

Chronic cavitary pulmonary aspergillosis

Tivya Kulasegaran, Pranav Kumar

ABSTRACT

Aspergilloma is a fungus ball composed of hyphae, fibrin, mucus, and cellular debris found within a pulmonary cavity. The pre-existing cavities are secondary to tuberculosis, sarcoidosis, bronchial cysts, bullae, ankylosing spondylitis, neoplasm and pulmonary infarction. Chronic cavitary pulmonary aspergillosis is defined as a pattern of disease in immunocompetent patients in whom there is formation and enlargement of one or more cavities over months. Usual clinical presentation is haemoptysis with or without chronic cough, but may remain asymptomatic. Intracavitary mobile mass is an important sign on CT scan. Aspergilloma is often misdiagnosed as lung cancer or tuberculosis. The older term complex aspergilloma is no longer used because majority of such patients won't have an aspergilloma visible radiologically. Nearly all patients with chronic cavitary pulmonary aspergillosis have Aspergillus IgG antibodies in the blood.

Keywords: Aspergilloma, Haemoptysis, IgG antibodies

How to cite this article

Kulasegaran T, Kumar P. Chronic cavitary pulmonary aspergillosis. Int J Case Rep Images 2018;9:100952Z01TK2018.

Tivya Kulasegaran¹, Pranav Kumar²

Affiliations: ¹Medical Registrar (FRACP), Prince Charles Hospital, Queensland Health, Australia; ²FRACP, Respiratory Physician, Mackay Base Hospital, Queensland Health, Australia.

Corresponding Author: Dr. Pranav Kumar, Mackay Base Hospital, 475 Bridge Road, Mackay, Queensland Australia 4740; Email: drpranavkumar@gmail.com

Received: 27 July 2018

Accepted: 30 August 2018

Published: 03 October 2018

Article ID: 100952Z01TK2018

doi: 10.5348/100952Z01TK2018CR

INTRODUCTION

Chronic cavitary pulmonary aspergillosis is the common and established form of aspergillus pulmonary involvement. This disease is commonly seen in immunocompromised hosts such as patients with acquired immunodeficiency, cystic fibrosis, diabetes mellitus, neutropenia, bone marrow or organ transplantation [1, 2].

CASE REPORT

A 62-year-old Caucasian male who presented to respiratory outpatient clinic for his annual clinic follow up. He was diagnosed with mycobacterium avium complex in 2016. His past medical history included COPD and current smoker. He had a 40-pack year smoking history.

He had initially presented to the hospital with ongoing productive cough, fevers and breathlessness. A chest X-ray was done at the time of admission that showed a cavitating left sided upper lobe lesion. He had three acid fast bacillus sputum that grew mycobacterium avium complex. He was commenced on Rifampicin, Clarithromycin and Ethambutol for a total period of 18 months. Subsequent sputum samples and AFB were culture negative while on treatment. Treatment was continued until sputum cultures were consecutively negative for at least 12 months. After completion of his treatment, he noticed new worsening of his usual cough along with degree of weight loss, low-grade fever, night sweats, and minimal hemoptysis.

On examination, he had a pulse rate of 82, blood pressure of 97/61 mm of Hg, saturating at 100% on room air and was afebrile. He had no finger clubbing but was cachectic at 47 kg. On chest auscultation, there were vesicular breath sounds with a few bibasilar crepitations and bilateral rhonchi throughout the lungs. Her heart sounds were dual with no murmurs. Her abdomen was

soft and non-tender. Her calves were soft, non-tender and there was no pitting edema. No skin rashes were noted.

His complete blood count were within normal values and erythrocyte sedimentation rate (ESR) was 105 mm /Hr. Serum urea, creatinine, random blood sugar and electrolytes were within normal limits. His ANA, ANCA, complement and immunoglobulins were within normal values. He was HIV and hepatitis negative. Chest radiograph (Figure 1) shown a cavitary lesion in upper lobe of the left lung with a mass within it and a crescentic rim surrounding the mass (Monod sign).

The differentials could be mycetoma or a cavitating bronchogenic carcinoma.

To further characterize the lesion, a computed tomography (CT) chest was done, it showed a new large left apical cavity lesion reflecting the development of a large pulmonary aspergilloma as shown in Figures 2 and 3. A CT prone and supine confirmed a mobile fungal ball.

His biochemistry confirmed the diagnosis of an aspergilloma with a positive aspergillus galactomannan antigen of 2.86 (Non- Detected <0.50, Detected >=0.50) and serum aspergillus precipitants positive and IgE levels of 37Ku/l. Other biochemical blood test results included an eosinophil count of 0.10, neutrophils of 5.33 and erythrocyte sedimentation rate 65.

He was started on Itraconazole therapy. Initially he was started on 200 mg daily with increment to 400 mg daily in future. He will have regular imaging and follow up in form of Aspergillus immunoglobulin (Ig)G and inflammatory markers every three months during therapy and chest radiographs every 6 to 12 months.

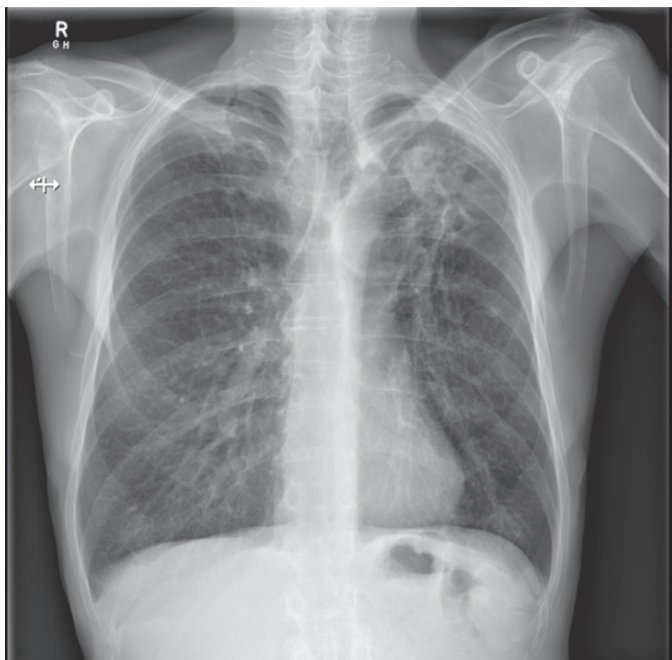


Figure 1: Left upper lobe cavitating lesion with a characteristic rim surround the mass called the Monod sign.

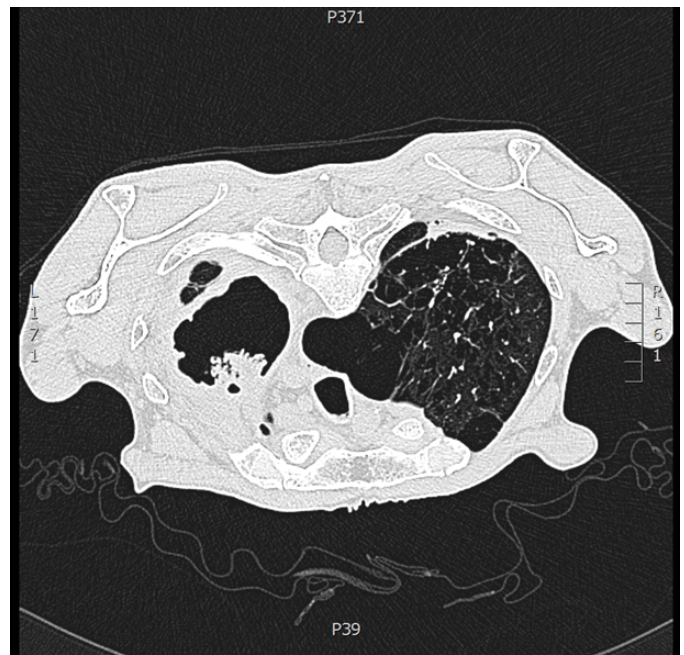


Figure 2: HRCT Prone images this has moved into the dependant portion indicative of a mobile aspergilloma.

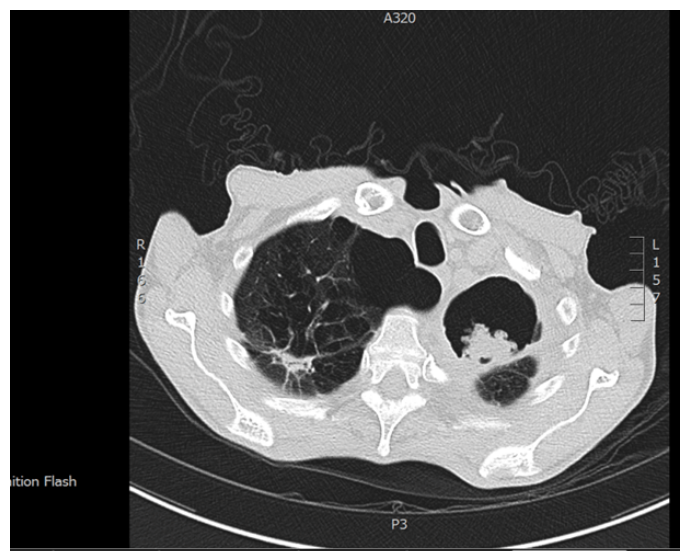


Figure 3: High resolution computed tomography a lobulated soft tissue in cavity and has frond like appearance indicative of Aspergilloma in the left upper lobe.

DISCUSSION

Aspergillus is a group of airborne saprophytic fungi that are ubiquitous in the environment [3, 4]. There are over 100 different species of Aspergillus but the commonly seen species in clinical practice include *Aspergillus fumigatus*, *A. niger*, *A. flavus* and *A. clavatus*. Transmission to human host is via the inhalation of the fungal spores [5]. Aspergillosis describes the clinical manifestation caused by this fungus, which can include an allergic reaction, invasion of lung parenchymal, cutaneous skin manifestation and extra pulmonary dissemination.

There are four main clinical manifestations of aspergillus infection. Allergic bronchopulmonary aspergillosis (ABPA) describes a complex hypersensitivity reaction against colonised *A. Fumigatus* in the airways. It typically manifests as a triad of poorly controlled asthma, pulmonary opacities and bronchiectasis [3]. The release of antigens from *A. fumigatus* results in an immune reaction where Th2 CD4(+) T cell are activated. This leads to airway inflammation and cytokine release.

It is commonly seen in asthmatics and cystic fibrosis patients where there can be impaired mucociliary clearance and epithelial cell dysfunction. It is estimated that the prevalence of aspergillus sensitization in asthmatics is 28%, of which 12.9% have ABPA [6]. ABPA is characterised radiologically by new pulmonary infiltrates and bronchiectasis. Pathologically ABPA results in mucous plugging, Bronchocentric granulomatosis and eosinophilic pneumonia. The diagnostic criteria for ABPA is outlined in Table 1, as per the latest. International Society for Human & Animal Mycology (ISHAM) criteria.

Table 1: Modified ISHAM working group 2013 criteria for diagnosis of ABPA [7]

1. Predisposing asthma or CF
2. Obligatory criteria
 - a. IgE > 1000 IU/mL and
 - b. Positive immediate skin test or increased IgE antibody to Aspergillus
3. Supportive criteria
 - a. Serum Eosinophilia > 500
 - b. Precipitins or increased IgG antibody to Aspergillus
 - c. Consistent radiographic opacities

Chronic necrotizing pulmonary aspergillosis, also termed subacute invasive aspergillosis is an indolent, local invasion of aspergillosis involving surrounding lung parenchymal and pleura. It tends to occur in patients with underlying diseases such as steroid dependent chronic obstructive disease, alcoholism, diabetes mellitus, radiation therapy and sarcoidosis [6, 8]. Symptoms may include productive cough, fevers, night sweats and weight loss. Elevated inflammatory markers, such as C-reactive protein and/or erythrocyte sedimentation rate, are very common in patients with chronic pulmonary aspergillosis but are not specific [9].

Aspergilloma is a fungus ball that typically develop in a previously cavitating areas. Pulmonary tuberculosis is the most common cavitory lung disease to promote the development of aspergilloma. Other cavitory lung diseases include sarcoidosis, cavitory tumor, bronchiectasis, and histoplasmosis [10]. Aspergillomas are typically composed of *Aspergillus* hyphae, fibrin, mucus, inflammatory cells and epithelial cells. Aspergillomas are typically asymptomatic, similar to Mr. R.O who reported no new respiratory symptoms. Radiologically, aspergilloma develops in preexisting cavities, usually in the upper lobes where there is a characteristic "air-crescent" sign. There can be a pocket area of air surrounding the mass

[11]. A CT chest prone and supine is done to illustrate a mobile fungus mass, which is another cardinal feature of aspergillomas. The criteria for the diagnosis of aspergilloma are radiologic evidence of a rounded mass in a pulmonary cavity combined with microbiologic evidence of aspergillus as the causative agent, usually a positive culture from sputum or detectable aspergillus IgG [12].

Hemoptysis is a potential dangerous complication of an aspergilloma. It is the result of the mechanical irritation of the cavity vasculature against the rolling fungus ball. In addition, there is a release of hemolytic endotoxin and trypsin-like proteolytic enzymes can cause hemoptysis. The clinical course of aspergilloma is highly variable, ranging from undergoing spontaneous lysis (7–10%) to causing severe hemoptysis. Jewkes *et al.* reported a recurrence of aspergillomas post-surgery to be in the region of 7% [11]. There has been great controversy regarding safety profile of surgical resection of aspergilloma. While it is potentially curable it is associated with relatively high risk of post-operative complications, therefore restricted for those with preserved lung function and symptomatic [4, 13].

Invasive aspergillosis (IA) is the severe form of aspergillosis remains an important cause of morbidity and mortality in immunocompromised patients. It is the systemic inflammatory form of aspergillosis that can disseminate to involve other organ systems. Disseminated central nervous system involvement occurs in approximately 17% of solid organ transplant recipients. Cutaneous aspergillosis may present as asymptomatic nodules or as necrotic extensive skin infection.

The mortality rate is estimated to be at 58% in immunocompromised group with the highest for bone marrow transplant recipients (86.7%) [14]. Other factors that predispose to invasive aspergillosis include haematological malignancies particularly acute myeloid leukemia, severe neutropenia, high doses of steroids, immunosuppressive regimens to prevent solid organ rejection and AIDS. The classical symptoms include fever, chest pain, shortness of breath, cough, and hemoptysis.

Definitive treatment of aspergilloma is surgical resection [15] but with a high morbidity and mortality (7–25%). Surgical resection is restricted to patients with severe haemoptysis and compromised pulmonary function, and patients with poor prognosis [11]. Regarding medical treatment, there are a number of antifungals such as amphotericin B, sodium or potassium iodide, itraconazole and fluconazole. Itraconazole is an orally active triazole antifungal agent with less toxicity, high tissue penetration and greater in vitro activity against *Aspergillus fumigatus* than amphotericin B [16]. Itraconazole is an azole-based antimycotic agents that inhibit ergosterol an important part of fungal cell membrane integrity. Effective doses of itraconazole is usually 200 to 400 mg/d orally with a duration of treatment of 6 to 18 months [17] Gupta *et al* examined the efficacy of itraconazole in aspergilloma patients post

tuberculosis infection. At the end of three months of therapy, 49% of patient had clinical as well as radiological improved. Two patients showed clinical response with stable radiological lesions [18]. Itraconazole, amphotericin B can be injected inside the mycetoma percutaneously under CT guidance, if response to oral medications is not adequate [19]. Aspergillus immunoglobulin (Ig)G and inflammatory markers should be repeated approximately every three months during therapy and chest radiographs every 6 to 12 months. Computed tomography (CT) scans of the thorax are indicated if there is a major change in clinical status.

CONCLUSION

This condition is characterized by cavity that may or may not demonstrate hyphal invasion of tissue on histopathology. It has slowly progressive nature because of host immune response and presents clinically as cough, weight loss, fatigue, and chest pain and radiograph showing a progressive lesion, which can be better appreciated on CT scan. Itraconazole has shown clinical and radiological improvement over the course of 6–12 months.

REFERENCES

1. Cheng WH SC, Jen CC, Hong WG, Yeung LC. Complex pulmonary aspergilloma: A Case Report. *J Med Sci* 2001;21(6):301–4.
2. Sheikh S, Fatimi SH. Aspergilloma in a patient with no previous history of chronic lung disease. *Ayub Med Coll Abbottabad* 2006 Jan-Mar;18(1):62–3.
3. Justyna EM, Anna GC, Marcelina M. A case report of allergic bronchopulmonary aspergillosis - disease well known but rarely diagnosed. *Journal of Education, Health and Sport* 2018;8(5):46–50.
4. Lee SH, Lee BJ, Jung DY, et al. Clinical manifestations and treatment outcomes of pulmonary aspergilloma. *Korean J Intern Med* 2004 Mar;19(1):38–42.
5. Harman EM. Aspergillosis: Practice Essentials, Background, Pathophysiology 2018. [Available at: <https://emedicine.medscape.com/article/296052-overview>]
6. Tracy MC, Okorie CUA, Foley EA, Moss RB. Allergic Bronchopulmonary Aspergillosis. *J Fungi* 2016;2(2):17.
7. Agarwal R, Chakrabarti A, Shah A, et al. Allergic bronchopulmonary aspergillosis: Review of literature and proposal of new diagnostic and classification criteria. *Clin Exp Allergy* 2013 Aug;43(8):850–73.
8. Kaymaz D, Ergün P, Candemir I, Çiçek T. Chronic necrotizing pulmonary aspergillosis presenting as transient migratory thoracic mass: A diagnostic dilemma. *Respir Med Case Rep* 2016 Oct 1;19:140–142.
9. Denning DW, Riniotis K, Dobrashian R, Sambatakou H. Chronic cavitary and fibrosing pulmonary

- and pleural aspergillosis: Case series, proposed nomenclature change, and review. *Clin Infect Dis* 2003 Oct 1;37 Suppl 3:S265–80.
10. Glimp RA, Bayer AS. Pulmonary aspergilloma. Diagnostic and therapeutic considerations. *Arch Intern Med* 1983 Feb;143(2):303–8.
11. Jewkes J, Kay PH, Paneth M, Citron KM. Pulmonary aspergilloma: Analysis of prognosis in relation to haemoptysis and survey of treatment. *Thorax* 1983 Aug;38(8):572–8.
12. Hope WW, Walsh TJ, Denning DW. The invasive and saprophytic syndromes due to *Aspergillus* spp. *Med Mycol* 2005 May;43 Suppl 1:S207–38.
13. Kasprzyk M, Pieczynski K, Mania K, Gabryel P, Piwkowski C, Dyszkiewicz W. Surgical treatment for pulmonary aspergilloma - early and long-term results. *Kardiochir Torakochirurgia Pol* 2017 Jun;14(2):99–103.
14. Lin SJ, Schranz J, Teutsch SM. Aspergillosis case-fatality rate: Systematic review of the literature. *Clin Infect Dis* 2001 Feb 1;32(3):358–66.
15. Kauffman CA. Quandary about treatment of aspergillomas persists. *Lancet* 1996 Jun 15;347(9016):1640.
16. Van Cutsem J, Van Gerven F, Van de Ven MA, Borgers M, Janssen PA. Itraconazole, a new triazole that is orally active in aspergillosis. *Aimicrob Agents Chemother* 1984 Oct;26(4):527–34.
17. Tsubura E. Multicenter clinical trial of itraconazole in the treatment of pulmonary aspergilloma. Pulmonary aspergilloma study group. [Article in Japanese]. [Article in Japanese]. *Kekkaku* 1997 Oct;72(10):557–64.
18. Gupta PR, Vyas A, Meena RC, Khangarot S, Kanoongo D, Jain S. Role of itraconazole in the management of aspergillosis in treated patients of pulmonary tuberculosis. *Lung India* 2005;22(3):81–5.
19. Klein JS, Fang K, Chang MC. Percutaneous transcatheter treatment of an intracavitary aspergilloma. *Cardiovasc Intervent Radiol* 1993 Sep–Oct;16(5):321–4.

Author Contributions

Tivya Kulasegaran – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Pranav Kumar – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

Source of Support

None.

Consent Statement

Written informed consent was obtained from the patient for publication of this case report.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

Copyright

© 2018 Tivya Kulasegaran et al. This article is distributed under the terms of Creative Commons Attribution License which permits unrestricted use, distribution and reproduction in any medium provided the original author(s) and original publisher are properly credited. Please see the copyright policy on the journal website for more information.

Access full text article on
other devices



Access PDF of article on
other devices

