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Radiology

Bilateral Cavitary Pulmonary Nodules Revealing Cat Scratch Disease in a Smoker with COPD: A Case Report

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Abstract **Case Report**

Cat scratch disease (CSD), caused by *Bartonella henselae*, is typically a benign and self-limiting condition in immunocompetent individuals [1]. Pulmonary involvement is exceedingly rare, especially in the form of bilateral cavitary nodules. We report the case of a 51-year-old woman with a history of smoking-related chronic obstructive pulmonary disease (COPD), who presented with progressive bilateral cavitary pulmonary nodules. Positron emission tomography (PET) demonstrated moderate FDG uptake, raising concern for malignancy. A CT-guided biopsy of a basal left nodule revealed granulomatous inflammation with necrosis, and PCR confirmed the presence of *Bartonella henselae*, consistent with cat scratch disease. This case highlights an unusual pulmonary presentation of CSD, mimicking metastatic or infectious etiologies, and emphasizes the importance of histological and microbiological confirmation in atypical radiologic findings.

Keywords: Bartonella henselae, cat scratch disease, cavitary nodules, COPD, PET scan, granulomatous inflammation.

INTRODUCTION

Cat scratch disease (CSD) is a zoonotic infection caused primarily by *Bartonella henselae*, typically transmitted through scratches or bites from infected cats [1]. While CSD usually presents with localized lymphadenopathy and mild systemic symptoms, atypical manifestations have been described, especially in immunocompromised patients [2]. Pulmonary involvement is extremely rare and often overlooked. We report a unique case of bilateral cavitary pulmonary nodules in a patient with chronic obstructive pulmonary disease (COPD), ultimately diagnosed as CSD following histopathologic and molecular confirmation.

CASE PRESENTATION

A 51-year-old woman with a medical history of moderate COPD related to prior tobacco use (35 pack-years) was under routine follow-up for respiratory management. A surveillance chest computed tomography (CT) revealed multiple bilateral cavitary nodules, predominantly in the lower lobes. The patient was asymptomatic aside from baseline dyspnea on exertion and chronic cough. She denied fever, weight loss, or night sweats.

Follow-up imaging over a 3-month period demonstrated a slight increase in nodule size. PET-CT revealed moderate FDG uptake in the nodules, suggestive of metabolically active lesions. Given her smoking history and radiologic features, malignancy (including metastases or primary lung cancer) was suspected. Infectious differentials included tuberculosis and fungal infections.

A CT-guided biopsy of a basal left cavitary nodule was performed. Histological examination showed necrotizing granulomatous inflammation. Stains for acid-fast bacilli and fungi were negative. PCR analysis of the biopsy tissue was positive for *Bartonella henselae* DNA, confirming the diagnosis of cat scratch disease.

On further questioning, the patient reported frequent contact with stray cats, including occasional scratches, though she had not considered this relevant to her pulmonary findings.

The patient was managed conservatively with a 3-week course of doxycycline, with clinical and radiological stability noted on follow-up imaging.

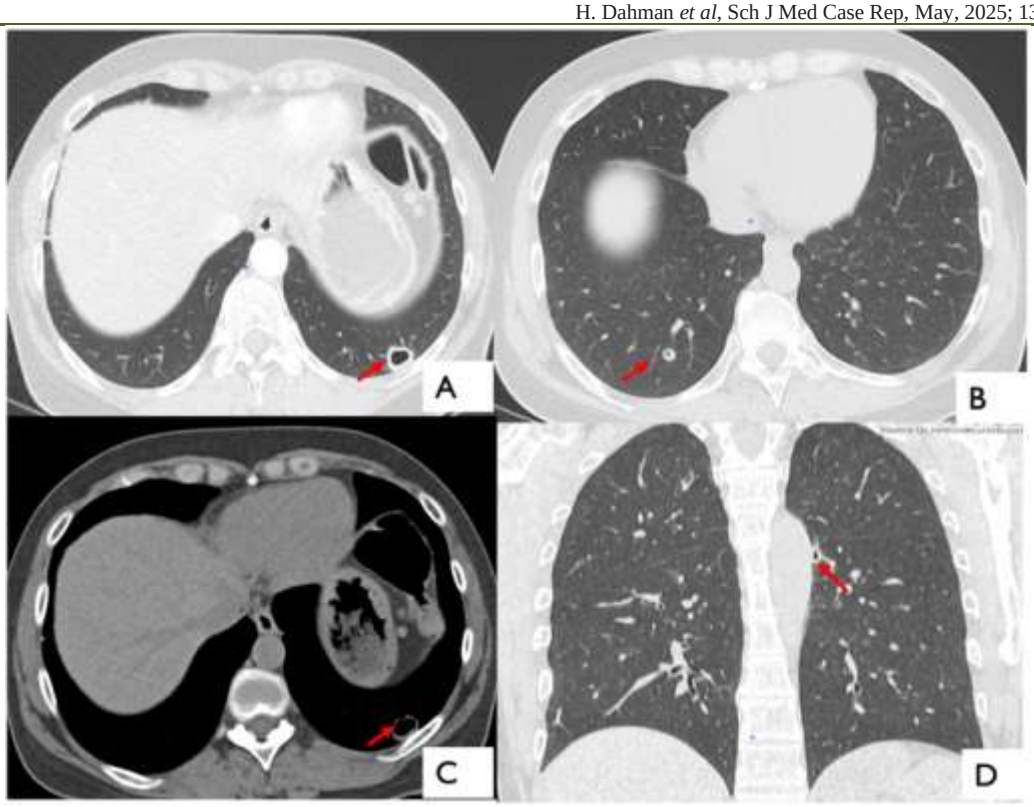

Figure: Axial and coronal CT lung and mediastinal windows showing multiples cavitary nodules with focally thichened walls (red arrows)

DISCUSSION

Bartonella henselae is the etiologic agent of cat scratch disease, commonly affecting children and young adults with regional lymphadenopathy following exposure to infected cats [1]. While the typical presentation includes benign lymphadenitis, disseminated infection involving the liver, spleen, central nervous system, and rarely, the lungs has been documented, particularly in immunocompromised patients [2,3].

Pulmonary involvement in CSD remains uncommon and can manifest in various forms, including pleural effusions, pneumonia, diffuse pulmonary infiltrates, and, more rarely, cavitary or non-cavitary nodules [4–6]. Pulmonary nodules are more often observed in immunocompromised hosts, especially those with T-cell defects such as HIV/AIDS or post-transplant states [5]. In contrast, reports of such findings in immunocompetent individuals, particularly adults, are exceedingly rare [7].

In a literature review by Bandyopadhyay *et al*., only 23 cases of Bartonella infection with pulmonary manifestations were identified, with nodular lesions being described predominantly in adults with immunodeficiency [7]. This highlights the unusual nature of the current case, where a patient with COPD—an immunocompetent but chronically inflamed pulmonary environment—developed bilateral cavitary nodules due to Bartonella infection.

Radiologic features such as cavitation, FDG avidity on PET-CT, and progressive nodule size often raise concerns for malignancy or fungal infections, as was initially suspected in this patient. However, granulomatous inflammation on histology and PCR positivity for *Bartonella henselae* were crucial for diagnosis. The differential diagnosis of cavitary pulmonary nodules includes tuberculosis, fungal infections, septic emboli, and vasculitis, among others [5,8].

CSD pulmonary disease is thought to result from hematogenous dissemination of *Bartonella henselae* to lung parenchyma. PCR amplification from tissue samples remains one of the most reliable diagnostic tools, especially in atypical presentations where serologic responses may be delayed or nonspecific [7,9].

Treatment is usually supportive for localized CSD, but systemic or atypical manifestations, including pulmonary involvement, warrant antimicrobial therapy. Doxycycline, macrolides (azithromycin), or rifampin are commonly used with favorable responses [1,6].

This case reinforces the importance of detailed exposure history and supports consideration of Bartonella infection in the differential diagnosis of cavitary nodules, particularly in patients with a history of animal exposure—even in the absence of classic systemic features.

CONCLUSION

Cat scratch disease should be included in the differential diagnosis of cavitary pulmonary nodules, particularly in patients with a history of animal exposure. In cases with inconclusive imaging and clinical findings, histopathological and molecular confirmation are essential. This case underscores the value of a thorough exposure history and the expanding clinical spectrum of *Bartonella henselae* infections.

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