

**Case Report:**

## **Atypical presentation of aspergilloma as solitary pulmonary nodule - a case report**

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**ABSTRACT:**

*Aspergillus fumigatus* is a fungal organism causing aspergillosis in human lungs. There are four forms of pulmonary aspergillosis – non-invasive, invasive, allergic bronchopulmonary aspergillosis and obstructive. The percentage of occurrence is not well known. Aspergilloma is a non-invasive form of colonization by the fungus in a lung cavity. They usually present in the upper lobes and are mostly asymptomatic. There are certain imaging signs and features that are seen on radiograph and computed tomography (CT) which serves as a key factor in the diagnosis of the condition.

Hereby we report a case of an elderly male who presented with symptoms of difficulty in breathing and cough presenting as a solitary pulmonary nodule on chest radiograph which turned out to be a case of aspergilloma showing monad sign on CT.

**Keywords:** Aspergilloma, monad's sign, solitary pulmonary nodule, Computed tomography

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**INTRODUCTION:**

Aspergillosis is a group of fungal diseases commonly affecting the lungs caused by a saprophytic organism *Aspergillus fumigatus* and is inhaled by every person on a day to day basis. Tissue invasion is uncommon and occurs most frequently in the setting of immunosuppression.<sup>[1]</sup>

In immunocompetent individual, it gets completely removed from the respiratory tract. There are various forms of pulmonary aspergillosis – aspergilloma, invasive, allergic bronchopulmonary aspergillosis and obstructive types. Aspergilloma is a non-invasive form, which is usually asymptomatic arising in patients with lung cavities or in immunocompromised persons by colonization and formation of a fungal ball or mycetoma in the cavity. Imaging modalities like radiograph, CT are supportive in making the diagnosis of aspergilloma. There are certain imaging signs like the air-crescent sign, monad's sign and halo sign

that is suggestive of the diagnosis but not confirmatory.

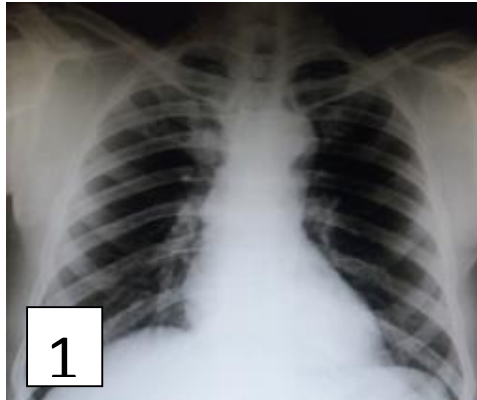
Herewith in this case report, we will discuss a case of an elderly male smoker presenting with symptoms of difficulty in breathing and imaging shows solitary pulmonary nodule on radiograph and was found to be an aspergilloma on CT.

**CASE REPORT:**

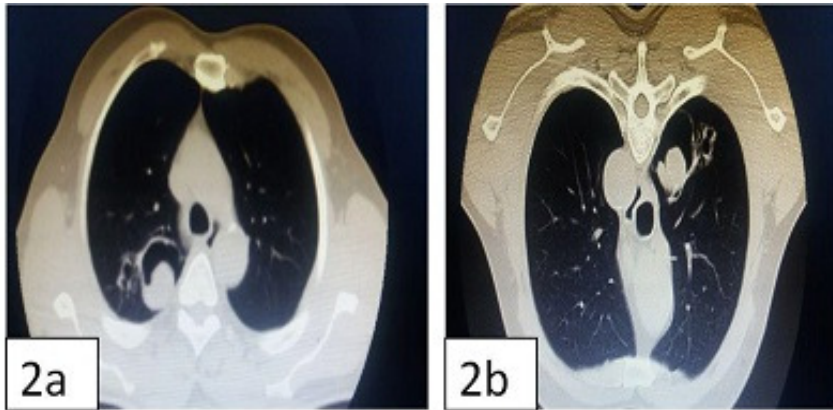
A 60-year-old male who is a chronic smoker for the past 20 years presented with complaints of difficulty in breathing for the past one month, cough for past one week. On chest radiograph, a well defined rounded opacity is noted in the paratracheal region of the right upper zone of lung suggestive of a solitary pulmonary nodule. There is no evidence of cavitation, adjacent collapse, calcification or satellite nodules (**Fig 1**) Later CT was taken to evaluate the nodule which showed a thin-walled cavity in the apico posterior segment of the right upper lobe with a homogeneously

hyperdense mass lesion noted within the cavity. Bronchiectatic changes were seen involving the

apical segment of right upper lobe bronchus adjacent to the mass lesion (**Fig 2a, b**).



**Figure 1:** Chest radiograph shows a well defined rounded opacity in the right upper zone paratracheal region of the lung. There is no evidence of cavitation, adjacent collapse, calcification or satellite nodules.



**Figure 2(a,b) :** HRCT thorax in supine and prone position shows a thin-walled cavity in the apico posterior segment of the right upper lobe with surrounding bronchiectatic changes. Homogeneously hyperdense mass lesion noted within the thin-walled cavity. Mass lesion shows postural variation within the cavity (gravity dependent variation of mass in supine and prone position)

#### **DISCUSSION:**

The first description of aspergillosis was made by Bennett in 1842. [2]The most prevalent fungal infection of the respiratory tract is Aspergillosis and the mode of dissemination to the human being is invariably by inhalation of the ubiquitous spores. The frequent location for it to colonize and form mycetoma is the upper lobes. Aspergilloma being a non-invasive condition mostly involves the existing cavities of the lung like tuberculous, bronchiectatic cavity, pneumocystis carinii pneumonia (PCP) with pneumatoceles etc.

The fungal ball encompasses the hyphae, cellular debris, and the cavity wall has vascular granulation tissue. Aspergilloma is frequently asymptomatic and infrequently present with hemoptysis. Massive hemoptysis due to breach in the pulmonary artery is an uncommon feature of aspergilloma and a relatively common feature in the invasive type of aspergillosis. The degree of prevalence of aspergilloma is unascertained. The estimated figures range between 0.016% and 17%. [2]

There are no standard laboratory investigations that can ascertain the diagnosis of aspergilloma. The

diagnosis of Pulmonary Aspergilloma is challenging, and a multidisciplinary approach as for other diseases is encouraged. <sup>[3]</sup>On a radiograph, aspergilloma can be seen as a solitary nodule as in our case or with the typical imaging features of a cavity with a radiodense gravity dependent mobile fungal ball. Non-specific features of pleural thickening is not an uncommon feature. CT is a better modality of choice than radiograph since it can show the exact location, help in delineation, and show the extent of the lesion and any underlying pathology for the pre-existing cavity. Aspergilloma is seen as a hyperdense almost round fungal ball within a well-defined cavity.

A crescentic cap of air can usually be identified separating the aspergilloma from the cyst wall. <sup>[4]</sup>This forms the monad's sign and in our case, it has been clearly depicted. Monad's sign of aspergilloma is formed in a pre-existing cavity, unlike air-crescent sign. Though this sign is a pointer to the diagnosis of aspergilloma, the absence of the sign is not a distinguisher for this condition.

Air crescent sign is similar to the monad's sign but seen in invasive aspergillosis and is a sign of improvement in the immunocompromised patient. There are other rare causes that can present with an air-crescent sign like a pulmonary abscess, tuberculosis, bronchogenic carcinoma especially squamous cell carcinoma which has a tendency to cavitate. The "halo sign" was defined as a macronodule surrounded by a perimeter of ground-glass opacity. <sup>[5]</sup>The ground glass attenuation is due to alveolar hemorrhage and is a feature of angioinvasive pulmonary aspergillosis.

The aspergilloma moves when the patient changes position. <sup>[6]</sup>By imaging the patient in supine and prone position in CT, the gravity dependent variation of the fungal ball can be seen as we have

demonstrated in our case. In instances, where the fungal ball fills the cavity completely and make the cavity devoid of any air there is no space for it to move with a change in position. In such cases where the diagnosis is not definite bronchoscopy may be required. Thus with the above-said findings, the diagnosis of aspergilloma by imaging can almost be diagnosed with utmost certainty in most of the cases without the requirement of invasive procedures.

Bronchoscopy with bronchoalveolar lavage (BAL) is a useful and safe tool in the diagnosis of aspergillosis and transbronchial biopsy can also be done if necessary. In our case, bronchoscopy confirmed the diagnosis of aspergilloma. The sensitivity and specificity of a positive result of BAL fluid are about 50% and 97%. <sup>[7]</sup>It also aids in collecting samples for fungal stain, histological examination, culture and detecting aspergillus antigens in the BAL fluid. Antigen for aspergilloma has been recovered from the BAL fluid but the diagnostic value of this test is variable.

#### **CONCLUSION:**

To conclude, radiologists have a vital role in the diagnosis of aspergillosis as the clinical and laboratory investigations are inconclusive. CT is very specific in showing the various findings like monad's sign, air-crescent sign, and halo sign. But these signs are not necessarily present in all cases of aspergillosis. CT can also help demonstrate the gravity dependent change in position of the fungal ball in supine and prone position which is a key factor. Additionally, it is helpful in showing the underlying pathology of a pre-existing cavity if any. Bronchoscopy may be required in certain cases with an indefinite diagnosis. In our case, we emphasize on the spectrum of findings of aspergilloma on CT that facilitate in the diagnosis and the importance of work up in a case of solitary pulmonary nodule.

## REFERENCES

1. Chantal Youssef, MD and David M. Widlus, MD. Imaging diagnosis of aspergilloma: Journal of Community Hospital Internal Medicine Perspectives. 2012; 2:1- 2. <http://dx.doi.org/10.3402/jchimp>.
2. S Kant, S Verma. Fungal ball presenting as Haemoptysis: The Internet Journal of Pulmonary Medicine. 2007; 10(1):1-4.
3. Migliore M, Gangemi M, Calvo D, et al. A large aspergilloma: BMJ Case Rep Published online.2013;1-2. 10.1136/bcr-2013-201769.
4. Greene R. The radiological spectrum of pulmonary aspergillosis: Medical Mycology Supplement 1. 2005; 43:S147-S154.
5. Reginald E. Greene, Haran T. Schlamme et al. Imaging Findings in Acute Invasive Pulmonary Aspergillosis: Clinical Significance of the Halo Sign: Clinical Infectious Diseases. 2007; 44:373–9.
6. Toma's Franquet et al. Spectrum of Pulmonary Aspergillosis: Histologic, Clinical, and Radiologic Findings: RadioGraphics. 2001; 21(4):825–837.
7. Kousha M, R. Tadi, and A.O. Souban. Pulmonary aspergillosis: a clinical review European Respiratory Review, 2011; 20: 121, 156–174.