

## Double trouble - *Burkholderia cepacia* infection in a patient with a malignant cavitory lesion

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### Abstract

*Burkholderia cepacia* is typically a pathogenic microorganism that tends to infect immunocompromised or hospitalized patients. It is also linked with infections in patients with cystic fibrosis and underlying structural lung diseases. Here, we report a rare case of *Burkholderia cepacia* infection in a Chronic Obstructive Pulmonary Disease (COPD) patient with a malignant cavitory lesion. To the best of our knowledge, this is the first case report of such a presentation.

**Key words:** *Burkholderia cepacia*, malignant cavity.

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### Introduction

*Burkholderia cepacia* is an aerobic Gram-negative bacillus commonly found in different aquatic environments. It typically exhibits low virulence and often colonizes various fluids utilized within healthcare settings, such as irrigation solutions and intravenous fluids. In healthy individuals, it rarely leads to infections. However, *B. cepacia* can colonize or infect the respiratory tracts of patients with conditions like cystic fibrosis or bronchiectasis. In some rare instances, it has been associated with cases of lung consolidation and the development of cavitory lesions in immunocompetent populations.

### Case Report

A 64-year-old gentleman, a former smoker with a smoking history of 45 pack-years, presented to us with symptoms of intermittent fever (up to 101°F), dry cough, progressive increasing breathlessness, loss of appetite, significant weight loss for 15 days, and persistent right side dull aching chest pain for 7 days. The patient had a ten-year history of Diabetes Mellitus (DM) and had been diagnosed with Chronic Obstructive Pulmonary Disease (COPD) six years ago but was not compliant with the prescribed treatment. Biochemical tests revealed normal hemograms and kidney and liver function tests but indicated uncontrolled blood sugar levels with an elevated Glycated Hemoglobin (HbA1C) of 11.5%.

On examination, the patient had a respiratory rate of 24/min with SpO<sub>2</sub> of 90% on room air, a pulse rate of 104 min, and a blood pressure of 110/76 mmHg. On chest auscultation, bilateral poly-

phonic wheezing was observed. A chest X-ray revealed the presence of a thick-walled cavity in the right upper zone. Subsequently, a Computed Tomography (CT) scan of the chest was performed, which identified a cavitory lesion in the right upper lobe (Figure 1). Both infective and malignant etiology were kept differential based on clinical-radiological features. After managing acute exacerbation of COPD and stabilizing the patient, a Video Bronchoscopy (VOB) was performed for evaluation of the cavitory lesion. VOB did not reveal any abnormalities within the airways, so radial Endobronchial Ultrasound (EBUS) was performed to sample the cavity wall, but no biopsiable lesion was localized. A Bronchoalveolar Lavage (BAL) sample was obtained. Initial microbiological staining for bacteria, fungi, and mycobacteria was negative. The cytopathological examination was negative for malignant or atypical cells. On the 5<sup>th</sup> day, the BAL culture report showed confluent growth of opaque colonies with light-yellow pigmentation on blood agar, which were oxidase positive, catalase producing, and non-lactose-fermenting colonies on Mac Conkey agar, suggestive of *B. cepacia*.

The antibiotic sensitivity report indicated resistance to cephalosporins, fluoroquinolones, and colistin, with sensitivity limited to meropenem. The patient was started on intravenous meropenem, resulting in a favourable clinical response characterized by the resolution of fever and an improvement in appetite and general well-being. Due to the presence of the appropriate clinical setting and the thick-walled cavitory lesion, the possibility of a malignant etiology was always kept in mind, and the patient was advised to be under strict follow-up. After initial clinical stabilization over the next 2 weeks, the patient developed worsening of the right-sided chest pain. To work up the same, whole-body Positron Emission Tomography (PET) CT with contrast was done, which

showed a highly Fluorodeoxyglucose (FDG) avid right upper lobe cavitory lesion with features suggestive of possible malignant etiology. The peri-cavitory infiltrates, which could be attributed to *Burkholderia*, had improved, but the cavity wall had thickened, and the cavity size increased significantly (Figure 2).

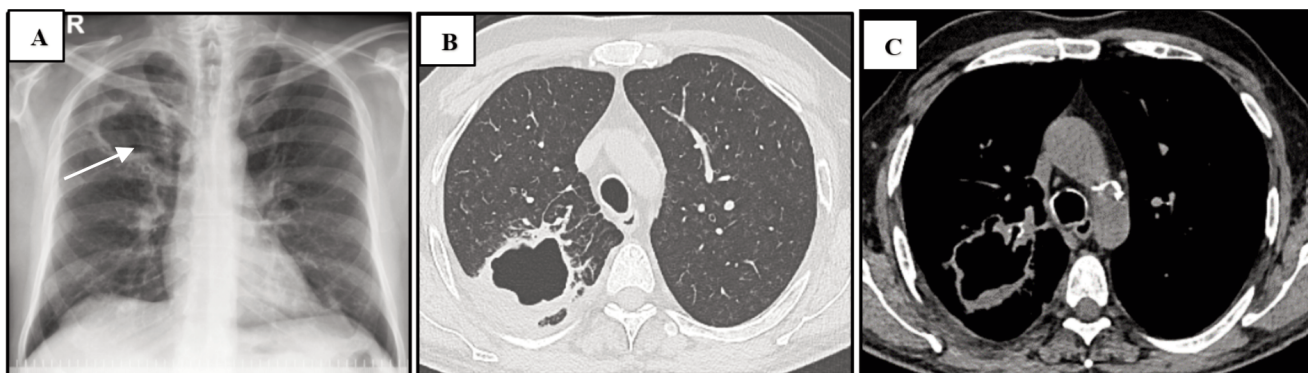
A CT-guided biopsy was taken from the cavity wall, yielding a diagnosis of a primary bronchogenic, squamous cell carcinoma. Following a multidisciplinary consultation at a separate medical centre, the patient underwent surgical resection followed by adjuvant chemotherapy. The patient was at stage IVA at the time of surgery. The bacterial culture of the surgical specimen also grew significant colonies of *B. cepacia*.

## Discussion and Conclusions

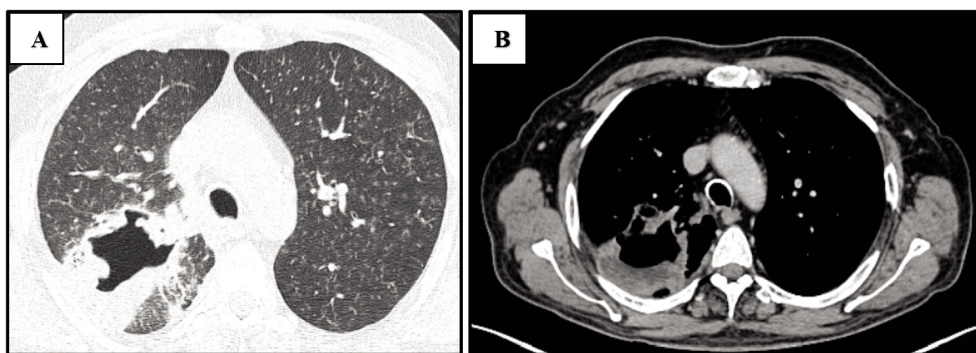
*B. cepacia* is commonly recognized as a bacterium linked to the lungs of individuals with cystic fibrosis. It can lead to potentially fatal pneumonia in immunosuppressed patients, especially cystic fibrosis or chronic granulomatous diseases.<sup>1-5</sup> Cystic fibrosis patients with the presence of *B. cepacia* in respiratory secretions often correspond with more severe lung disease and diminished pulmonary function.<sup>6,7</sup> Because *B. cepacia* often colonizes various

fluids utilized within healthcare settings, it can lead to epidemics of nosocomial infection through a contaminated medical device.<sup>6</sup> In immunocompromised individuals and patients with breached local defence like bronchiectasis, burn patients, and those with indwelling catheters or medical devices, *B. cepacia* can lead to severe infections and can present like pneumonia, meningitis, bacteremia, peritonitis, and postoperative wound infections. *B. cepacia* has now been recognized as causing fatal disease in healthy individuals.<sup>1-4</sup>

Our patient presented to us with a cavitory lesion in an emphysematous lung along with a high risk for malignancy, given a heavy smoking history. Our initial differentials included tuberculosis, malignancy, and fungal infection. Considering the cavity wall's thickness exceeding 15 mm and the soft tissue density of the cavity wall, malignancy was still a possibility. A lung cavity with a wall thickness exceeding 15 mm and irregular inner and outer margins is highly suggestive of a malignant etiology. Indeed, it is worth emphasizing that *B. cepacia* infections are commonly linked to damaged or compromised lungs rather than entirely healthy ones. These factors led us to undertake additional investigations to examine coexisting alternative pathology. As a result, an image-guided biopsy of the cavitory lesion was done, which subsequently revealed bronchogenic carcinoma as the primary cause of the lung cavity. A case of community-acquired bacteremic pneumonia due



**Figure 1.** A) Chest X-ray showing a thick-walled cavity in the right upper zone. (Marked with white arrow). B) and C) CT Chest showing a thick wall cavity (1.4 cm) measuring 5.8x4.5 cm in the right upper lobe with associated pleural thickening.



**Figure 2.** Positron Emission Tomography/Computed Tomography (PET CT) (A - Lung Window, B - Mediastinal Window): Fluorodeoxyglucose (FDG) avid (Maximum Standard Uptake Value, SUV max: 4.7) irregularly marginated thick-walled (1.6 cm) cavitory lesion in the right lung upper lobe, measuring approximately 6.2x4.4 cm in size.

to *B. cepacia* in a treated lung cancer patient without any active lesion/mass has been reported.<sup>8</sup> Still, in that case, there was not any definite residual lesion. To the best of our knowledge, this is the first case report of concomitant active lung cancer and *B. cepacia* infection. This report underscores the likelihood of encountering *B. cepacia* as a community-acquired infection in a structurally damaged lung.

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