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Pulmonology

EVERY CAVITY IS NOT A TUBERCULOSIS

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ABSTRACT Cavities occasionally are encountered on thoracic images. Their differential diagnosis is large and includes, among others, various infections, autoimmune conditions, and primary and metastatic malignancies. we present a case which showed cavity on X-ray and was first thought as tuberculosis but upon further investigations it was found to be aspergilloma.

KEYWORDS : pulmonary cavity, tuberculosis, aspergilloma

INTRODUCTION:

Cavities are frequent manifestations of a wide variety of pathological processes involving the lung. The presence of a cavity helps the clinician to focus the diagnostic evaluation, as some diseases are more commonly associated with cavities than others. In the case of infectious diseases, cavitation represents the outcome of complex interactions between host and pathogen.

CASE REPORTS:

A 50 year old female patient k/c/o carcinoma breast presented with chief complaints of fever since one week sudden in onset gradually progressive in nature, high grade no diurnal variations,

Patients also has complains of dyspnea grade 1 to 2 MMRC since five days

Chief complains of cough, and chest pain since four days

Upon investigations her blood reports where normal

Chest xray showed a cavitory lesion

BAL was done which showed klebsiella growth positive

Then patient was started on piptaz initially she responded then again the fever was not coming down

And she was also started on ATT thinking of mycobacterium causing cavity

Then again serum galactomannan antigen test was done to rule out fungus causing cavitory lesion.

The result turned out to be positive for galactomannan.

And the patient was started on voriconazole

After two days of voriconazole the fever started to decrease and patient was feeling symptomatically better

ATT was stopped

Caption

And antifungal(voriconazole) was advised to continue for two weeks.

DISCUSSION:

A cavity has been defined in the radiology literature as (pathologically) "a gas-filled space within a zone of pulmonary consolidation or within a mass or nodule, produced by the expulsion of a necrotic part of the lesion via the bronchial tree" and (radiographically) "a lucency within a zone of pulmonary consolidation, a mass, or a nodule; hence, a lucent area within the lung that may or may not contain a fluid level and that is

surrounded by a wall, usually of varied thickness"(1)

Pathophysiology:
A cavity is the result of any of a number of pathological processes including suppurative necrosis (e.g., pyogenic lung abscess),

caseous necrosis (e.g., tuberculosis),

ischemic necrosis (e.g., pulmonary infarction),

cystic dilatation of lung structures (e.g., ball valve obstruction and *Pneumocystis* pneumonia),

or displacement of lung tissue by cystic structures (e.g., *Echinococcus*)

In addition, malignant processes may cavitate because of treatment-related necrosis, internal cyst formation, or internal desquamation of tumor cells with subsequent liquefaction

Mycobacterium tuberculosis generally has the highest prevalence of cavities among persons with pulmonary disease of any infection,

probably because this pathogen causes extensive caseous necrosis.

In the case of *M. tuberculosis*, the tendency to form cavities is clearly advantageous to the propagation of the organism because cavities contain large numbers of organisms, which can then be efficiently aerosolized and transmitted to other susceptible hosts

Other pathogens, such as *Klebsiella pneumoniae*, are associated with extensive pyogenic lung necrosis and frequent cavitation

organisms that cause subacute or chronic pulmonary infections (e.g., mycobacteria and fungi) seem to be more frequently associated with cavities than organisms that cause acute pulmonary infections (e.g., viruses and *S. pneumoniae*)

Investigations:
Plain chest radiography and computed tomography are the radiographic modalities most often used to image the chest

Ultrasound is a suboptimal modality for imaging the lung parenchyma because of poor sound transmission through the mostly air-filled lungs
.
Magnetic resonance imaging of the lung has been limited by motion artifact and relatively low spatial resolution (3)

Characteristics Of Cavities Used For Differential Diagnosis
The radiographic appearance of cavitary lesions can sometimes be useful to differentiate among a broad spectrum of etiologies but should be combined with clinical and laboratory data to obtain an accurate diagnosis.

One traditional method used to classify cavitary lesions is wall thickness.

Cavitary lesions associated with specific diseases are frequently described as being "thick walled" or "thin walled," but exact definitions for these terms are often lacking.

Cavities with a maximum wall thickness of 4 mm or less were usually caused by nonmalignant processes.

Cavities with a maximum wall thickness of 5 to 15 mm were mixed, nonmalignant and malignant cavities. Cavities with a maximum wall thickness of >15 mm were usually malignant. (2)

Cavities associated with lung cancer had significantly thicker walls than cavities associated with aspergillomas , but there was significant overlap in wall thickness between lung cancers and aspergillomas.

Furthermore, cavity wall thickening observed using computed tomography may be an early sign of the development of an intracavitary mycetoma , so wall thickness is at best an imperfect tool for discriminating between malignant and nonmalignant etiologies of pulmonary cavities

Nonradiographic factors such as age of >50 years and a history of malignancy were also associated with nonmycobacterial ethology

NONINFECTIOUS DISEASES ASSOCIATED WITH LUNG CAVITIES
Malignancies
In particular, primary lung cancer and tuberculosis are not infrequently encountered together, and either one can be responsible for cavitary lesions . (6)

The causal pathway for this association can go both ways: chronic inflammation and scarring caused by tuberculosis may contribute to the development of malignancy at the site, or immunosuppression associated with cancer and treatment may result in the reactivation of tuberculosis. Other mycobacterial or fungal pathogens can also coexist in malignant cavities; one report described concurrent *Aspergillus*, *Mycobacterium xenopi*, and lung cancer in a single patient

Rheumatological diseases:
Wegener's granulomatosis
Sarcoidosis
Systemic lupus erythematosus

Mycobacterial Infections
***Mycobacterium tuberculosis*.**
Mycobacterium tuberculosis is classically associated with cavitary pulmonary disease(4)

Fungal Infections
Aspergillosis.
Aspergillus species are environmental molds that cause a wide range of pulmonary disease in humans. Pulmonary disease is most commonly caused by *Aspergillus fumigatus*, although it can be caused by other species such as *A. flavus*, *A. niger*, and *A. terreus*, and can manifest as one of four distinct clinical entities, ordered by increasing pathogenicity and tissue invasion:
(i) allergic bronchopulmonary aspergillosis, which afflicts patients with long-standing asthma;
(ii) aspergilloma, which afflicts primarily patients with preexisting lung cavities;
(iii) chronic necrotizing aspergillosis or semi-invasive aspergillosis, which afflicts patients with a history of chronic lung disease; and
(iv) invasive aspergillosis, which afflicts immunocompromised and critically ill hosts

In areas where tuberculosis is endemic, tuberculosis is still the most common condition predisposing subjects to aspergilloma formation .(7)

However, any illness that causes a chronic, nonresolving pulmonary cavity produces an environment conducive to aspergilloma formation, and aspergillomas have been reported in association with most of the disease entities

Chronic necrotizing or semi-invasive aspergillosis generally occurs in middle-aged or elderly individuals with chronic lung disease or mildly immunosuppressive conditions such as alcoholism or diabetes(5)

Invasive pulmonary aspergillosis afflicts primarily severely immunocompromised patients,

especially those with hematological malignancies,

bone marrow transplant recipients,

and those with long-term immunosuppressive or corticosteroid use

the presence of a "halo sign," defined as a nodule surrounded by a zone of ground-glass attenuation, is reasonably sensitive and specific for invasive aspergillosis in high-risk patients . (4)

Cavitation generally occurs later in the course of the disease (1 to 2 weeks after the appearance of the halo sign) and is often noted during recovery from neutropenia in previously neutropenic patients .

The onset of cavitation is heralded by the so-called "air crescent sign," defined as crescents of air surrounding nodular lesions; further necrosis due to fungal angioinvasion(10)

Other fungal organisms causing cavity
coccidiomycosis//

histoplasmosis
Zygomycosis
Blastomycosis
cryptococcus neoformans
Pneumocystis jiroveci

Parasites

Echinococcus.

Echinococcus granulosus, a cestode tapeworm that lives predominantly in dogs, causes cystic echinococcosis . Infection occurs worldwide, but prevalence is highest in Mediterranean countries, South America, Australia, New Zealand, and Turkey.

Infection occurs when humans ingest soil contaminated with dog feces that contain *E. granulosus* eggs.

The eggs mature into larvae in the intestine and subsequently travel through the bloodstream, eventually forming a cyst in an end organ(9)

CONCLUSION:

In conclusion, we would like to draw attention to the fact that not all cavitates, even in the clinical setting of fever with evening rise, cough, and weight loss needs to be tuberculosis. This is of particular relevance in the setting of diabetes mellitus. Bronchoscopy and BAL fluid analysis and even a post bronchoscopy sputum analysis must be encouraged to isolate an incriminating organism in those who are sputum negative for AFB Also one should not hesitate in going ahead with further diagnostic procedures even if you have isolated one organism because chronic cavitary lesions might harbour secondary bacterial pathogens while the primary aetiology is a tubercular or fungal infection.

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