



Endobronchial blastomycosis: A rare pathogen in a unique location

Elsbeth Springsted^{a,*}, Venkateswara Kollipara^b, Badri Giri^c

^a Department of Internal Medicine, Virginia Tech School of Medicine-Carilion Clinic, Roanoke, VA, USA

^b Department of Critical Care and Pulmonary Medicine, Salem VA Medical Center, Salem, VA, USA

^c Department of Critical Care and Pulmonary Medicine, Virginia Tech School of Medicine, Carilion Clinic, Roanoke, VA, USA

ARTICLE INFO

Keywords:

Chronic cough
Blastomycosis
Endobronchial lesion
Pulmonary medicine
Infectious disease
Bronchoscopy

ABSTRACT

A middle-aged woman from Southwest Virginia presented to pulmonary clinic with 4 months of dry cough. Further imaging with Computed Tomography (CT) of the chest showed an infiltrative lung mass. The patient underwent bronchoscopy that showed an endobronchial lesion on right and left main stem bronchi. Endobronchial biopsy of the lesion showed acute and chronic granulomatous inflammation and tissue cultures grew Blastomycosis dermatitidis. We hereby present a rare case of endobronchial blastomycosis with pulmonary infiltrates presenting as chronic cough.

1. Background

Blastomycosis is a dimorphic fungus that causes a pyogranulomatous fungal infection that primarily affects the skin and lungs [1]. Most cases are found near the southeastern and south-central states that border the Mississippi River and Ohio River in the United States. Although this can be a systemic and multiorgan disease; it commonly manifests as acute or chronic pneumonia. Pulmonary blastomycosis can present with phenotypic variation from nodules, lobar consolidations, or lung mass [2]. Blastomycosis rarely manifests as an endobronchial lesion. This is a rare case of endobronchial blastomycosis manifesting as a chronic cough that demonstrates how pulmonary blastomycosis can present as many different pulmonary phenotypic variations.

2. Case report

A 46-year-old morbidly obese African American woman presented to the pulmonary clinic with chronic dry cough for 4 months. Patient was initially treated for an upper respiratory tract infection with antibiotics and prednisone, following which she has persistent dry cough. The patient additionally had complaints of malaise, dyspnea, and wheezing. Initial vitals were blood pressure of 187/93 mmHg, pulse of 105 beats per minute, afebrile, and peripheral oxygen saturation of 100% on room air. The chest x-ray showed left hilar opacity and chest CT without contrast demonstrated an infiltrative mass in the medial aspect of the upper three quarters of the left hemithorax measuring 11.8cm × 2.6 cm

and mediastinal lymphadenopathy (Figs. 1–4).

Bronchoscopy showed yellow to tan color polypoidal endobronchial lesions in right and left main stem bronchi (Fig. 5).

In addition, left main stem bronchus showed significant mucosal swelling and narrowing. Biopsy of endobronchial lesions and mediastinal lymph node were performed. Pathology of both endobronchial lesion and lymph node showed acute and chronic inflammation with granuloma (Fig. 6.) GMS stain of endobronchial tissue highlighted a rare yeast form (Fig. 7), from which the initial impression was histoplasmosis.

The final tissue isolate was confirmed by DNA probe to be Blastomycosis dermatitidis. The patient was treated with itraconazole 200mg twice a day for 12 months with complete resolution of cough, pulmonary infiltrates, and endobronchial lesion (Fig. 8).

Fig. 8 shows a repeat CT scan of the Chest without contrast after 1 year of treatment of the blastomycosis that shows complete resolution of the mass. Fig. 9 shows repeat bronchoscopy images with resolution of endobronchial mass.

3. Discussion

Blastomyces dermatitidis is a thermal dimorphic fungus that is endemic in organic material. Originally, named Gilchrist's disease after the man that discovered the disease in 1894; blastomycosis was initially noted to be primarily a disease of the skin. Now we know that blastomycosis can affect many organ systems including the skin, lungs,

* Corresponding author. 1906 Belleview Ave, Roanoke, VA, 24015, USA.

E-mail address: eespringsted@carilionclinic.org (E. Springsted).

<https://doi.org/10.1016/j.rmcr.2021.101517>

Received 14 July 2021; Received in revised form 27 August 2021; Accepted 9 September 2021

Available online 20 September 2021

2213-0071/© 2021 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

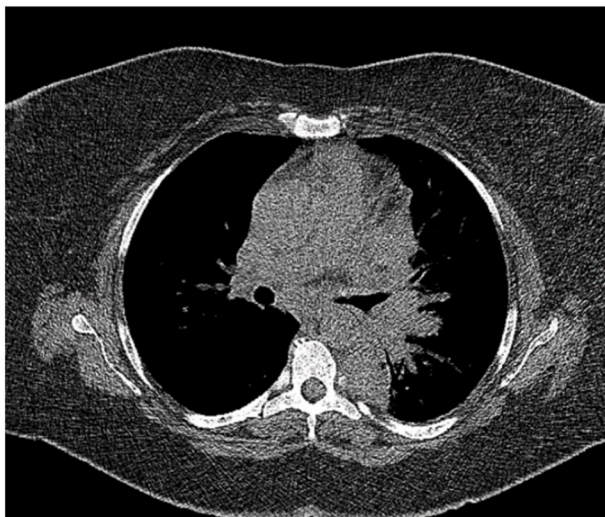


Fig. 1. Axial CT scan of the chest without contrast demonstrating infiltrative mass with soft tissue window.

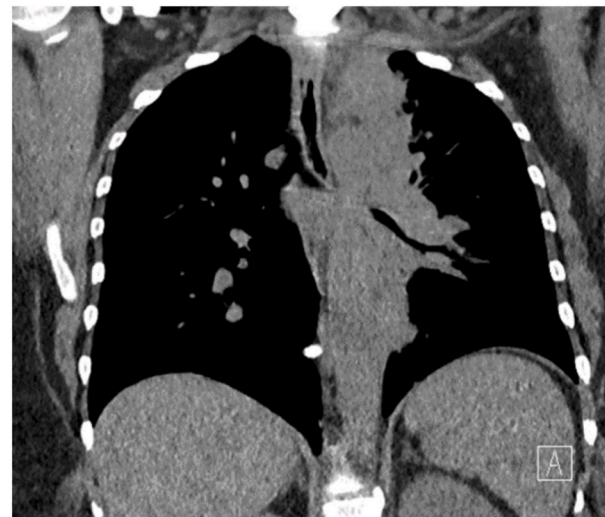


Fig. 3. Coronal CT scan of the chest without contrast demonstrating the mass.

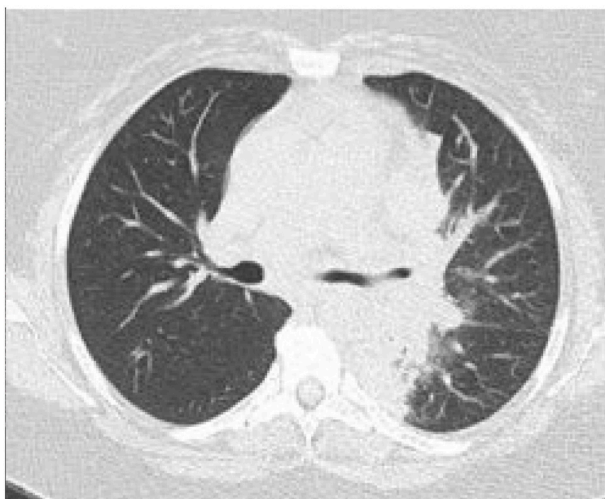


Fig. 2. Axial CT scan of the chest without contrast demonstrating the mass with lung tissue window.

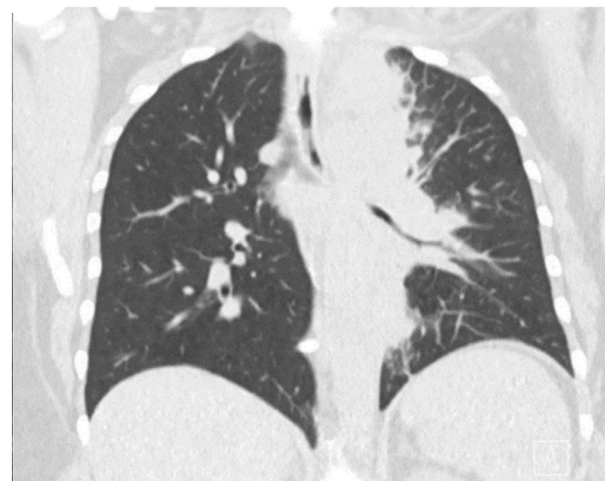


Fig. 4. Axial CT scan of the chest without contrast demonstrating the mass.

nervous system, genito-urinary tract, bone [1]. In fact, blastomycosis is a mimicker of many diseases including bacterial and fungal pneumonias, tuberculosis, and cancer due to its nonspecific symptoms.

With a common presentation of a normal initial chest xray by report and a chronic cough, our patient was treated for GERD with proton pump inhibitors. The differential for this presentation was GERD, cough variant asthma, upper airway cough syndrome, and non-asthmatic eosinophilic bronchitis. When the chest xray was obtained after the initial visit; a hilar opacity was seen. A CT chest was obtained to better characterize the opacity and a large infiltrative hilar mass was found with lymphadenopathy. Malignancy was high on the differential given patients chronic symptoms and infiltrative mass on chest CT. A bronchoscopy was performed to obtain a diagnosis through biopsy and washings. A rare yeast was seen from the GMS stain of the tissue; and it became clear that this patient had a fungal infection. This was further proven when the culture grew Blastomycosis dermatitidis.

Pulmonary blastomycosis can present as asymptomatic disease to acute hypoxic respiratory failure and extrapulmonary dissemination. Most patients present to specialty clinic for non-resolving pneumonia or concern for cancer. The most common radiographic presentation is air

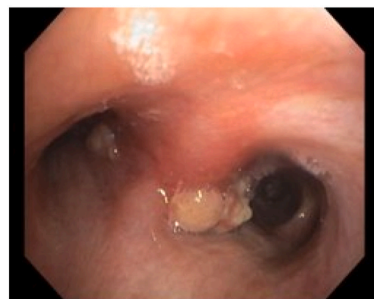


Fig. 5. A photograph taken during the bronchoscopy that showed an endobronchial lesion on right and left main stem bronchi.

space consolidation which is usually central and abutting the mediastinum [2], as seen in our patient. Additional findings include interstitial disease with reticular patterns, focal or patchy consolidations, nodules, and lung mass [2,3]. Endobronchial blastomycosis is a rare presentation and only limited cases have been reported. Saeed et al reported a case of endobronchial blastomycosis with cobblestone appearance of oropharyngeal, tracheal, and bronchial mucosa [4]. Martynowicz et al reported a retrospective case series of total 56 pulmonary blastomycosis of which

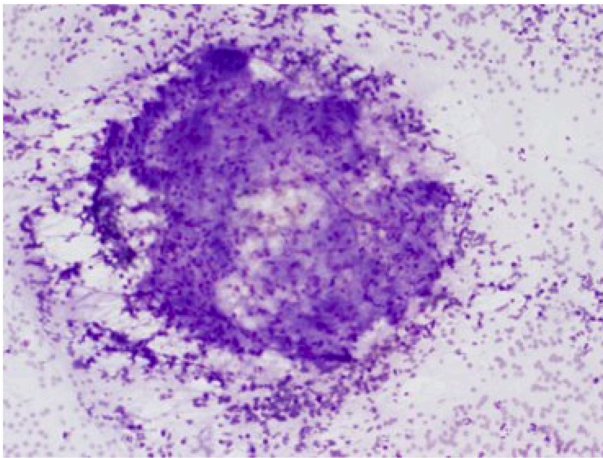


Fig. 6. The pathology slide of the subcarinal lymph node (100x) demonstrating granulomas.

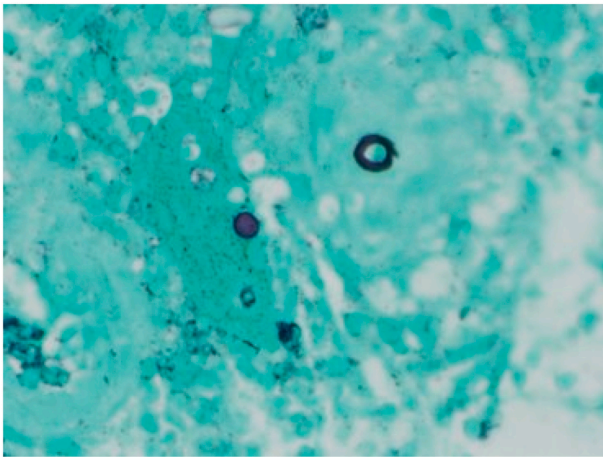


Fig. 7. The pathology slide of endobronchial lesion (600x) shows a yeast form on GMS special stain.

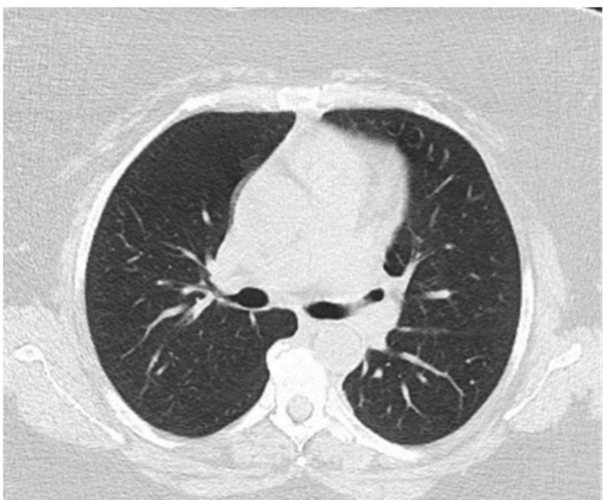


Fig. 8. Axial CT scan of the chest without contrast after treatment showing complete resolution of the mass.

24 patients underwent bronchoscopy. Of the 24 patients, bronchial

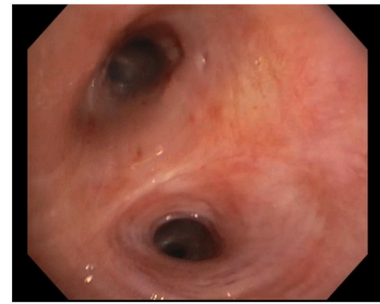


Fig. 9. Photograph from repeat bronchoscopy with resolution of the endobronchial lesion.

inspection was abnormal in 13 patients (mucosal abnormality including “friability,” “thickening” or “irregularity”) and nodular endobronchial lesion was noted in one patient [5].

Pulmonary blastomycosis can be diagnosed noninvasively with sputum cultures or invasively with bronchial washings, bronchoalveolar lavage, brushing or lung biopsies [5]. In the same study, out of 92 specimens obtained by noninvasive means the diagnostic yield was 86% per patient and 75% per single sample. Noninvasive means include sputa (72 specimens), tracheal secretions (5 specimens) and gastric washings (15 specimens). Flexible bronchoscopy was performed in 24 patients and yielded diagnosis in 92% with bronchial secretions 100% positive and BAL fluid 67% positive [5]. Pathology specimens obtained from bronchoscopy lung biopsies, bronchial brushings, needle aspirations were 22%, 50%, 0% respectively. Cytology was positive for *Blastomyces dermatitidis* in 5 patients (sputum 3 patients, 2 bronchial washings) [5]. Once diagnosed, blastomycosis is treated with antifungals based on severity of the disease. Disease severity varies greatly from asymptomatic to ARDS, but the age adjusted estimated mortality rate is 0.21 per one million persons per year [6]. Mild to moderate disease can be treated with itraconazole 200mg daily or twice a day for 6–12 months. Severe disease requiring ICU admission can be treated with liposomal amphotericin B for 1–2 weeks followed by itraconazole for 6–12 months [1].

4. Conclusion

- Pulmonary Blastomycosis dermatitidis is a dimorphic fungus that has many different phenotypic variants; and can present in unique pulmonary manifestations.
- Early diagnosis and treatment improves outcomes in pulmonary blastomycosis.

References

- [1] Michael Saccente, L. Gail, Woods, Clinical and laboratory update on blastomycosis, *Clin. Microbiol. Rev.* 23 (2) (2010) 367–381, <https://doi.org/10.1128/CMR.00056-09>.
- [2] Hilary L.P. Orłowski, Sebastian McWilliams, Vincent M. Mellnick, et al., Imaging spectrum of invasive fungal and fungal-like infections, *Radiographics* 37 (4) (2017) 1119–1134.
- [3] Maini, R., Ranjha, S., Tandan, N. et al. Pulmonary Blastomycosis: A case series and review of unique radiological findings. *Medical Mycol. Case Rep.*, 28, 49–54. <https://doi.org/10.1016/j.mmcr.2020.03.006>.
- [4] Ali I. Saeed, Antoinette L. Williams, Robert F. Bradley, et al., Bronchoscopic view of pulmonary blastomycosis, *J. Bronchol. Intervent. Pulmonol.* 16 (2009) 266–269, <https://doi.org/10.1097/LBR.0b013e3181b643ba>.
- [5] Marek A. Martynowicz, Udaya B.S. Prakash, Pulmonary blastomycosis- an appraisal of diagnostic techniques, *Chest* 121 (2002) 768–773.
- [6] D. Khuu, S. Shafir, B. Bristow, F. Sorvillo, Blastomycosis mortality rates, United States, 1990–2010, *Emerg. Infect. Dis.* 20 (11) (2014) 1789–1794, <https://doi.org/10.3201/eid2011.131175>.