RESEARCH ARTICLE

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Underlying Malignancy in Patients Initially Diagnosed with Organizing Pneumonia on CT-Guided Lung Biopsy: When Should Repeat Biopsy be Considered?

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Abstract

Objectives: Organizing pneumonia (OP) is a non-specific clinicopathological entity that may mimic pulmonary malignancy and can coexist with primary or metastatic lung cancer. This study aimed to evaluate the clinical and radiological characteristics of patients initially diagnosed with OP on computed tomography (CT)-guided lung biopsy who were subsequently found to have underlying malignancy on repeat biopsy.

Methods: This retrospective study included 151 patients who underwent CT-guided lung biopsy for suspected primary or metastatic lung cancer. The study group comprised twelve patients (7.9%) whose initial biopsy results were reported as OP. Patients with persistent clinical or radiological suspicion of malignancy underwent repeat biopsy. Clinical risk factors and thoracic CT features associated with malignancy were evaluated and correlated with final pathological outcomes.

Results: Among the 12 patients diagnosed with OP on initial biopsy, 6 underwent repeat biopsy due to ongoing suspicion of malignancy. Underlying malignancy was confirmed in 5 of these patients (41.6% of the study group): three cases of primary lung cancer and two cases of metastatic malignancy. Key indicators prompting repeat biopsy included lesion progression, lack of response to treatment, history of malignancy, and technically inadequate initial biopsy. No progression was observed in patients managed with clinical and radiological follow-up alone.

Conclusion: OP and malignancy may coexist and share overlapping imaging features. In patients with OP who demonstrate lesion progression, treatment resistance, or persistent clinical or radiological suspicion of malignancy, repeat biopsy should be strongly considered to avoid delayed cancer diagnosis.

Keywords: Organizing pneumonia, lung cancer, CT-guided lung biopsy

Introduction

Cryptogenic organizing pneumonia (OP), formerly called bronchiolitis obliterans OP, is a clinicopathological pulmonary diagnosis secondary to alveolar wall damage from various causes. OP shows no sex predilection and is more common in the fifth and sixth decades of life.[1]

OP can present with dry cough, dyspnea, malaise, fever, weight loss, and flu-like symptoms. However, none of these symptoms is specific to OP. Due to non-specific clinical features, OP can be confused with various diseases such as infections and cancer. This situation may lead to delays in the diagnosis and treatment of the underlying disease and to mismanagement.[2] In organizing pneumonia, thoracic computed tomography (CT) shows imaging features such as peripheral consolidations, perilobular opacities, ground-glass opacities, inverted-halo sign, and mass-like appearance, but none of these findings are specific.[3,4] OP may be associated with primary or metastatic lung cancer or develop secondarily from existing lung cancer in patients.[5-8]

OP has been associated with many non-specific clinical and radiological features. OP and lung cancer can co-occur in the same patient. Due to these characteristics, lung biopsy results obtained under CT guidance should be interpreted carefully. Because biopsy samples may be taken from an area of OP accompanying lung cancer, this can give misleading results.[9]

The aim of this study is to examine specific clinical and radiological features of patients diagnosed with OP on initial biopsy whose repeat biopsy also revealed malignancy, and to identify predictors of malignancy among patients with OP.

Methods

This retrospective study Binali Yıldırım University Mengücek Gazi Training and Research Hospital was approved by the institutional review board (date: 04/09/2025; decission no: 2025-15/05). The requirement for informed consent was waived by the institutional ethics committee

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due to the retrospective nature of the study. In this retrospective study, 151 patients who underwent CT-guided lung biopsy for suspected lung cancer or metastatic disease were evaluated. Twelve of 151 patients (7.94%) whose biopsy results were reported as OP formed our study group. Patients whose biopsy results were reported as suspicious, or whose initial biopsy did not indicate OP were excluded from the study. Among the 12 patients whose biopsy results were reported as OP, those who continued to have clinical or radiological suspicion of malignancy underwent a second biopsy. The Patient selection flow diagram is shown in Figure 1.

Concordance and discordance between histopathological and radiological findings were determined according to a previously conducted study. Concordance is defined as the agreement between pre-biopsy imaging features and a histopathological result not reported as malignant.[10]

Discrepancy is defined as a mismatch between pre-biopsy imaging features and a histopathological result reported as non-malignant. Absence of infection, a new or growing lesion, lesion size greater than 1 cm, a history of cancer, and a mass lesion are clinical features that raise suspicion of malignancy.

On thoracic CT, heterogeneous contrast enhancement, invasion of surrounding tissues, upper-lobe lesions, lesions with irregular borders, multiple lesions, spiculated contours, and solid lesions are radiological features that raise suspicion for malignancy. The presence of at least one of the defined clinical features and at least two accompanying radiological features was considered an indication for repeat biopsy. The patients' ages, gender, average lesion size, and thoracic CT images were evaluated.

A total of 15 imaging features were evaluated on thoracic CT scans: crazy-paving pattern; adjacent bronchiectasis; ground-glass opacities; inverted halo sign; multiple similar lesions; adjacent pleural effusion; adjacent atelectasis; peripheral location; background pulmonary fibrosis; preservation of the subpleural region; microlobulation; halo sign; intralesional calcification; trapped lung; and spiculation.[11,12]

Statistical Analysis

Descriptive statistics were used to summarize clinical, imaging, and pathological variables. Continuous variables were reported as mean ± standard deviation or median with interquartile range, as appropriate. Categorical variables were presented as frequencies and percentages. Due to the limited sample size, inferential statistical analyses were not performed.

Results

A total of 151 patients underwent CT-guided biopsy. OP was detected in 12 of these patients. Our study group consisted of these 12 patients (7 women and 5 men). Two of the 12 patients had a history of malignancy. Five of the 12 lesions (41.6%) had spiculated contours. Of the 12 lesions, one (8.3%) had ground-glass opacity, four (33.3%) were of mixed type, and seven (58.3%) were solid. Six of these 12 patients, who still had clinical or radiological suspicion of malignancy, underwent repeat biopsy. Four of these six patients underwent repeat CT-guided lung biopsy, one underwent a wedge resection, and one underwent a bronchoscopy-guided biopsy to obtain pathological samples. The six patients who did not undergo repeat biopsy were followed clinically for a mean of 4 months from the date of the first biopsy. No progression of lesions was observed during these 4 months. Of the 6 patients who underwent repeat biopsies because of persistent radiological and clinical suspicion of malignancy, 1 had lung metastases from pancreatic cancer, 1 had lung metastases from colon cancer, and 3 had primary lung cancer. In the remaining patient, the pathology report indicated OP (Table 1, 2).

Discussion

Since malignancy and OP can coexist in the same patient, distinguishing isolated OP from OP associated with malignancy.[5,6,13] The clinical and radiological features of OP are non-specific and can mimic malignancy. In this study, among 151 patients who underwent CT-guided lung biopsy, pathology reports for 12 patients indicated OP.

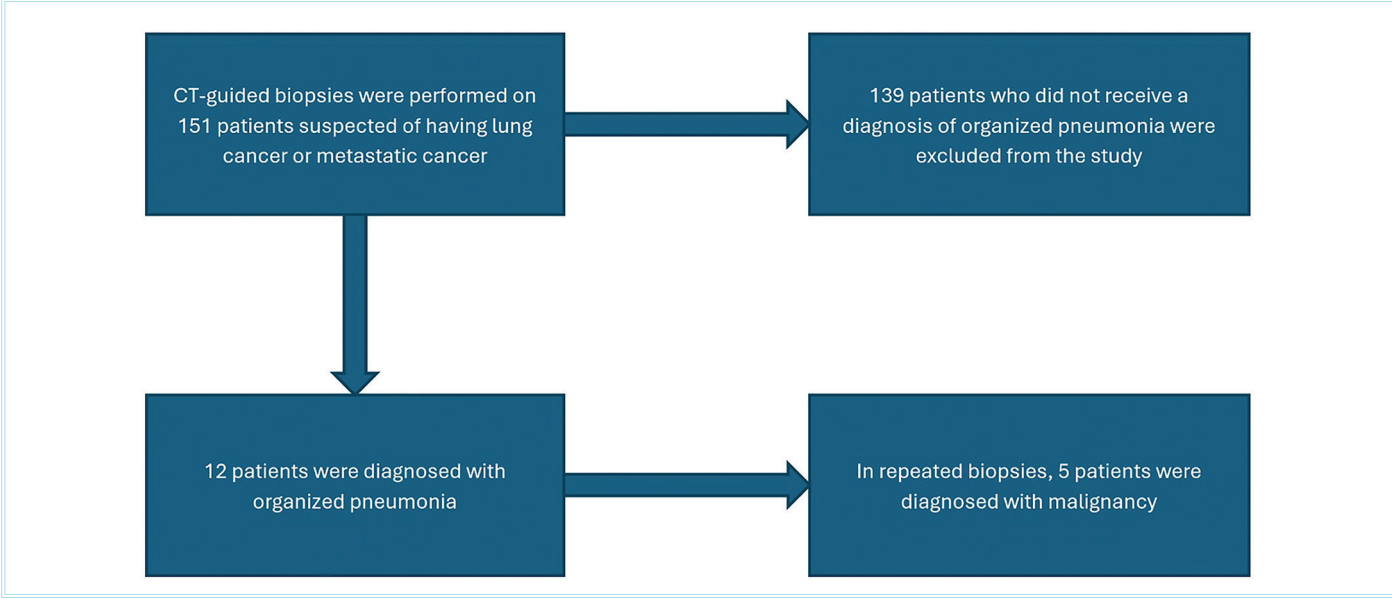

Figure 1. Patient selection flow diagram
CT: Computed tomography

Due to continued clinical and radiological suspicion of malignancy, repeat biopsies were performed in 6 of the 12 patients; underlying malignancy was confirmed in 5 of these 6 patients (5/12, 41.6%). A detailed examination of these five patients with OP revealed several features suggestive of an underlying malignancy.

Table 1. Demographic and imaging characteristics of 12 patients diagnosed with organizing pneumonia after CT-guided lung biopsy

	Diagnosed malignancy (n=5)	Proven organized pneumonia (n=7)
Male	2 (40%)	3 (42.9%)
Female	3 (60%)	4 (57.1%)
Density (%)		
Ground glass Mixed	0 (0%) 2 (40%)	1 (14.2%) 2 (28.5%)
Solid	3 (60%)	4 (57.1%)
Reversed Halo sign	0 (0%)	0 (0%)
Multiple similar lesion	2 (40%)	3 (42.9%)
Crazy paving pattern	0 (0%)	0 (0%)
Adjacent bronchiectasis	1 (20%)	2 (28.5%)
Adjacent pleural effusion	1 (20%)	2 (28.5%)
Adjacent atelectasis	2 (40%)	3 (42.9%)
Peripheral location	3 (60%)	4 (57.1%)
Lung fibrosis	0 (0%)	1 (14.2%)
Calsicification in lesion	0 (0%)	1 (14.2%)
Spiculated contour	3 (60%)	2 (28.5%)
Subpleural sparing	0 (0%)	2 (28.5%)
Microlobulation	1 (20%)	1 (14.2%)
Trapped lung	1 (20%)	1 (14.2%)
Halo sign	0 (0%)	1 (14.2%)

CT: Computed tomography

In the first patient, a follow-up thoracic CT scan performed three months later showed an increase in lesion size, leading to a wedge resection and a diagnosis of malignancy with accompanying OP. This demonstrates that a second biopsy should be considered if there is an increase in lesion size on subsequent imaging.

In the second patient, thoracic CT scans obtained immediately before and during the biopsy showed a large area of consolidation suggestive of underlying malignancy. Since no regression was observed in the lesion on a thoracic CT scan performed 14 days after treatment initiation, the CT-guided biopsy was repeated, confirming a concomitant malignancy. This indicates that a second biopsy should be considered in patients who do not respond to treatment.

The third and fourth patients had known diagnoses of pancreatic and colon adenocarcinoma, respectively. Two months later, a follow-up thoracic CT scan showed lesion progression in both patients, leading to repeat biopsies that demonstrated metastatic disease accompanied by OP in the lungs. This demonstrates that metastatic disease should be considered in the differential diagnosis when lesion progression occurs in patients with a known history of cancer.

In the fifth patient, the first biopsy could not be performed adequately because of hemorrhage. Therefore, a second biopsy was performed 21 days later, and concomitant malignancy was diagnosed. This shows us that if a biopsy cannot be obtained under appropriate conditions, repeated biopsies may be considered in patients with clinical and radiological suspicion of malignancy.

Evaluation of patients' thoracic CT images at diagnosis revealed no findings indicative of malignancy. Given the many similarities between OPand malignancy or metastatic lung disease, this finding is not surprising.[6,13-15] Compared with the previous study, our findings are similar.[9]

Table 2. Additional characteristics of 5 patients diagnosed with malignancy on repeat biopsy

Patient no	First biopsy	Cancer histopathology	Diagnosing method	Previous malignancy	Consistency	Clinical follow-up
1	-	Squamous cell carcinoma of the lung	Wedge resection	No	Consistent	A thoracic CT scan performed 3 months later showed an increase in lesion size, and wedge resection confirmed the diagnosis of associated malignancy.
2	-	Lung adenocarcinoma	CT-guided repeat lung biopsy	No	Consistent	A thoracic CT scan taken 14 days after treatment showed no regression, prompting a repeat biopsy and confirming the diagnosis of accompanying malignancy.
3	-	Pancreatic cancer with lung metastasis	CT-guided repeat lung biopsy	Yes	Inconsistent	A follow-up thoracic CT scan taken 2 months later showed progression of the lesion, so a repeat biopsy was performed.
4	-	Colon adenocarcinoma with lung metastasis	CT-guided repeat lung biopsy	Yes	Consistent	A follow-up thoracic CT scan taken 2 months later showed progression of the lesion, so a repeat biopsy was performed.
5	Restriction due to bleeding around the lesion during the procedure	Squamous cell carcinoma of the lung	Bronchoscopy	No	Inconsistent	A second biopsy was performed 21 days after the first, and an accompanying malignancy was diagnosed.

CT: Computed tomography

Study Limitations

Due to the retrospective nature of our study, the follow-up periods of the patients and the time between biopsy and control imaging varied, and the small number of patients in our study group prevented us from performing statistical analysis; these are considered limitations of our study. More comprehensive research is needed to standardize the follow-up of patients with organized pneumonia.

Conclusion

OP and malignancy can coexist and share similar clinical and radiological features. In patients diagnosed with organized pneumonia who do not respond to treatment, who do not show regression on follow-up imaging, who show progression, repeat biopsy should be considered if malignancy is suspected on clinical and radiological grounds.

Ethics

Ethics Committee Approval: This retrospective study Binali Yıldırım University Mengücek Gazi Training and Research Hospital was approved by the institutional review board (date: 04/09/2025; decission no: 2025-15/05).

Informed Consent: Since the study was a retrospective study, informed consent was not required by the ethics committee.

Footnotes

Authorship Contributions

Concept: M.F.Ö., Desing: M.F.Ö., K.B.M., Data Collection or Processing: T.B.A., Analysis or Interpretation: M.F.Ö., K.B.M., Literature Search: K.B.M., T.B.A., Writing: M.F.Ö., K.B.M., T.B.A.

Conflict of Interest: No conflict of interest was declared by the authors.

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