

February 2017 Pulmonary Case of the Month

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History of Present Illness

A 45-year-old man presented with weight loss, copious amounts of light green sputum, low grade fever and chest discomfort on the right. He had moved to Arizona 8 months ago. Two months later he developed hemoptysis and had increased cough with copious phlegm. He denied any fever, chills, malaise or fatigue.

Past Medical History, Social History and Family History

He has a history of tuberculosis in 2010 treated with 4 drug therapy for a year. The tuberculosis was not drug resistant. He had been treated with a 6-month course of voriconazole about 2 years ago.

Physical Examination

He was afebrile and his vital signs were unremarkable. He had decreased breath sounds in his right lower chest.

Laboratory

His CBC, electrolytes and urinalysis were unremarkable.

Chest Radiography

His admission chest x-ray is shown in Figure 1.



Figure 1. Admission PA of chest.

In regards to the chest x-ray which of the following are **true**?

1. There are cavities in the right lung
2. There is a large right pleural effusion
3. There is volume loss in the right lung
4. 1 and 3
5. All of the above

Correct!
4. 1 and 3

There is volume loss as indicated by the tracheal and mediastinal shift to the right. There appear to be cavities with the consolidation. Although there could be a small pleural effusion, a large effusion would cause volume expansion and not volume loss. Furthermore, there is no meniscus sign as seen in a pleural effusion. The silhouetting of the right diaphragm is probably mostly due to consolidation.

Which of the following should be **done at this time?**

1. Serum β -D-glucan assay
2. Sputum culture for fungi
3. Sputum culture for tuberculosis
4. 1 and 3
5. All of the above

Correct!
5. All of the above

The causes for hemoptysis after treatment for tuberculosis include recurrent tuberculosis, bronchiectasis with superimposed infection, and lung cancer (1).

The serum β -D-glucan assay was elevated consistent with a fungal infection. He had sputum smears and cultures for tuberculosis, bacteria and fungi. The sputum smear was positive for 45° branching hyphae and the sputum culture grew *Aspergillus fumigatus*.

Further records were obtained about his prior care. A sputum culture had previously shown *Aspergillus spp.* which was the reason for his 6-month course of voriconazole. The hemoptysis was massive at that time consisting of several hundred mls. in less than 1 hour.

He was again placed on voriconazole and his hemoptysis initially improved. Unfortunately, his hemoptysis recurred after several days consisting of about 2 Tbsps. of clotted blood.

Which of the following are **indicated at this time?**

1. Bronchoscopy
2. Consideration for bronchial artery embolization
3. Consideration for lobectomy or pneumonectomy
4. Thoracic CT scan
5. All of the above

Correct!
5. All of the above

His recurrent hemoptysis is not an uncommon problem with cavitary lung disease with superimposed *Aspergillus spp.* infection. Thoracic CT scan confirmed the presence of cavitary lung disease and bronchiectasis in the right and right middle lobes with a question of an intracavitary fungus ball (Figure 2).

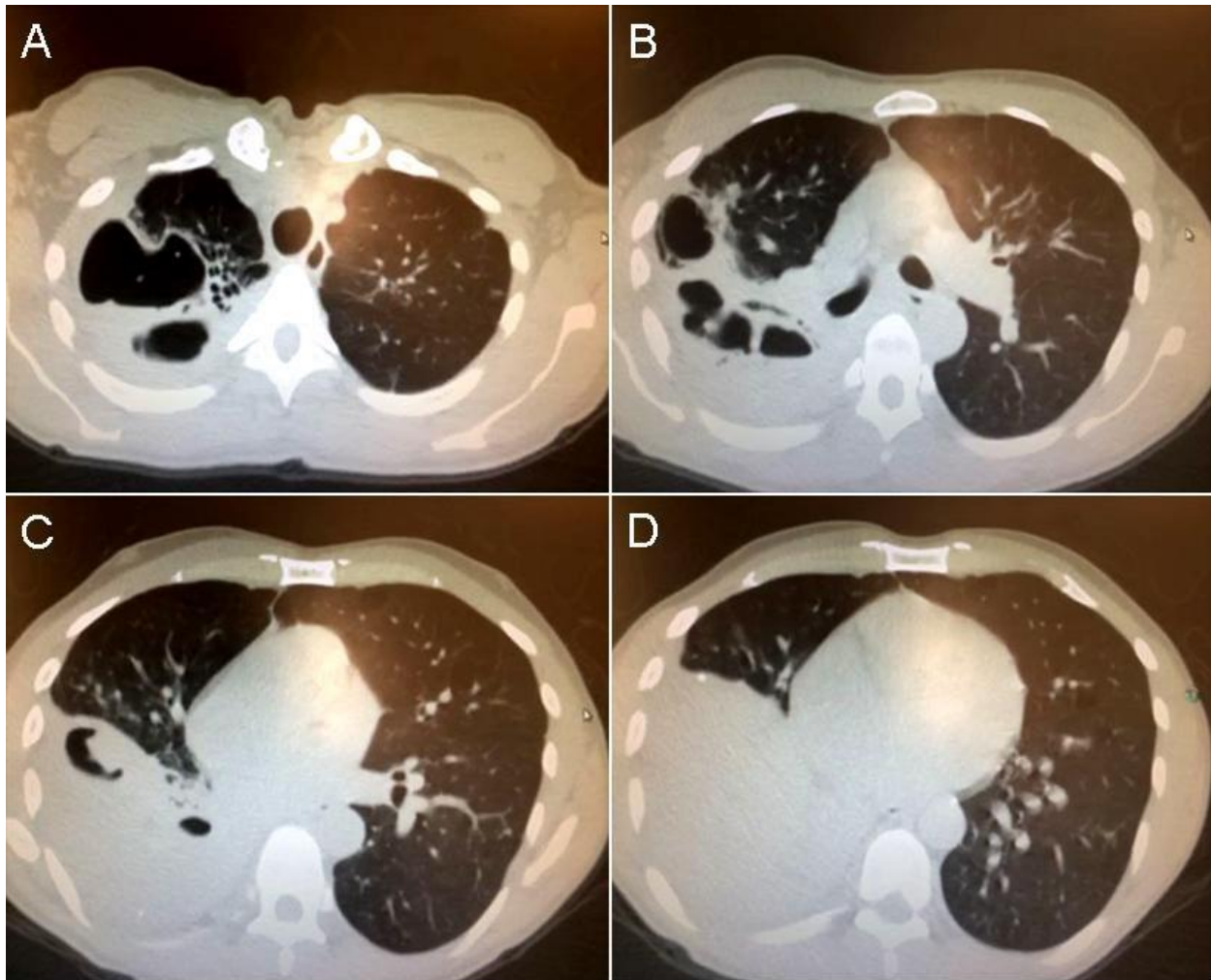


Figure 2. Thoracic CT scan in lung windows showing cavitary lung disease, bronchiectasis and possibly an intracavitary fungus ball (Panel C).

His 6 months of voriconazole apparently failed to clear the *Aspergillus spp.* probably due to poor penetration into the cavities or bronchi. Therefore, consideration of other therapies should be considered (1). Bronchial artery embolization can be used to control hemoptysis. Consideration should be given to removing lung causing the hemoptysis. Bronchoscopy should be performed to confirm that he does not have a lung cancer.

Bronchoscopy was performed and no endobronchial lesions or bleeding source was identified. Bronchoscopic culture showed *Aspergillus fumigatus*. Radiology consultation was obtained to consider bronchial artery embolization, but was felt not to be indicated in the absence of massive hemoptysis. Thoracic surgery consultation recommended RML and RLL lobectomy.

A decision is made to proceed with the RML and RLL lobectomy.

Which of the following **should be performed prior to lobectomy?**

1. Diffusing capacity
2. Exercise pulmonary function testing
3. Spirometry
4. 1 and 3
5. Any of the above

Correct!
5. Any of the above

The patient has known lung disease and something should be done to ensure that he has adequate pulmonary function after lung removal. Although this is a clinical decision, there are several algorithms which are recognized to assist with this decision (3). One of the simplest is to have the patient walk 2-3 flights of stairs. If the patient is able to do this without stopping, he or she probably has adequate lung function to tolerate a pneumonectomy. Another simple test is to perform spirometry. Those patients with an FEV1 > 2L are suitable for pneumonectomy or an FEV1 > 1.5 L are suitable for lobectomy. Another algorithm uses a radionuclide perfusion lung scan where the FEV1 is multiplied by the percent perfusion of the lobes that will not be removed. If the predicted post-operative FEV1 is over 1 L, this is generally thought to be adequate. Still others use the diffusing capacity where a post-operative predicted DLCO of >60% is considered acceptable. Lastly, some use exercise pulmonary function testing where a VO2 max of > 20 ml/kg/min is considered adequate.

Our patient had an FEV1 of 2.2 L. Although a right lower lobe and right middle lobe lobectomies were planned, he underwent pneumonectomy secondary to technical surgical reasons that made a pneumonectomy preferable. His post-operative chest x-ray is shown in Figure 3.



Figure 3. Post-operative AP of chest.

Which of the following are **true** regarding post-operative pneumonectomy chest x-rays?

1. Fluid accumulates at a rate of one to two intercostal spaces per day
2. Immediately after pneumonectomy the post-pneumonectomy space fills with blood
3. The ipsilateral hemidiaphragm becomes slightly elevated
4. 1 and 3
5. All of the above

Correct!
4. 1 and 3

The post-pneumonectomy space fills with air, fluid and blood at a rate of about 1-2 intercostal spaces per day. More rapid accumulation of fluid may indicate hemorrhage, chylothorax from injury to the thoracic duct or infection. In contrast, a decrease in the air/fluid level by 2 cm. or more might indicate the presence of a post-operative bronchopleural fistula. It takes an average of about 4 months for complete opacification of the hemithorax.

Our patient made an uneventful surgical recovery. He was extubated and discharged home without further hemoptysis.

References

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