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January 2024 Critical Care Case of the Month: I See Tacoma

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History of Present Illness

An 80-year-old man was admitted to the hospital for exacerbation of COPD. He has a history of emphysema and has been on Breo Ellipta and Spiriva Respimat. He became increasingly short of breath although he had no productive cough.

Past Medical History, Social History and Family History

He has a past medical history of right upper lobe resection for an adenocarcinoma of the lung and a history of coronary artery bypass grafting and aortic valve replacement done about 5 years ago.

He smoked ½ pack/day of cigarettes but quit 5 years ago.

Medications

He takes Warfarin for a history of atrial fibrillation and prosthetic aortic valve replacement.

Physical Examination

Other than dyspnea with tachypnea and decreased air movement on auscultation, as well as the expected right thoracic scar, his physical examination is unremarkable.

Laboratory

His arterial blood gases showed a PaO₂ of 58, a PaCO₂ of 32, and a pH of 7.50 on 2L/min by nasal cannula. Complete blood count, electrolytes were normal. Prothrombin time was therapeutic.

Radiography

Chest x-ray taken in the emergency department is shown in Figure 1.



Figure 1. Initial PA of chest. To view Figure 1 in a separate, enlarged window click [here](#).

What should be ***done at this time?***

1. Admit to the hospital.
2. Begin on a theophylline drip
3. Treat with inhaled bronchodilators, oral antibiotics and corticosteroids
4. 1 and 3
5. All of the above

Correct!

4. 1 and 3

The chest x-ray suggested an enlarging right apical bullae (Figure 2) which was confirmed on chest CT scan.

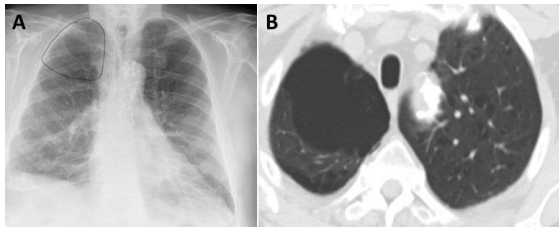


Figure 2. Panel A: Chest x-ray showing right lung bullae (circled). Panel B: Confirmation of enlarging bulla on CT scan. To view Figure 2 in a separate, enlarged window click [here](#).

It is very appropriate to admit an 80-year-old complaining of shortness of breath and hypoxic to the hospital often to the ICU. Theophylline is of dubious value in treating an exacerbation of COPD (1,2).

Bronchodilators, antibiotics and corticosteroids have been shown to be of value (2).

He was admitted to the ICU and improved. After a short course of antibiotics, his prednisone was tapered and he was treated with an inhaled beta agonist on an as needed basis.

He did well until about 15 months later. He was admitted to a hospital in Vancouver with a small amount of hemoptysis. A representative image from a thoracic CT scan is shown in Figure 3.

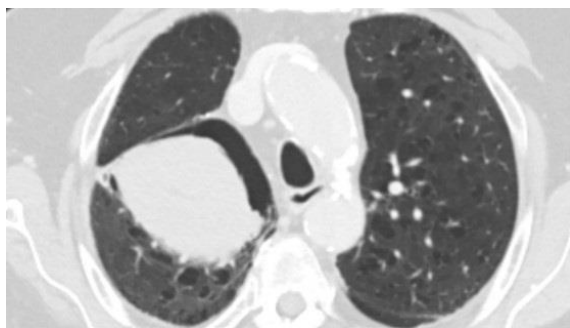


Figure 3. Representative image from thoracic CT in lung windows. To view Figure 3 in a separate, enlarged window click [here](#).

He did not recall the diagnosis although it sounded like “I see Tacoma”. He became concerned when his doctors discussed

another thoracic operation and he came back to Phoenix for a second opinion.

Which of the following is the ***most likely diagnosis?***

1. Bacterial infection of the cavitory legion
2. Coccidioidal pseudomycetoma
3. Granulomatosis with polyangiitis (Wegner’s granulomatosis)
4. Lung adenocarcinoma
5. Mycetoma

Correct!

5. Mycetoma

The CT scan shows a large mass-like opacity inside the previous identified bulla with a rim of air surrounding the mass, an air crescent sign. The most likely diagnosis from the CT findings was thought to be a mycetoma or Aspergillus fungus ball inside the bulla. The air crescent sign of a mycetoma, also referred to as the Monad sign, is seen in an immunocompetent host with preexisting cystic or cavitory lung disease, usually from tuberculosis or sarcoidosis (3). The fungal ball or mycetoma develops within a preexisting lung cavity and may exhibit gravity dependence. The mycetoma is composed of fungal hyphae, mucus, and cellular debris. Mycetomas can cause hemoptysis. The treatment options include surgical resection, bronchial artery embolization, and antifungal agents. The air crescent sign is not specific for Aspergillus infection and can be seen in other conditions, such as cavitating neoplasm, intracavitary clot, and Wegener’s granulomatous pneumonitis with angiitis (GPA) (3). Note that p-ANCA, c-ANCA and MPO and PR3 antibodies were negative. A bronchoscopy was performed (Figure 4).

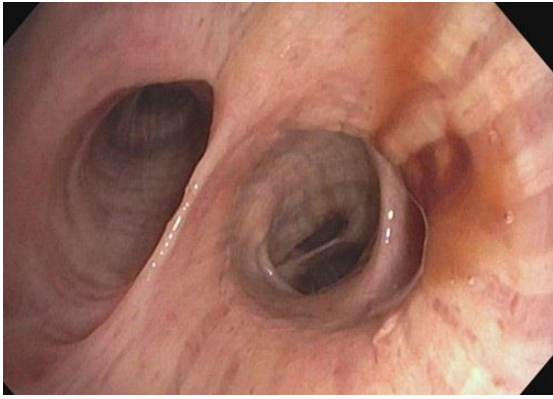


Figure 4. Bronchoscopy showing small amount of blood coming from the superior subsegment of the right lower lobe (RLL). To view Figure 4 in a separate, enlarged window click [here](#).

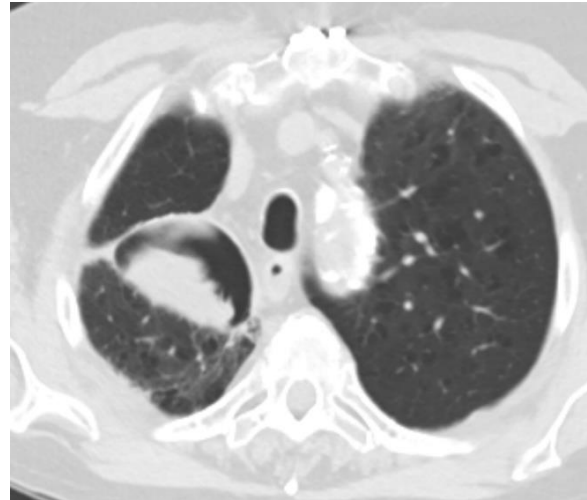


Figure 5. Thoracic CT scan 1 month later. To view Figure 5 in a separate, enlarged window click [here](#).

Washings from the RLL showed no growth and cytology was negative.

What should be done next?

1. Multiple sputum specimens for culture and cytology
2. Empiric treatment with voriconazole
3. Repeat bronchoscopy with transbronchial biopsy
4. Resection of the lesion
5. Any of the above

Correct!

2. Empiric treatment with voriconazole

The imaging was very suggestive of a mycetoma and the patient was thought to be at high risk for surgical resection and a bronchoscopic or CT-guided biopsy were considered high risk for pneumothorax, so the patient was treated empirically with voriconazole, although that was switched very shortly to itraconazole due to side effects.

The patient was followed closely with repeat CT imaging which showed a rapid resolution of both the intra-bulla mass and resolution of the bulla. Note that azole treatment was discontinued after 1 month due to rapid resolution of the opacity. The reasons for the resolution of the bulla are not certain, but blood can lead to a fibrotic response in the lungs which may have contributed to the resolution of the bulla.

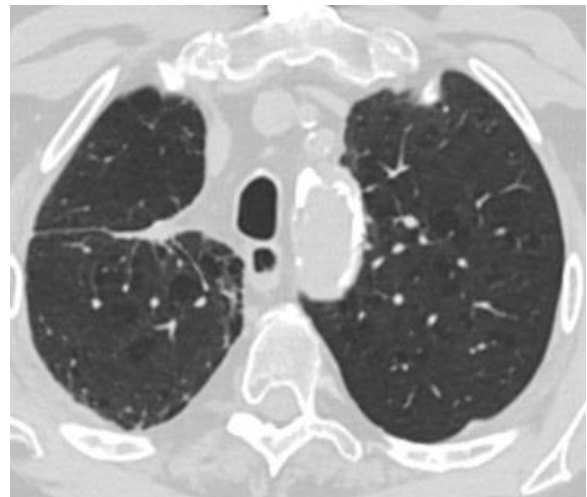


Figure 6. Resolution by 4 months. To view Figure 6 in a separate, enlarged window click [here](#).

The most likely explanation for the resolution of the intra-bulla opacity is:

1. The opacity was an intra-bulla hemorrhage related to treatment with warfarin
2. Rapid antimicrobial response of mycetoma to azole treatment
3. Foreign body blockage of the superior segment of RLL that resolved
4. This was due to aspiration into the bulla which cleared

5. Rapid antimicrobial response of Coccidioidal pseudomycetoma

Bronconeumol. 2023 Jun;59(6):394-395. English, Spanish. [\[CrossRef\]](#) [\[PubMed\]](#)

Correct!

1. The opacity was an intra-bulla hemorrhage related to treatment with warfarin.

Intra-bulla hemorrhage is a rare complication in bullous emphysema which usually occurs in patients on anticoagulant therapy (4). It may occur when a bulla enlarges leading to rupture of intrabulla vessels. The presence of a large blood clot in the bulla can have very similar radiologic features to a mycetoma (4-6). The resolution of the mass was thought to be too rapid and not consistent with a mycetoma. There was no evidence of foreign body or aspiration on bronchoscopy. The reasons for the resolution of the bulla are not certain, but blood can cause a fibrotic response in the lungs which may have contributed to the resolution of the bulla.

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