Challenging Cases in Pulmonary Medicine

**Douglas M. Beach, MD, MPH**

Division of Pulmonary, Critical Care Medicine, and Sleep Medicine
Beth Israel Deaconess Medical Center
Instructor in Medicine
Harvard Medical School
Boston, MA

*Education is at the heart of patient care.*
Case 1

A 62 year old man with COPD presents to the emergency department with increasing shortness of breath for two days. During this time he has had increased cough, wheezing, and sputum production. On physical examination, he is using accessory muscles of ventilation and his RR=34. There are diffuse wheezes and poor air movement on exam. O2 sat is 84%. ABG on room air: PO2=45, PCO2=80, pH=7.15.
Case 1 cont.

As you are examining the patient he able to say a few words at a time, and says “can’t breathe too well Doc.”

What do you do next?
Case 1 cont

A. Administer supplemental oxygen along with bronchodilators and steroids

B. Immediately intubate the patient and begin mechanical ventilation

C. Avoid oxygen as patient is relying on hypoxic drive to breathe, but give bronchodilators and steroids.

D. Begin BiPAP with supplemental oxygen
Case 2

A 55 year old man with cirrhosis, sober for many years, and moderate emphysema, comes in for evaluation of hypoxemia and DOE. He has no history of encephalopathy or ascites, normal INR, and otherwise his liver disease is well compensated.

He tells you that he feels well at rest but gets short of breath even walking to his mailbox. No cough or wheezing.
Case 2 cont.

- On exam he appears well. HR 84, BP 120/60, RR 18, O2 sat 88% at rest. Breath sounds slightly diminished throughout, no wheezes or crackles.
- On walking down the hall he desaturates to 76% on RA. A repeat walk with 4L O2 by NC and he desaturates to 83%.
- Lying down, his sat improves to 90%, back to 87% with standing.
- An echocardiogram with bubble study shows appearance of bubbles in the LA. The cardiologist is on the fence about whether they are ‘early” or “late” bubbles.
Case 2 cont.

• At this point you should:
  A. Provide supplemental oxygen and tell him he will not be a candidate for liver transplant
  B. Send him to cardiology for consideration for repair of an atrial defect
  C. Refer him for liver transplant evaluation
  D. Treat him for a COPD exacerbation
A 75 year old woman with h/o mild HTN presents with chronic productive cough for the past 5 years that has not responded to empiric inhalers, GERD treatment or fluticasone nasal spray. She also reports mild chronic DOE. Her BMI is 21, unchanged.

The cough is “irritating” but does not interfere with her daily life.

CT is notable for bronchiectasis, and spirometry shows mild obstruction. Induced sputa x 3 reveal mycobacterium avium in 2/3 samples.
Case 3 cont

- A next best step is to:
  A. Place a PPD
  B. Begin therapy for MAI
  C. Perform a bronchoscopy
  D. Start bronchodilators and an airway clearance regimen and monitor symptoms and spirometry over time
Case 4

A 26 year old woman with a history of asthma, currently 31 weeks pregnant, presents with severe cough and intermittent wheezing. She had significant asthma in childhood. Her asthma is now usually well controlled, but for the last several weeks she has had recurrent severe coughing. She reports severe acid reflux as well. However, although heartburn improved with initiation of treatment, her cough did not. She has received prednisone bursts on 2 occasions (second course currently), and is on ICS/LABA twice daily.
Case 4 cont.

She says prednisone led to rapid resolution of her cough the first time, but not as helpful this time (currently on day 3).

She tells you this is “ruining my life.” Reports cough-induced incontinence. Can not sleep as cough worsens whenever she lies down. No fevers, no significant SOB except when coughing. Pregnancy has otherwise been unremarkable. Her asthma worsened slightly with her prior pregnancy, but nothing like this.
Case 4 cont.

- Exam notable for well appearing young woman.
- HR 70 BP 114/62 O2 sat 100% RA, T 98
- Frequent coughing during visit. Lung exam is clear.
Case 4 cont.

At this point you would:

A. Give her a nebulizer treatment and advise her to complete the course of prednisone
B. Treat with antibiotics for suspected bacterial bronchitis
C. Obtain a CXR
D. Increase GERD treatment and consider GI referral
Case 5

A 69 year old man with a h/o rheumatoid arthritis present with worsening DOE and cough over the past 2-3 months. He is very active at baseline, an avid hiker and skier, but now gets SOB with 2 flights of stairs. He was on methotrexate previously for RA, but was taken off this 8 months ago. He was re-started on TNF alpha monoclonal antibody inhibitor (adalimumab) 2 months ago for increased joint pain in wrists.

CXR done to evaluate his SOB showed increased interstitial markings, and he was referred to pulmonary.
Case 5 cont.

He is a never-smoker. Works as a university professor. Exam: well-appearing, HR 66, BP 122/70, O2 sat 97% on RA at rest. With 3 flights of stairs HR increases to 130 and O2 sat 90%

Lungs: bilateral crackles lower half of lung fields
Case 5 cont.

The next best step is to:

A. Obtain a lung biopsy
B. Stop TNF-alpha inhibitor (adalimumab)
C. Begin prednisone
D. Both B and C
Case 6

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 thinks he may have pulled a muscle.

On exam, there are diminished breath sounds on the right, but no wheezes. CXR shows a large right pneumothorax.

A chest tube is inserted to re-expand the lung.
Case 6 cont

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.
Case 6 cont.

At this point, you should:

A. Intubate the patient and start mechanical ventilation

B. Get the thoracic surgeon back to do a bronchoscopy to assess for pulmonary hemorrhage

C. Give supplemental oxygen and observe the patient

D. Administer a diuretic to the patient
Case 7

A 65 year old man with COPD comes in for a consultation due to increased frequency of COPD exacerbations requiring prednisone.

6 exacerbations in past 2 years, 3 requiring hospitalization. He uses $O_2$ at all times. Chronically poor appetite with BMI of 19.

Started on chronic prednisone 5mg daily 6 months ago, with one exacerbation since then.
Case 7 cont.

Spirometry:

<table>
<thead>
<tr>
<th>Spirometry</th>
<th>Pre Observed</th>
<th>Pre % Predicted</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC (L)</td>
<td>2.91</td>
<td>64</td>
<td>4.55</td>
</tr>
<tr>
<td>FEV1 (L)</td>
<td>0.62</td>
<td>18</td>
<td>3.40</td>
</tr>
<tr>
<td>FEV1/FVC (%)</td>
<td>21</td>
<td>18</td>
<td>3.40</td>
</tr>
<tr>
<td>FEFmax (L/sec)</td>
<td>1.41</td>
<td>29</td>
<td>7.5</td>
</tr>
<tr>
<td>TET</td>
<td>14.16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FEV1 (+), EOT(-), TET(+)
Case 7 cont.

• Medications include:
  – Tiotropium 1 cap IH daily
  – Budesonide/formoterol 160/4.5 2 puffs IH twice daily
  – Albuterol neb or MDI PRN
  – Prednisone 5mg daily

• Says “Doc, I have osteoporosis. Is there anything I can do to get off prednisone?”
Case 7 cont.

You would suggest:

A. Starting Roflumilast 500mg po daily

B. Starting Azithromycin 250mg po daily

C. Increasing the dose of prednisone to 10mg as 5mg is not effectively preventing exacerbations

D. Starting Fluticasone 110mcg IH 2 puffs twice daily
Case 8

A 62 year old woman with remote h/o breast cancer and current stable CLL presents with worsening dyspnea over the past year. She spends winters in Florida and first noticed this while there when she was had noted increased SOB and was eventually hospitalized for SOB/hypoxemia and suspected pneumonia. She was treated with antibiotics and prednisone for suspected COPD exacerbation. A CT was done and she was told to follow up with pulmonary.
Case 8 cont.

She denies cough or fevers. Currently feels well walking on a flat surface, but has trouble keeping up with friends on hills or stairs.

Prior smoker, quit many years ago. Retired from an office job. No travel except to Florida. Hobbies include helping her daughter with an in-home baking business. She also belongs to a “Swedish weaving” group in Florida and spends significant time on this hobby.
Case 8 cont.

• Exam: well appearing woman, HR 76, BP 132/80, O2 sat 95% on RA, down to 85% on RA with a walk up and down a long hallway.
• Lungs: Few crackles at bases bilaterally, no wheezes
• No clubbing or cyanosis
• PFT’s: mild restriction and moderate decrease in DLCO
Case 8 cont.

Although initially stable, over the next winter her symptoms worsen again, with increased DOE. On return visit her spirometry shows stable mild restriction, but DLCO has declined somewhat. CT chest shows worsening of previously seen ground glass and fibrotic change.

A lung biopsy is consistent with hypersensitivity pneumonitis.
Case 8 cont.

Next you should:

A. Start prednisone
B. Refer her for lung transplant evaluation
C. Tell her to stop helping with the baking business
D. Tell her to stop the Swedish weaving
Case 9

A 62 year old man is being treated with Prednisone and mycophenolate mofetil for non-specific interstitial pneumonia (NSIP). 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.
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 9 - 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.
Case 9 - continued

At this point, you should do which of the following:

A. Begin on broad spectrum antibiotics
B. Perform a bronchoscopy
C. Perform a thoracoscopic biopsy
D. Increase the dose of steroids.
Case 10

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 10 - 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 P₂. There is no peripheral edema.
Case 10 - 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 50 mm Hg. The right ventricle is mildly dilated.
Case 10

Evaluation of this patient should include all of the following except:

A. Blood tests for ANA, ESR, complement
B. HIV test
C. CT angiogram
D. Bronchoscopy
E. Pulmonary function tests with exercise oximetry
Case 11

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, 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 11 - 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 demonstrates multiple matched subsegmental perfusion defects on the right and is read as “low probability.”
Case 11

With the results of the V/Q scan in hand, you should:

A. Begin thrombolytic therapy
B. Obtain a CT angiogram
C. Initiate beta agonists and steroids
D. Obtain an echocardiogram
Case 12

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 12 - continued

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

A. She was exposed to TB and needs to be treated prophylactically with INH.

B. She was infected with TB and needs to be treated with INH to cure the infection.

C. She was exposed to TB and does not need to be treated.

D. She was infected with TB and needs to be treated with three drugs.
Thank you!

- Special thanks to:
  - Richard Schwartzstein, MD
  - Kathryn Berg, MD