Radiographic QUIZ

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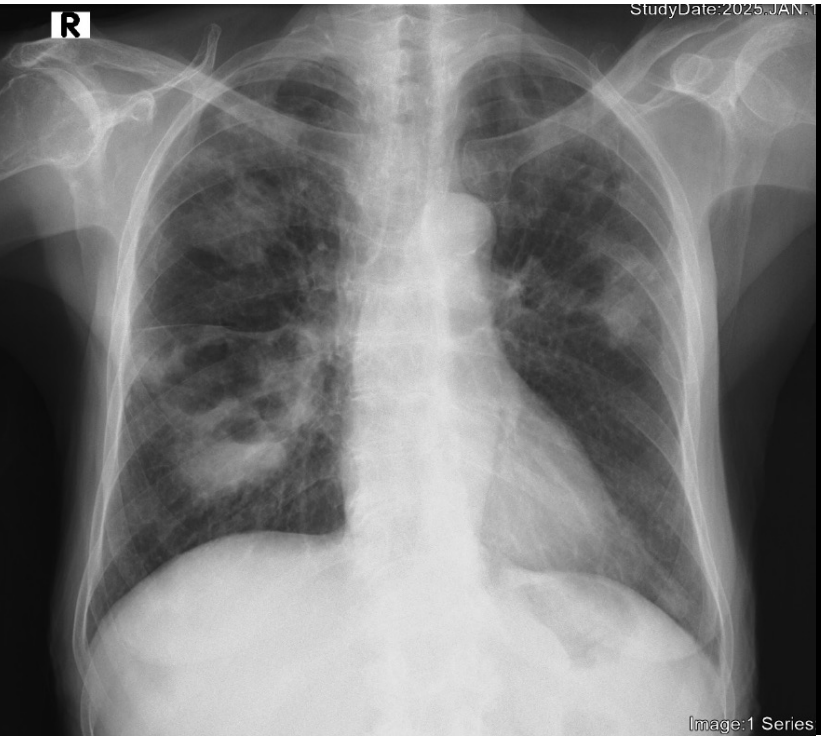
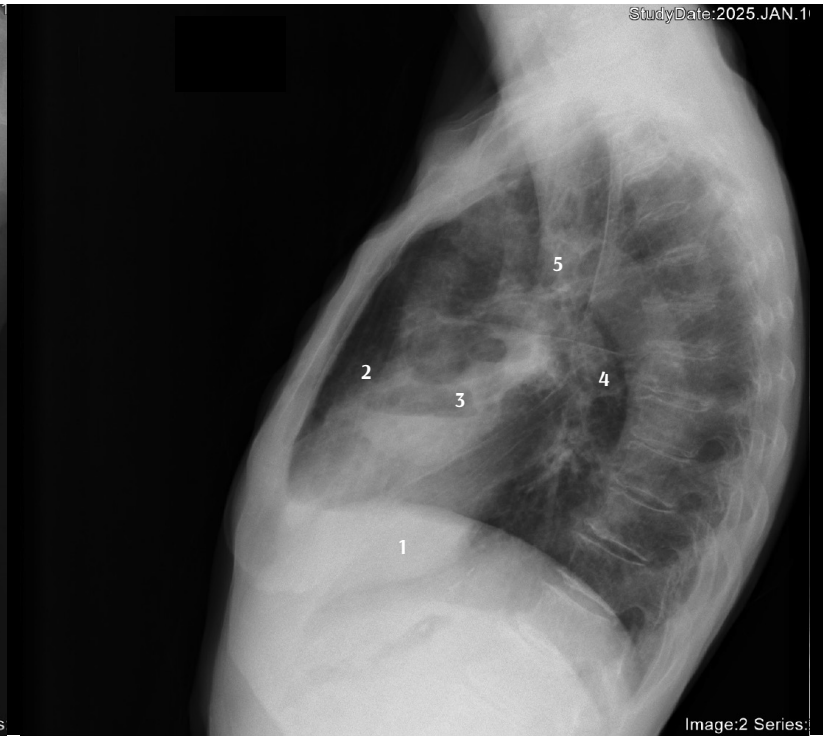
81-year-old Non-Insulin Dependent Diabetes Mellitus female patient CO extreme weakness for 1 week, associated to nausea. She also reported fever for the last 3 days. Chest X-ray studies were taken.





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From your interpretation of the radiographic images, mark with an X which you consider the most appropriate diagnosis(s):

___ Pleural effusion

___ Pulmonary fibrosis

___ Lung tumor

___ Atelectasis

___ Bronchopneumonia

___ Pneumothorax

___ Lung abscess

Indicate true or false as appropriate

___ Alveolar peribronchial infiltrate is observed in both lung fields.

___ The aortic arch is prominent with calcified atheromatous plaques.

___ Cardiomegaly is observed.

___ Reticulonodular infiltrates are observed in both lung fields compatible with chronic interstitial disease, pulmonary fibrosis.

___ A complex image with air-fluid level and irregular margins in the middle lobe of the right lung is present.

What is the left adnexal lesion?

___ Aortic arch

___ Air-fluid level

___ Retro-sternal space

___ Left ventricle

___ Left hilar region

From the following statements, mark which one you consider to be true (V) or false (F), as appropriate.

___ Abscesses may be secondary to respiratory infections.

___ The most common aerobic germs found in lung abscess are staphylococci and klebsiella.

___ Lung abscesses due to aspiration of infectious materials are much more frequent on the left side.

___ Occasionally, abscesses rupture into the pleural cavity resulting in pneumothorax or empyema.

___ Radiologically, the abscesses are visualized as an air-fluid level cavity.

RADIOGRAPHIC REPORT

There is a large cavity with air fluid level located in the middle pulmonary lobe compatible with a lung abscess.

There are multiple radiopacities like a patch in both upper pulmonary lobes, some of them with cavitation, probably related to septic emboli or focuses or pneumonia.

There are ring shadows, visible in the retrocardiac region in the lateral view compatible with bronchiectasis.

DISCUSSION

Lung abscesses are circumscribed collections of pus within the lungs. They are often complicated to manage and difficult to treat and, in some cases, a life-threatening condition.

As a result of the widespread availability of antibiotics, the incidence of lung abscesses has been dramatically reduced. Mortality has similarly been reduced. The elderly, immunocompromised, malnourished, debilitated, and, of course, those who do not have access to antibiotics are particularly susceptible and have the worst prognosis. The rate is on the rise, though, particularly due to an increased number of immunocompromised patients (secondary to HIV/AIDS and iatrogenic immunosuppression).

Lung abscesses are divided, according to their duration, into acute (<6 weeks) and chronic (>6 weeks). The presentation is usually non-specific and generally similar to a non-cavitating chest infection. Symptoms include fever, cough and shortness of breath. Peripheral abscesses may also cause pleuritic chest pain.

If chronic, symptoms are more indolent and include weight loss and constitutional symptoms. In some cases, erosion into a bronchial vessel may result in a sudden and potentially life-threatening massive hemoptysis.

Usually, occurs from liquefactive necrosis of tissue.

It is convenient to divide lung abscesses into primary and secondary as they differ not only in etiology but also in microbiology and prognosis.

A primary abscess is one that develops as a result of a primary infection of the lung. These most commonly arise from aspiration, necrotizing pneumonia or chronic pneumonia, e.g. in the setting of pulmonary tuberculosis or immunodeficiency.

In patients who develop abscesses as a result of aspiration, mixed infections are most common, including anaerobes.

Some organisms are particularly prone to causing significant necrotizing pneumonia resulting in cavitation and abscess formation. These include *Staphylococcus aureus*, *Klebsiella sp (Klebsiella pneumoniae)*, *Pseudomonas sp*, *Proteus sp.*

In immunocompromised patients, additional organisms may also be implicated, including, *Candida albicans*, *Legionella micdadei* and *Legionella pneumophila* and *Pneumocystis jirovecii.*

A secondary abscess is one that develops as a result of another condition. Examples include bronchial obstruction (lung cancer, inhaled foreign body), hematogenous spread (bacterial endocarditis, intravenous drug use), direct extension from adjacent infection (mediastinum, subphrenic, chest wall). The colonization of pre-existing cavities with organisms is also sometimes grouped with secondary abscesses.

Radiographic features

As aspiration is the most common cause of pulmonary abscesses, the superior segment of the right lower lobe is the most common site of infection.

Plain radiograph

The classical appearance of a pulmonary abscess is a cavity containing a gas-fluid level. In general, abscesses are round in shape and appear similar in both frontal and lateral projections. Additionally, all margins are equally well seen, although adjacent consolidation may make the assessment of this difficult. These features are helpful in distinguishing a pulmonary abscess from an empyema (see empyema vs pulmonary abscess).

CT

CT is the most sensitive and specific imaging modality to diagnose a lung abscess. Contrast should be administered, as this enables the identification of the abscess margins, which may otherwise blend with the surrounding consolidated lung.

Abscesses vary in size and are generally rounded in shape. They may contain only fluid or a gas-fluid level. Typically there is surrounding consolidation, although with treatment the cavity will persist longer than the consolidation.

The wall of the abscess is typically thick and the luminal

surface irregular.

Bronchial vessels and bronchi can be traced as far as the wall of the abscess, whereupon they are truncated.

Treatment and complications

Despite treatment, abscesses continue to have a high mortality rate (15-20%). This is particularly the case with nosocomial infections, which account for the majority of deaths, presumably due to the combined effect of pre-existing illness and the higher prevalence of virulent antibiotic-resistant strains, especially *P. aeruginosa* (mortality rate of 83%), *S. aureus* (50%), and *Klebsiella pneumoniae* (44%).

In addition to medical treatment, it is crucial to address underlying risk factors that may have contributed to the development of the lung abscess. This may include improving oral hygiene, managing swallowing difficulties, and reducing alcohol consumption. In some cases, underlying conditions like endocarditis or other systemic infections may need to be treated simultaneously. With prompt and effective treatment, most people can recover from a lung abscess, but it's essential to follow-up with a healthcare provider to ensure complete recovery and prevent future complications.

Complications of surgery or percutaneous drainage include empyema, bronchopleural fistula, hemorrhage (from chest wall or the lung), pneumothorax.

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ANSWER TO THE QUIZ

From your interpretation of the radiographic images, mark with an x which you consider the most appropriate diagnosis(s):

- [ ] Pleural effusion
- [ ] Pulmonary fibrosis
- [ ] Lung tumor
- [ ] Atelectasis
- [x] Bronchopneumonia
- [ ] Pneumothorax

Indicate true or false as appropriate.

- [T] Alveolar peribronchial infiltrate is observed in both lung fields.
- [T] The aortic arch is prominent with calcified atheromatous plaques.
- [F] Cardiomegaly is observed.
- [F] Reticulonodular infiltrates are observed in both lung fields compatible with chronic interstitial disease, pulmonary fibrosis.
- [T] A complex image with air-fluid level and irregular margins in the middle lobe of the right lung is present.

Match the above structure to the number shown in image 2.

- [5] Aortic arch.
- [3] Air-fluid level.
- [2] Retro-sternal space.
- [1] Left ventricle.
- [4] Left hilar region.

From the following statements, mark which one you consider to be true (V) or false (F), as appropriate.

- [T] Abscesses may be secondary to respiratory infections.
- [T] The most common aerobic germs found in lung abscess are staphylococci and klebsiella.
- [F] Lung abscesses due to aspiration of infectious materials are much more frequent on the left side.
- [T] Occasionally, abscesses rupture into the pleural cavity resulting in pneumothorax or empyema.
- [T] Radiologically, the abscesses are visualized as an air-fluid level cavity.