had increased cough, wheezing, and sputum production.

On physical examination, he is using accessory muscles of ventilation and his RR=32. There are diffuse wheezes and rhonchi. ABG on room air: PO2=45, PCO2=55, pH=7.34.
Case 5 - Continued

As you discussing nebulizer treatments with the respiratory therapist, the nurse comes up to you and says she would like to put start the patient on supplemental oxygen by mask.

The respiratory therapist looks horrified.
At this point you should:
1. Administer supplemental oxygen along with bronchodilators
2. Avoid oxygen because the patient is relying upon “hypoxic drive” to breathe
3. Immediately intubate the patient and begin mechanical ventilation
4. Prescribe Ativan for the respiratory therapist
Case 6

A 30 year old woman presents with the acute onset of shortness of breath four hours ago. She has mild chest discomfort on deep breathing. She smokes cigarettes, has a history of asthma (usually associated with exposure to allergens), and broke her ankle six weeks ago.

On exam, she is anxious and in mild respiratory distress. RR=26, temp.=100.5° Chest reveals scattered wheezes. The pulse oximeter shows a saturation of 94%.
Case 6 - Continued

- ABG on room air: PO2=70, PCO2=28, pH=7.49.
- The CXR is clear, although the lungs appear hyperinflated.
- A V/Q scan was performed because patient has allergy to radiographic contrast, and it demonstrates multiple subsegmental perfusion defects on the right and is read as “low probability.”
With the results of the V/Q scan in hand, you should:

1. Initiate beta agonists and steroids
2. Obtain lower extremity ultrasound
3. Pre-treat her with steroids and proceed with a contrast-CT scan
4. Begin anti-coagulation
Case 7

A 62 year old man is being treated with Prednisone and Cytoxan for idiopathic pulmonary fibrosis. He has shown improvement in his CXR, oxygenation, and pulmonary function over the course of three months.

Six weeks ago you began to taper his steroids from 40 mg qd to 20 mg qod.
Case 7 - Continued

In the past week he has begun to complain of a non-productive cough and increased dyspnea. He denies fever and chest pain. On exam, he appears to be in mild respiratory distress. Temp 99, BP 140/90, HR 100, RR 22. Chest auscultation is notable for bibasilar rales, which he has had on prior visits.
Case 7 - Continued

Oxygen saturation is 85% on room air (down from 92%) and a CXR shows diffuse interstitial markings, which are increased compared to 6 weeks ago.
At this point, you should do which of the following:
1. Begin on broad spectrum antibiotics
2. Perform a bronchoscopy
3. Perform a thoracoscopic biopsy
4. Increase the dose of steroids.
Case 8

A 35 year old man presents with dyspnea on exertion. He has been in good health with no chronic medical problems. He is active and jogs 3-4 times a week for 30 minutes at a time. Over the past several months, he has noted increased shortness of breath on his runs and occasionally when carrying packages up stairs.
Case 8 - Continued

On physical exam, the patient is thin and well appearing. His vital signs are normal. The oral exam is notable for a few white patches on the buccal mucosa. There are a few enlarged, non-tender posterior cervical and axillary lymph nodes. The chest is clear with good air movement bilaterally. Cardiac exam reveals a pronounced $P_2$. There is no peripheral edema.
Case 8 - Continued

An echocardiogram is performed and shows a normal aortic and mitral valve and left ventricular function. There is moderate tricuspid regurgitation with an estimated pulmonary artery systolic pressure of 60 mm Hg. The right ventricle is mildly dilated.
The patient’s pulmonary hypertension is most likely due to

1. Elevated pressures in the left heart
2. Hypoxemia
3. An acute blood clot in the lungs
4. Changes in the structure of the pulmonary arterioles
Case 9

You are providing care for a patient with pneumonia, cirrhosis and ascites. In the first 24 hours of the hospitalization, the patient required 6L of crystalloid to sustain an adequate BP. In the past day, urine output has declined and the creatinine is rising.
Case 9 - Continued

Administration of a 500 cc bolus of normal saline does not increase urine output.

On physical exam, BP=100/60, HR 90. The abdomen has become increasingly firm, but is non-tender. There is 2+ pitting edema of the legs.

The INR is 2.5 and the albumin is 1.8.
At this point, you should:

1. Administer a diuretic
2. Administer albumin
3. Perform a paracentesis
4. Transfuse fresh frozen plasma (FFP)
Case 10

A patient with bronchiectasis, worsening lung function and chest radiograph, increased cough, and weight loss comes to you for evaluation.

On physical exam, the patient is thin but appears comfortable. BP and HR are normal; respiratory rate is 20. Chest auscultation reveals bilateral rhonchii.
Case 10 - continued

He undergoes sputum induction. The sputum culture grows Mycobacterium avium complex (MAC) on three occasions.

He tells you he had a negative PPD 10 years ago.
At this point you should:
1. Place a PPD
2. Assume the organism is a “colonizer” and ignore the findings
3. Perform a bronchoscopy
4. Begin therapy for MAC
5. Place the patient in isolation pending determination of sensitivity of the organism to various anti-tuberculosis drugs.
A 69 year old man with COPD and chronic hypercapnia (baseline PCO2=55 mm Hg) has been intubated and ventilated for 10 days because of hypercapnic respiratory failure in the setting of acute bacterial pneumonia. He has been treated with antibiotics and bronchodilators. You are now assessing him for possible removal from the ventilator and subsequent extubation.
He is placed on pressure support ventilation of 5 cm H2O with an FIO2 of 0.4 and observe him. The best predictor of his ability to be successfully extubated is:

1. PaO2 > 60 mm Hg
2. PaCO2 < 50 mm Hg
3. Tidal volume > 5 ml/kg
4. Resp frequency/tidal volume ratio < 100
5. Maximal inspiratory pressure > -25 mm Hg
Case 12

Yesterday, you admitted a 78 year old man with a RLL pneumonia. He lives in a nursing home and has been noted to aspirate periodically. Despite antibiotics, his oxygenation is worsening and you transfer him to the ICU for intubation and initiation of mechanical ventilation.
Case 12 - Continued

The CXR shows bilateral alveolar infiltrates and his PaO2 with a 100% non-rebreathing mask in place is only 50 mm Hg.

The patient is now intubated and the respiratory therapist suggests that you need to be careful about causing lung injury with the ventilator.
In considering the settings for the ventilator, you must be most aware of (i.e., concerned about):

1. Overdistention of alveoli (volume trauma)
2. High peak airway pressures (barotrauma)
3. Rapid respiratory frequencies
4. High carbon dioxide levels
5. PEEP (positive end-expiratory pressure) above 5 cm H2O
Case 13

A 37 year old man is admitted to the ICU from the ED with presumed septic shock. Blood cultures are positive for strep pneumonia. He is warm with good capillary refill in the extremities, but the blood pressure has dropped to 70 mm Hg systolic and urine output is < 20 cc/hr.

CVP=7 cm H2O. He received one liter of fluid in the ED and is presently receiving high dose norepinephrine.
You should advise:
1. Begin a phenylephrine (neosynephrine) infusion.
2. Begin a dopamine infusion.
4. Give more fluids.
Case 14

One of your patients is 56 years old and asks you about getting a CT scan to screen for lung cancer. He has smoked cigarettes 1 pack per day X 20 years.
You reply:
1. Yes, I will schedule it.
2. No, it has not been proven to save lives.
3. No, the extra radiation outweighs any benefit.
4. No, it is too expensive.
5. No, you haven’t smoked enough cigarettes to qualify.
6. Yes, I do anything my patients want (it takes too long to explain why they shouldn’t have the test).
Case 15

You are asked to do a medical consultation on a patient who underwent abdominal surgery 24 hours ago. The patient has a fever. He denies cough and shortness of breath. A CXR shows a small area of right lower lobe atelectasis. The urinalysis is negative.
You recommend:

1. The atelectasis is likely the cause of the fever. Begin incentive spirometry.
2. Send a urine culture.
3. Both #1 and #2
4. Continue to monitor for occult causes of fever.
Case 16

A 75 year old woman is admitted to you from the emergency department with hypotension. She has a fever to 103 degrees, BP was 80/40 mm Hg initially. The UA shows many WBCs and bacteria. Serum lactate level increased from one measurement to another on three occasions while she was in the ED. Blood pressure is now 100/60 with the patient receiving a dopamine infusion at 6 micrograms/kg/min.
Based on the rising serum lactate levels, you should:

1. Tell the family that her risk of dying is increased
2. Tell the family that she will need to be intubated
3. Tell the family that once a lactate level is elevated, further rise is not important
4. Ask the family if she has been taking illicit drugs
Question 17

You are called to see a 58 year old Portuguese speaking woman undergoing a liver biopsy (for possible liver abscess) in the interventional radiology department. She has suddenly developed acute shortness of breath and the O2 sat has dropped to 92% with high flow oxygen by mask; she denies chest pain. On exam, she appears very anxious with use of accessory muscles of breathing. She has wheezes on exam with good breath sounds bilaterally.
At this point, you should:

1. Intubate the patient
2. Give morphine and bronchodilators
3. Start antibiotics
4. Get a CT scan of the chest
Question 18

A 45 year old man is admitted to you with a diagnosis of possible sepsis. He has been healthy other than for a history of hypertension. He recently flew back from a business meeting in California, and has some head congestion. In the ED, BP was 85/60 which improved somewhat with 2L of fluid; BP now 95/70. CXR is clear. WBC is 6,000, Hct 35. BUN/Creat before fluid was 40/1.5.
The next best course of action is to:
1. Start vasopressors
2. Give more fluid
3. Place an nasogastric tube
4. Get a renal consult
5. Obtain a chest CT scan