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CASE REPORT

# MUCINOUS ADENOCARCINOMA MIMICKING CRYPTOGENIC ORGANIZING PNEUMONIA: A CASE REPORT

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## ABSTRACT

Mucinous adenocarcinoma of the lung is a type of malignancy that originates from glands or gland-like structures in the lung and can mimic pneumonia forms on radiological images. Our case report aims to raise awareness about this radiological pattern. A 72-year-old male patient was applied to an external center with the complaint of cough with sputum and back pain. Computed tomography revealed a kind of consolidation in the lower right lung zone of the patient. The patient, whose consolidation progressed in the lower right zone of the lung, was diagnosed with cryptogenic organizing pneumonia, and then corticosteroids were started. His condition worsened and a biopsy was requested for further investigation. The biopsy revealed mucinous adenocarcinoma of the lung in the patient. Mucinous adenocarcinoma is a malignancy that can be misdiagnosed as organizing pneumonia due to the similarities in patterns between the radiological images. Therefore, differential diagnosis of adenocarcinoma should be considered in cases of organizing pneumonia.

**Keywords:** Neoplasms, pneumonia, mucinous adenocarcinoma

## INTRODUCTION

Lung cancer is one of the world's leading causes of death (1). Lung cancers are mostly divided into two main groups: small cell lung cancers in about 15% of all lung neoplasms and non-small cell lung cancers (NSCLCs) in about 85% of all lung neoplasms (2). Lung adenocarcinoma is the most common form among non-small cell cancers at about 50% of all NSCLCs (3). Adenocarcinoma is a malignancy that originates from glands or gland-like structures and can occur in many organs. Pneumonia is the inflammation of the distal lung structures. If the pneumonia is not resolved, it can lead to the organization of inflammatory exudate, which leads to fibrosis in the lung tissue, called organizing pneumonia. Organizing pneumonia is a prominent inflammatory lung disease due to easily reversible intra-alveolar fibrosis (4, 5).

Exclusion of any other etiology and a histopathologic examination of the lung tissue leads to the diagnosis of "cryptogenic" organizing pneumonia (COP) while organizing pneumonia secondary to other conditions such as infectious agents, drugs (5-aminosalicylic acid, acebutolol, amiodarone, amphotericin B, bleomycin, busulfan, carbamazepine, cephalosporin, fluvastatin, gold salts, methotrexate, etc.), radiation, or malignancy termed as "secondary" organizing pneumonia (5). Lung adenocarcinoma is known to mimic different types of pneumonia, including organizing pneumonia, and can be confused on computed tomography (CT) imaging (6).

In this study, we aimed to present a patient whose pneumonia mimicked COP, who was later diagnosed with mucinous adenocarcinoma after his condition worsened. As it can be difficult to distinguish between these two pathologies, we believe that this study will raise awareness about the differential diagnosis of these conditions.

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## CASE REPORT

A 72-year-old male patient applied to an external center with complaints of cough with sputum and back pain. The patient was a retired metal worker with a 40-year smoking history and had quit smoking for 12 years. The patient had no chronic disease other than hypothyroidism.

A CT scan was performed on the patient (Figure 1), and the patient who was diagnosed with community-acquired pneumonia was referred to Trakya University School of Medicine Hospital, Department of Chest Diseases for further examination. The chest CT performed on the patient showed pneumonic infiltrates that progressed in the right lower lobe (Figure 2). Flexible bronchoscopy was requested to find the cause of pneumonia. According to the results of bronchoscopy, no signs of infection or endobronchial lesion were found. The basal segment openings of the lung were edematous and bronchoalveolar lavage from the right lower lobe revealed inflammation, but no malignancy was found. In addition, a sample was taken for bronchoalveolar lavage culture.

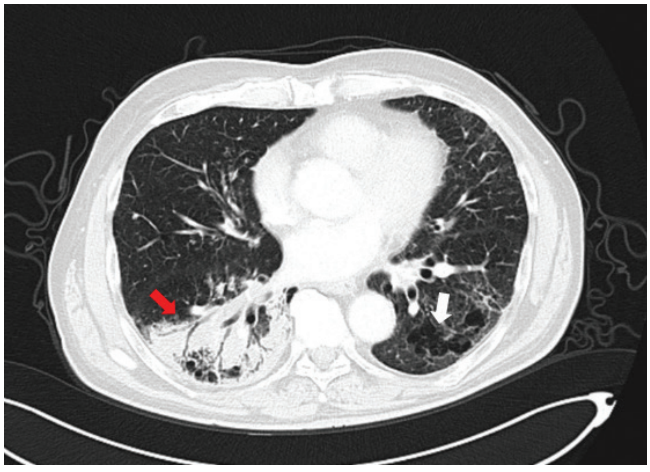

**Figure 1:** A homogeneous consolidation area with air bronchogram is observed in the posterobasal segment of the lower lobe of the right lung (red arrow). In addition, cystic emphysematous changes are observed in the lower lobe of the left lung (white arrow).

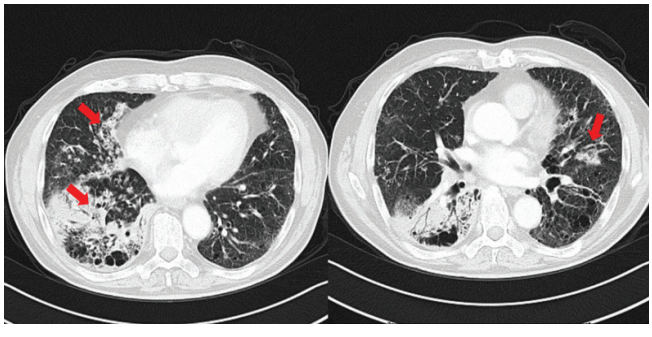

**Figure 2:** Axial plane contrast computed tomography scan 6 weeks after the first admission. In addition to previous consolidations in the lower right basal segment, newly developed air bronchograms and consolidation areas are observed in both lungs (red arrows).

The patient was then recalled with the results of the lavage culture. The patient did not have chest pain or hemoptysis, but sputum and dyspnea continued. Inspiratory sounds were coarse, and crackles were heard in the lower zone of the right lung. Saturation of peripheral oxygen ($SpO_2$) levels were normal. No bacterial growth was detected in the bronchoalveolar lavage culture, and a contrast-enhanced CT scan was requested.

Computed tomography findings (Figure 3) were evaluated as COP due to the absence of other etiological factors. The patient was started on methylprednisolone (40 mg/day) and levofloxacin (750 mg/day) for two weeks. No disease progression or improvement in his condition was observed in this period, and the patient started to suffer from severe dysnepea. The patient was hypoxic with $SpO_2$ levels between 65-70%. The patient was given oxygen supplementation and was started on piperacillin-tazobactam for two weeks. Chest CT was also requested. Both lungs had peripheral consolidations compared to older CT scans (Figure 4). The patient also had a negative coronavirus disease-2019 polymerase chain reaction test in this period.

The patient was then referred to the department of interventional radiology for percutaneous transthoracic lung

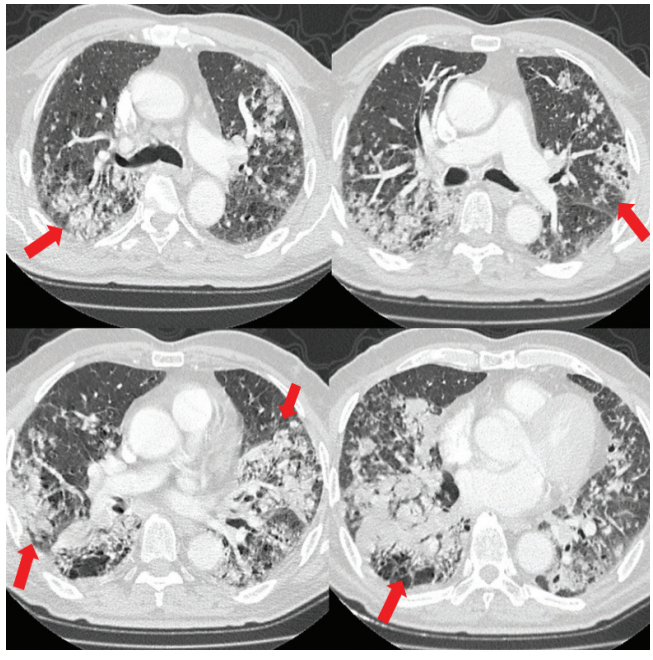

**Figure 3:** Axial plane contrast computed tomography scan, 5 months after the first admission. The increasing number of infiltration areas are observed in both lungs (red arrows). Infiltration areas consist of nodular consolidation that tends to coalesce.

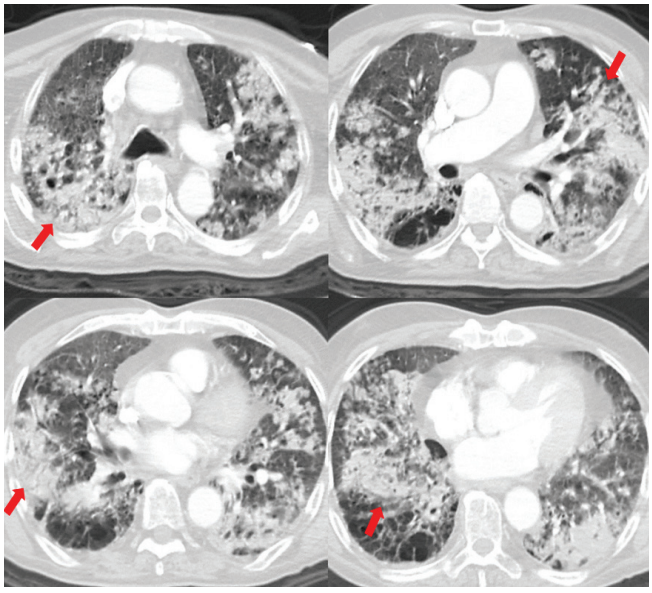

**Figure 4:** Axial plane contrast computed tomography scan, 7 months after the first admission. Increasing infiltration areas are observed in both lungs. Infiltration areas consist of common consolidation areas (red arrows).

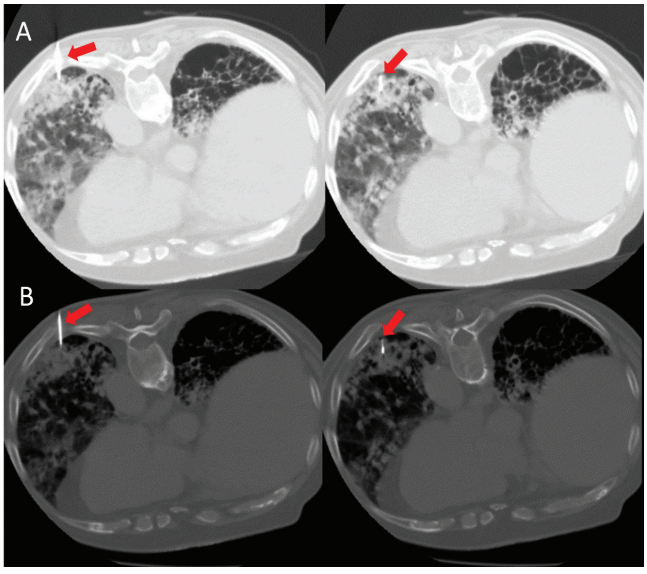


**Figure 5:** Core needle biopsy was performed by entering percutaneous from the consolidation area observed in the lower lobe of the left lung (red arrows). A: Lung parenchyma window. B: Bone window.

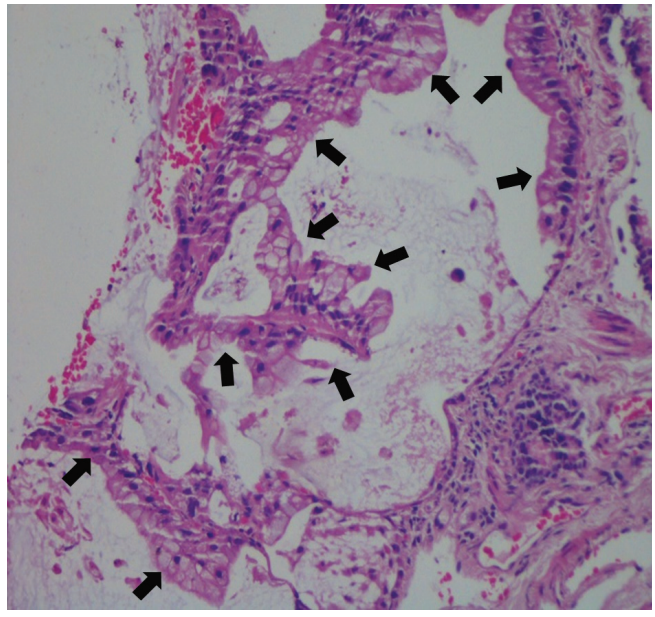

**Figure 6:** Cubic and columnar tumor cells with a basally located nucleus and abundant cytoplasmic mucin lining the alveolar wall (arrows) (hematoxylin & eosin stain, x100 magnification).

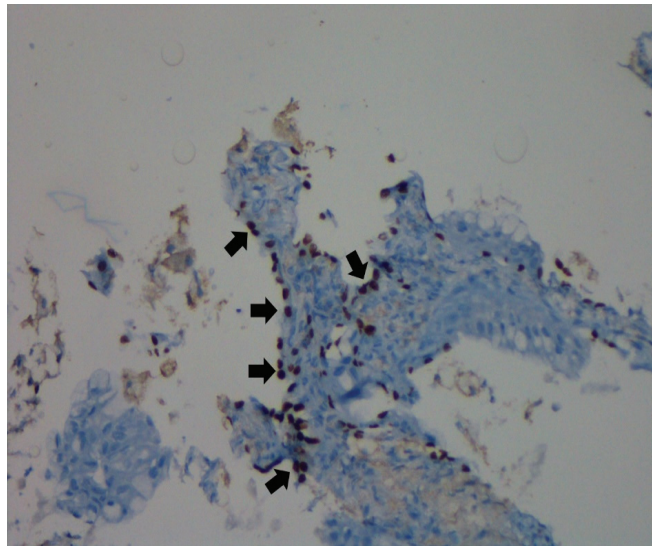

**Figure 7:** Positive stain for thyroid transcription factor-1 antibody in pneumocyte nuclei (arrows) (x100 magnification).

biopsy (Figure 5). Biopsy material was positive for thyroid transcription factor-1 and negative for P40 stains, confirming the diagnosis of lung adenocarcinoma (Figure 6, 7).

Adenocarcinoma was determined as mucinous type with lepidic pattern [World Health Organization (WHO) classification of bronchoalveolar carcinoma pre-2011]. Although a definite classification of invasiveness could not be made on the small biopsy material after diagnosis, the patient was referred to the department of medical oncology for chemotherapy.

## DISCUSSION

Cancer is among the deadliest diseases with approximately 10 million deaths worldwide (7). According to studies conducted by WHO, lung cancer ranks first in the list with 1.8 million deaths in 2020 (7).

Adenocarcinoma is the most common histological subtype of lung cancer, and many different subtypes are depending on the mucinous differentiation and invasion stage (3). In our case, the patient had mucinous adenocarcinoma with a possible lepidic predominant pattern.

World Health Organization 2011 classification removed the term of bronchoalveolar carcinoma and added subtypes of adenocarcinoma *in situ*, minimally invasive adenocarcinoma, invasive mucinous adenocarcinoma, and lepidic-predominant invasive non-mucinous adenocarcinoma (6). Organizing pneumonia CT patterns include peripheric patchy consolidations, ground-glass opacities, perilobular opacities, reversed halo sign, nodules, and masses (8). Consolidations and ground-glass opacities were found to be characteristics of both general lung adenocarcinoma (previously bronchoalveolar carcinoma) and organizing/infectious pneumonia, though the peripheral distribution of consolidation and nodular pattern were found to be significantly more common in patients with adenocarcinoma (8, 9). Findings of cysts, cavities, CT angiogram sign, and leafless tree bronchogram sign were not significantly different among pneumonia and adenocarcinoma (9).

Detterbeck et al. (10) described pneumonic type adenocarcinoma radiologically as regional rather than the nodular appearance of varying areas of ground glass and consolidation. Microscopically they are typically found to be mucinous adenocarcinomas that are invasive with a predominance of lepidic growth. The increasing prevalence of CT imaging made cancers with ground glass and/or lepidic nodules seen more commonly. Moderate levels of correlation have been reported between imaging and histological subtypes of these pneumonic-type adenocarcinomas. The consolidative pattern was around 33-75% of the cases. Areas of ground glass are observed in about 75% of the cases (10). The five-year disease-free survival rate for lepidic predominant adenocarcinoma was found to be around 72-90% (11).

In our case, we observed a similar progressive consolidation pattern on CT scans of the patient, and the peripheral consolidations suggested the diagnosis of lung adenocarcinoma. However, the absence of nodular pattern was more in favor of pneumonia. It can be confused with mucinous adenocarcinoma of the lung and COP due to similar radiological findings. Other diagnoses must be ruled out before a diagnosis of COP can be made.

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