

Case Report

Lung Cancer Mimicking Aspergilloma: A Case Report

Sheikh M. Wasim Jamal^{a,b,c} Mohamed R. Aboukamar^{a,b}
Mohamad Khatib^{a,b} Muna Al Maslamani^b Abdulqadir J. Nashwan^{a,b}

^aHazm Mebareek General Hospital, Doha, Qatar; ^bHamad Medical Corporation, Doha, Qatar;
^cWeill Cornell Medicine-Qatar, Cornell University, Doha, Qatar

Keywords

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Abstract

An aspergilloma is a conglomeration of *Aspergillus* hyphae, fibrin, mucus, and cellular debris, typically found within a pulmonary cavity or ectatic bronchus. Computerized tomography (CT) scans often depict a cavity containing a solid mass and a notable crescent sign. Though these signs are indicative of aspergilloma, the European Respiratory Society emphasizes the need for a more detailed diagnostic criteria. A patient with a history of hemoptysis was initially diagnosed with an aspergilloma based on CT chest findings, showing a cavitory lesion in the left upper lobe with an intracavitory lobular opacity. Post resection, histological examination contradicted the initial diagnosis, revealing lung cancer instead. This case underscores the importance of tissue diagnosis from the outset or employing a multifaceted diagnostic criteria encompassing radiological findings, serology and microbiology tests. In the absence of an initial tissue diagnosis, rigorous follow-up, including early interval scanning, is crucial.

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Introduction

An aspergilloma is a conglomeration of *Aspergillus* hyphae, fibrin, mucus, and cellular debris, typically found within a pulmonary cavity or ectatic bronchus [1]. Computerized tomography (CT) scans of the chest often reveal distinctive findings considered characteristic of aspergilloma. These include a cavity containing a solid, rounded mass with a crescent sign – indicating the fungus ball's partial or complete separation from the surrounding cavity

Correspondence to:
Abdulqadir J. Nashwan, anashwan@hamad.qa

wall. Nonetheless, the European Respiratory Society (ERS) recommends a comprehensive set of criteria for accurately diagnosing an aspergilloma [2].

Diagnosing and establishing the etiology of a cavitary lung lesion can prove challenging in many cases. In the case we present, an initial diagnosis of aspergilloma was made; however, subsequent tissue examination confirmed it to be lung cancer. Due to the non-specificity of many radiological findings in cavitary lung lesions, other supportive diagnostic tests have become increasingly important. In our discussion, we explain radiologic features typically associated with aspergilloma and delve into features indicative of benign cavitary lesions. However, our main emphasis is to adopt various strategies to minimize, and ideally completely nullify, the chances of an incorrect diagnosis. The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000534527>).

Case Presentation

A 32-year-old Nepalese gentleman, employed as an air conditioner technician and an ex-smoker with a cumulative smoking history of 10 pack years, was admitted to the emergency department. He presented with a 1-week history of intermittent hemoptysis and mild chest discomfort. He did not report experiencing shortness of breath, fever, sweating, or weight loss. His past medical history was unremarkable, and he had no known pulmonary diseases. Upon admission, he presented as afebrile and normotensive, with an oxygen saturation of 95% on room air and a respiratory rate of 18 breaths per minute. His body mass index was 28.

Physical examination revealed the absence of clubbing or supraclavicular lymphadenopathy. His heart sounds were normal without any murmurs, and his chest was clear on auscultation. The abdomen was soft and non-tender, and there was no pedal edema. A chest X-ray showed an irregular opacity in the right mid-zone (Fig. 1).

His laboratory tests indicated a C-reactive protein (CRP) level of <2 mg/L, a white blood cell count of $5.7 \times 10^3/\mu\text{L}$, a hemoglobin level of 15 g/dL, and an international normalized ratio of 0.9. Connective tissue disease screening and antineutrophil cytoplasmic antibody testing returned negative results.

His two sputum samples tested negative for acid-fast bacilli stain and also negative for tuberculosis culture. His CT scan of the chest revealed a cavitary lesion in the left upper lobe (Fig. 2a–c) with an intracavitary lobular opacity. These CT findings were indicative of an aspergilloma. A bronchoscopy was performed, revealing unremarkable gross findings. Bronchial wash did not yield any organism growth.

The case was discussed with the radiology and infectious diseases teams. Given the CT findings, an aspergilloma diagnosis was made, and the patient was commenced on voriconazole. The management strategy encompassed scheduled follow-ups with the infectious diseases and pulmonology clinics, along with a planned repeat CT chest in 4–6 weeks.

The patient's intermittent hemoptysis persisted, and a follow-up CT scan at the 6-week interval showed worsening results (Fig. 3). The CT chest demonstrated a consistent left upper lobe cavitary lesion, with the size of the cavity remaining unchanged but with an increased soft tissue component. Additionally, more prominent ground-glass attenuation in the surrounding area was observed. However, no new lesions were detected.

Subsequently, a repeat bronchoscopy indicated mild inflammatory changes in the left upper lobe. No endobronchial tumor was identified. Notably, the bronchial wash grew *Aspergillus nidulans* (1 colony) and *Candida parapsilosis*. Given the recurring hemoptysis and deteriorating CT findings, the patient was referred to the thoracic surgeons.

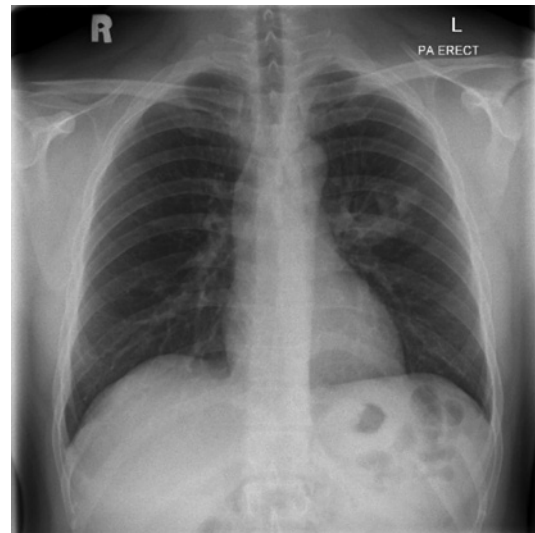


Fig. 1. Chest X-ray: An irregular opacity in the right middle zone.

The patient underwent a left upper lobectomy. Histopathological examination of the lesion confirmed invasive adenosquamous carcinoma. A subsequent positron emission tomography scan displayed no evidence of distant metastasis. Given that the initial surgery did not achieve clear margins, the lung cancer multidisciplinary team proposed a treatment plan involving additional resection with clear margins or radical radiotherapy, depending upon the patient's preference.

Discussion

Cavities found in the lungs can arise from various underlying conditions, leading to a broad range of potential diagnoses. Due to their diverse etiology, non-specificity of imaging findings in many cases, and overlapping symptoms, their diagnosis on numerous occasions is a challenge. Likewise, the manifestation of lung cancer can take diverse and unforeseen forms. For such a challenge, the chance of missing a cancer diagnosis remains a genuine worry for the physicians.

Our case study presents a cavitory lung lesion initially diagnosed as an aspergilloma. However, further follow-up and tissue analysis confirmed it to be cancer. While the ERS recommends a comprehensive approach using radiology findings, microbiology, and serology tests for diagnosing aspergilloma [2], a review of existing literature, including case reports, highlights that in many instances, within the right clinical context, classical radiology findings alone have been deemed sufficient to establish the diagnosis; with a close follow up as part of overall management.

Typically found within a pulmonary cavity, aspergilloma comprises *Aspergillus* hyphae, fibrin, mucus, and cellular debris. CT chest scans frequently reveal features typically associated with aspergilloma, including a cavity harboring a solid and round mass. The intracavitary mass can be uni or multilobed [3]. In our case, the intracavitary mass was multilobed. A “crescent sign,” characterized by a lung mass surrounded by a crescent-shaped area of air [4, 5] may be present. “Crescent” might demarcate the fungus ball from the surrounding wall, partially or entirely. Additional indications pointing to a pulmonary fungal infection include a halo sign. It is a CT finding of ground-glass opacity surrounding a nodule or mass. The surrounding halo of ground-glass attenuation depicts a zone of inflammation or hemorrhage. Another distinctive indication, termed the Monod sign, is characterized by positional changes

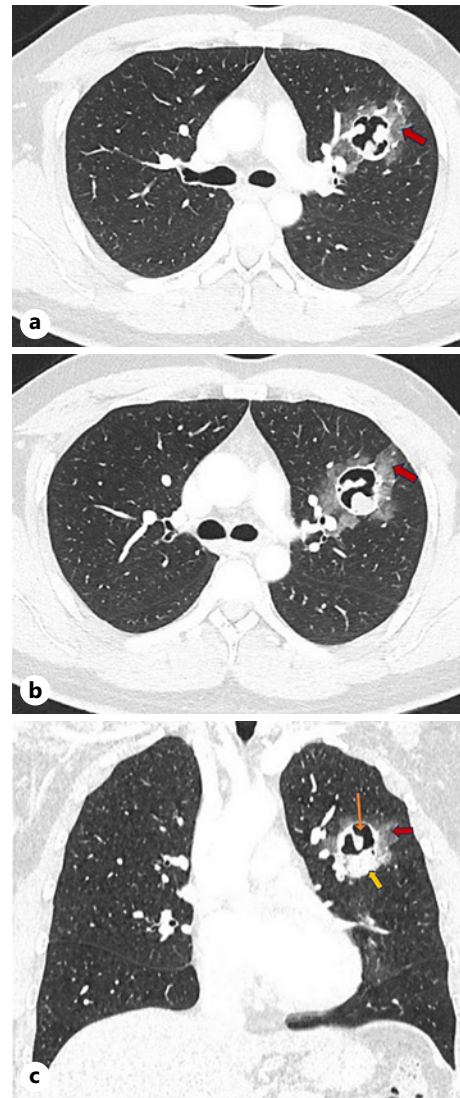


Fig. 2. **a, b** First CT scan of the chest (Transverse Section): A cavitary lesion in the left upper lobe with an intracavitary multi-lobular opacity. Ground-glass changes also observed surrounding the cavity (arrow). **c** First CT scan of the chest (Coronal Section): A cavitary lesion in the left upper lobe with an intracavitary lobular opacity. Ground-glass changes were observed surrounding the cavity (red arrow). In the coronal plane of the CT scan, a wide variation in the thickness of the cavity wall was also noted, with the thickest margin noted on the inferior aspect (yellow arrow). A rim of air was also noted surrounding the intracavitary mass lesion (orange arrow).

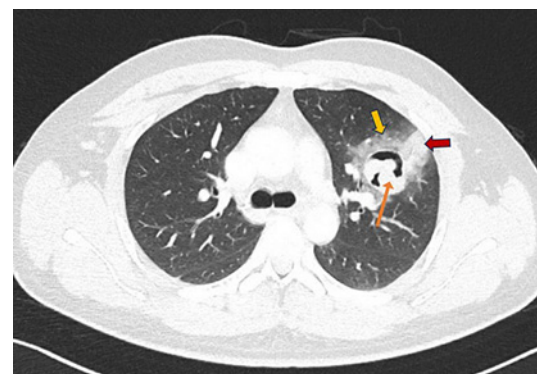


Fig. 3. Interval 2nd CT scan of the chest: An increase in the “soft tissue” component of the lesion was noted on the interval scan (orange arrow). Perilesional consolidation (red arrow) and ground-glass changes (yellow arrow) were also present. A rim of air was again observed surrounding the intracavitary mass lesion.

of the “ball” with shifts in the patient’s positioning. Further CT findings suggestive of a nonmalignant process include the presence of consolidation around the lesion. Notably, our patient’s CT scans (Fig. 2a–c, 3) exhibit most of the aforementioned characteristics (all except Monod’s sign, which was not elicited).

There exist numerous characteristics that aid in distinguishing between a benign and a malignant pulmonary cavitory lesion. Thin cavity walls, smooth inner walls, perilesional consolidation, and ground-glass changes are a few attributes linked to the nonmalignant nature of a cavitory lung lesion. In research conducted by Woodring et al. [6] utilizing chest X-rays, it was observed that cavities with a maximum wall thickness of 4 mm or below were indicative of a benign nature. In comparison, those with a maximum wall thickness exceeding 15 mm were more likely to be associated with malignancy. Nin et al. [7], in their study, concluded that nonmalignant lesions tend to exhibit thinner walls and more perilesional consolidation and centrilobular nodules than malignant lesions. Their results also reveal that maximum wall thicknesses of 7 and 24 mm indicate nonmalignant and malignant disease, respectively. In our case, the maximum wall thickness of the cavity was 13 mm. The thickness of an aspergilloma can vary, and it can be high or low depending upon various factors, including duration of infection, fungal growth rate, and severity of immune response. In our case, the cavitory lesion exhibited an air crescent and halo sign. It also had perilesional consolidation. All of these CT scan chest features, which are deemed indicative of clues pointing toward a benign pathology, however, yielded a malignant diagnosis on histopathological examination. Additional investigations apart from histological examination can significantly contribute to indicating or dismissing a diagnosis; however, it is important to acknowledge that they can never provide absolute certainty, thus warranting careful interpretation. Vigilant follow-up is particularly crucial in such instances when tissue diagnosis is not confirmed at the outset.

Based on our report, to minimize the risk of missing a lung cancer diagnosis, we strongly recommend either confirming tissue diagnosis at the outset or applying a multifaceted approach to diagnose an aspergilloma, which includes assessing radiological findings and conducting serology and microbiology tests. In any case, where an initial tissue diagnosis is not established, we emphasize the importance of comprehensive follow-up, including an early interval scan. This approach allows for monitoring the lesion’s progression and, if any concerns arise, facilitates the option of performing a biopsy or resection of the lesion. In our case, the interval scan indicated worsening findings, leading to the decision to refer the patient for surgical resection.

Conclusion

While radiology findings can offer valuable insights and suggestions regarding the underlying cause of a pathological condition, there are instances where these findings lack specificity and can inadvertently lead to misinterpretation. Apart from considerations related to cost and patient preferences, the degree of invasiveness associated with procedures aimed at confirming diagnoses also factors into the formulation of a conservative and pragmatic diagnostic approach. Nonetheless, when feasible and with patient consent, our recommendations in light of our case report lean toward pursuing tissue diagnosis in cases involving cavitory lung lesions when there is even the slightest possibility of an underlying malignant process, especially after excluding alternative diagnoses like tuberculosis during the initial evaluation. In scenarios where immediate tissue diagnosis is not established, we emphatically advocate for applying comprehensive diagnostic criteria, as, for example, endorsed by the ERS, in establishing the aspergilloma diagnosis. Furthermore, we emphasize the paramount significance of meticulous follow-up in such cases.

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Statement of Ethics

The Medical Research Center at Hamad Medical Corporation in Qatar has granted approval for the publication of this case report under the reference number MRC-04-23-603. Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

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Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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