March 2012 Pulmonary Case of the Month: There’s Air in There

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History of Present Illness

A 40 year old male was seen with a one week history of dyspnea, dry cough, weakness and abdominal pain. He has a history of acute myelogenous leukemia (AML) diagnosed in December, 2010. He underwent consolidation chemotherapy but had a complication of acute lung injury following chemotherapy thought either to be due to infection or ara-C lung toxicity. Bronchoalveolar lavage was negative and video-assisted thoracotomy revealed only organizing pneumonia.

He underwent stem cell transplantation in May 2011 from a hepatitis C +, allogenic bone marrow transplant and received lamivudine post transplant because of the hepatitis C. Unfortunately, bone marrow biopsy in June 2011 revealed recurrent AML He received two cycles of decitabine.

He had further complications of severe graft versus host disease affecting his eyes, mouth and liver and severe, recurrent C. difficile sepsis. Present medications included: co-trimoxazole (Bactrim), lamivudine, acyclovir, posaconazole, tacrolimus, and prednisone.

Physical exam

Physical exam revealed a thin, moderately short of breath man but was otherwise unremarkable.

Radiology

His chest X-ray (Figure 1) and selected images from his CT scan (Figure 2) are shown below:
Figure 1. Chest x-ray.

Figure 2. Thoracic CT scan. Lung windows.
In addition to the confluent areas of airspace and ground glass opacities throughout both lungs what other finding is present?

1. Enlarged mediastinal lymph nodes  
2. Pneumothorax  
3. Atelectasis of the left lower lobe  
4. Pneumomediastinum  
5. Large RLL lung mass
Pneumomediastinum can present with chest pain, dyspnea, abdominal pain and/or dysphagia. Physical findings may include neck pain or swelling, dysphonia, torticollis, or fever.

Air can enter the mediastinum from either the outside (trauma, iatrogenic) or from the inside (lung, head and neck, abdomen, or rarely, gas producing organisms). Air enters the mediastinum from the lung when increased alveolar pressure and/or abnormal lung parenchyma causes alveolar over distention and rupture. Air dissects through the interstitium to the lung roots and enters the mediastinum. Some clinical causes of pneumomediastinum are in table 1.

### Table 1. Cause of pneumomediastinum.

<table>
<thead>
<tr>
<th>Increased alveolar pressure</th>
<th>Abnormal parenchyma</th>
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<tbody>
<tr>
<td>- Vent assistance (PEEP)</td>
<td>- Infection</td>
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<tr>
<td>- Airway obstruction</td>
<td>- Sarcoid</td>
</tr>
<tr>
<td>(asthma)</td>
<td>- Emphysema</td>
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<tr>
<td>- Vomiting</td>
<td>- ARDS</td>
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<td>- Coughing</td>
<td>- Mets to the lung</td>
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<td>- Straining</td>
<td>- Needle bx</td>
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<tr>
<td>- Heimlich manuver</td>
<td>- Atelectasis</td>
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<td>- Blunt chest trauma</td>
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Infection was considered possible in the context of the present patient. Which of the following infections would be most likely to cause pneumomediastinum in the situation of a bone marrow transplant?

1. Aspergillus
2. Pertusis
3. Mycoplasma
4. PCP
5. Nocardia
Correct!
1. Aspergillus

Bronchoalveolar lavage was performed in a search for an infectious cause of the pneumomediastinum. This was negative for all infections and cytology revealed acute inflammation. The patient continued to decline and had video-assisted thoracotomy (VATS) performed (Figure 3).

Figure 3. Results from VATS lung biopsy demonstrating nonspecific acute and chronic inflammation but no organisms. Special stains were also negative for infection.

In this case which of the following is most likely the cause of the pneumomediastinum?
1. Aspergillus
2. Nocardiosis
3. Graft versus host disease
4. Recurrent leukemia
5. Lung cancer from immunosuppression
Correct!

3. Graft versus host disease

Vogel et al. (1) reported 6 cases of thoracic air leak syndrome (pneumomediastinum, pneumothorax or interstitial emphysema) after stem cell transplant. All had had histologically proven bronchiolitis obliterans (BO) or bronchiolitis obliterans organizing pneumonia (BOOP). Active invasive pulmonary aspergillosis was also identified in 4 of the 6. Others have made similar observations that the incidence of thoracic air leak syndrome is relatively uncommon at <3% of stem cell transplants but nearly all with thoracic air leak syndrome had BO or BOOP (2-4).

References