CLINICAL VIGNETTE

Cavitary Lung Lesion in a 70-Year-Old Male

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Case Presentation

A 70-year-old obese male presents with worsening nonproductive cough for several months. His PMHx includes: systemic lupus erythematosus (SLE) with antiphospholipid antibody syndrome on chronic anticoagulation. He also has hypertension, chronic obstructive pulmonary disease (COPD), diabetes mellitus, obstructive sleep apnea, and gastroesophageal reflux disease with Barrett's esophagus. His cough was largely nonproductive with associated rhinitis. It occurred in the context of wildfires and ongoing home construction/renovations. Physical examination was notable for scattered expiratory wheezes and otherwise clear lung fields. He was initially managed with antibiotics, escalation of pharmacotherapy and environmental modification for rhinitis and addition of inhaled corticosteroid to his long-acting muscarinic antagonist. His cough did not improve, and he developed worsening fatigue and loss of appetite with unintentional weight loss. There was no change in the physical examination, however. Chest radiographs revealed a large cavitary lesion within the right upper lobe/right lung apex with adjacent pleural thickening/pleural infiltration measuring 8.7 cm x 8.2 cm with dependent air-fluid level. (See Figures 1 and 2.) WBC was elevated at 19.5 with leukocytosis and mild eosinophilia. He was admitted and CT Chest confirmed a large right apical cavitary mass with irregular thick wall measuring 8.6 cm x 7.3 cm. (See Figures 3 and 4.) Tuberculosis was excluded with negative acid-fast bacillus smears and Quanti-FERON gold test. Coccidiomycosis was considered in the differential, and empiric fluconazole was initiated pending serologic confirmation. The patient declined inpatient bronchoscopy and was discharged on fluconazole. Infectious serologies returned negative and he was re-hospitalized with persistent fatigue and leukocytosis for bronchoscopy. Endobronchial ultrasound was used for tissue sampling of 3 lymph nodes as well as the right upper lung mass, however, pathology was non-diagnostic. A second bronchoscopic procedure several days later demonstrated obstruction of right upper lobe apical segment and narrowing of anterior and posterior right upper lobe subsegments. Pathologic examination returned as squamous cell carcinoma. Positron emission tomography-computed tomography demonstrated layering of fluid in the cavity, extrapleural and chest wall extension with associated osseous erosion of the right first and second ribs, liver metastases and lytic left femoral neck lesion suggesting nondisplaced pathologic fracture. He underwent intramedullary nail fixation of the left femur before being discharged home with hospice.

Discussion

Cysts and cavities in the lungs are foci of decreased lung density with definable walls on chest imaging. Computed chest tomography with its ability to image in three dimensions may be necessary to help visualize such walls around the radiolucent area(s). A cyst refers to a clearly defined air-containing space with a thin (<4mm) wall whereas a cavity will refer to one with a thick (>4mm) wall.[1] Cystic lesions, such as bullae or blebs as seen in emphysematous or congenital in origin, are less likely to require invasive investigation given likelihood of benign etiology, whereas cavitary lesions will typically be pursued more aggressively.[2] Solitary cavitary lesions have a broad differential, spanning infectious, autoimmune and malignant etiologies.[2-4] Radiologic features of focal cystic or cavitary lung disease that may help with diagnosis include the measured thickness of the wall, the character of the lining (e.g., smooth versus irregular), location and contents if any. Thicker and more irregular walls are typically associated with malignant etiologies,[2,4] although there have reports of cancerous lesions appearing with thin walls or arising in emphysematous bullae.[5] Solid contents within the cavity suggest an infectious process. The location of the cavity in the lung can help point towards a particular infectious process, with tuberculous lesions typically affecting the upper lobes and bacterial lung abscesses predominantly occurring in the posterior segments of the upper lobes and superior segments of the lower lobes.[1,2] The duration of a lesion in the context of clinical symptoms and signs and availability of prior imaging for comparison will assist with differential diagnosis. More acute and subacute processes suggest infectious, progressive inflammatory, embolic (cardiovascular) or traumatic causes, and chronic processes typically characterize malignancy, inflammatory fibrotic disorders and congenital lesions.[2] Symptoms and signs including fevers, chills, night sweats, undesired weight loss, cough, dyspnea, chest pain, rash and arthralgias as well as underlying host risk factors including tobacco use, diabetes mellitus, age, immunocompetency, environmental and occupational exposures, trauma, and travel will offer additional diagnostic clues.[1,2]

While several historical features, soil exposure during construction and immunocompromised state and eosinophilia raised the possibility of the fungal infection coccidiomycosis, this was less likely as that disease has 2-8% cavitation.[1] Pulmonary embolism, was higher risk due to antiphospholipid antibody syndrome, but typically does not result in infarcts (15% of cases), with only 5% of infarctions cavitating.[2] The autoimmune disorders in which cavitation can occur include

rheumatoid arthritis, where interstitial lung disease, pleural disease and rheumatoid nodules will be more common; and granulomatosis with polyangiitis (Wegener's) with its multi-focal nodular involvement and 25-50% cavitation of such nodules.[1] Systemic lupus erythematosus rarely causes cavitary lung disease but has been reported.[6] Ruling out infection is necessary before initiating aggressive immunosuppression. Malignancy associated with cavitary lung disease may represent primary bronchogenic carcinoma and less commonly metastatic disease or even lymphoma. Malignant cavities are typically associated with thicker, more irregular walls and have upper lobe predominance. It is important to exclude coexisting infection when faced with radiographic lesion suggestive of malignancy. There are case reports of lung adenocarcinoma and tuberculosis within a single lesion.[7] In primary bronchogenic cancer with cavitation, non-small cell lung cancer is most likely with squamous cell histologic type most common.[8] This proved to be the final diagnosis in this case.

Figures

Figure 1

Figure 2

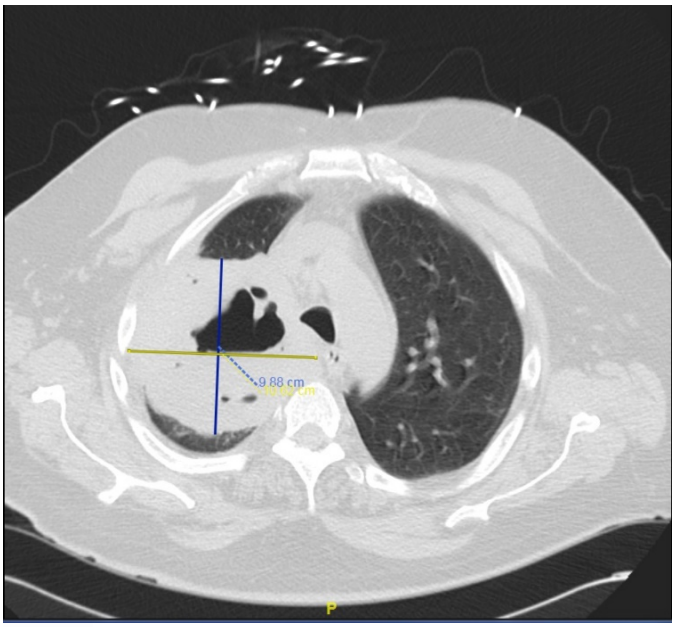

Figure 3

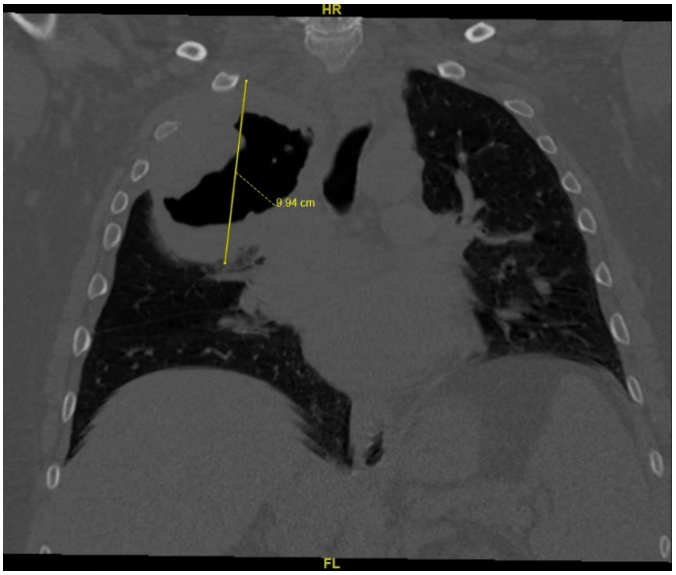

Figure 4.

REFERENCES

1. **Gafoor K, Patel S, Girvin F, Gupta N, Naidich D, Machnicki S, Brown KK, Mehta A, Husta B, Ryu JH, Sarosi GA, Franquet T, Verschakelen J, Johkoh T, Travis W, Raoof S**. Cavitary Lung Diseases: A Clinical-Radiologic Algorithmic Approach. *Chest*. 2018 Jun;153(6):1443-1465. doi: 10.1016/j.chest.2018.02.026. Epub 2018 Mar 6. Review. PubMed PMID: 29518379.
2. **Ryu JH, Swensen SJ**. Cystic and cavitary lung diseases: focal and diffuse. *Mayo Clin Proc*. 2003 Jun;78(6):744-52. Review. PubMed PMID: 12934786.
3. **Holt MR, Chan ED**. Chronic Cavitary Infections Other than Tuberculosis: Clinical Aspects. *J Thorac Imaging*. 2018 Sep;33(5):322-333. doi: 10.1097/RTI.0000000000000345. Review. PubMed PMID: 30036298.

4. **Ketai L, Currie BJ, Holt MR, Chan ED**. Radiology of Chronic Cavitary Infections. *J Thorac Imaging*. 2018 Sep;33(5):334-343. doi: 10.1097/RTI.0000000000000346. Review. PubMed PMID: 30048346.
5. **Iwata T, Nishiyama N, Nagano K, Izumi N, Tsukioka T, Hanada S, Kimura T, Kudoh S, Hirata K, Suehiro S**. Squamous cell carcinoma presenting as a solitary growing cyst in lung: a diagnostic pitfall in daily clinical practice. *Ann Thorac Cardiovasc Surg*. 2009 Jun;15(3):174-7. Review. PubMed PMID: 19597393.
6. **La VT, Teves K, Sandhu VK**. Dilemma in management: a patient with active systemic lupus erythematosus presenting with pulmonary cavitary lesion. *Oxf Med Case Reports*. 2017 Oct 10;2017(10):omx064. doi: 10.1093/omcr/omx064. eCollection 2017 Oct. PubMed PMID: 29038734; PubMed Central PMCID: PMC5634987.
7. **Byun HG, Yoo JY, Kim SJ, Lee OJ, Yoo MY**. Coexistence of lung adenocarcinoma and pulmonary tuberculosis within a single lesion: A rare case report. *Medicine (Baltimore)*. 2019 Sep;98(39):e17378. doi: 10.1097/MD.0000000000017378. PubMed PMID: 31574888; PubMed Central PMCID: PMC6775354.
8. **Opoka LM, Szturmowicz M, Oniszh K, Korzybski D, Podgajny Z, Błasińska-Przerwa K, Szołkowska M, Bestry I**. CT imaging features of thin-walled cavitary squamous cell lung cancer. *Adv Respir Med*. 2019;87(2):114-117. doi: 10.5603/ARM.2019.0018. PubMed PMID: 31038723.