

Enlarged Subcarinal Lymph Nodes: Differentiation of Lymphoma and Sarcoidosis on Virtual CT Bronchoscopy

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Abstract: *This retrospective study evaluated the usefulness of virtual CT bronchoscopy for differentiating lymphoma from sarcoidosis in patients with histologically confirmed subcarinal lymph node enlargement. One hundred contrast enhanced CT examinations, including 50 lymphoma and 50 sarcoidosis cases, were analyzed. Virtual CT bronchoscopy was reconstructed from the original CT datasets, and the carinal ridge was classified as normal, partially widened, or completely obliterated by a blinded radiologist. Partial widening or complete obliteration was observed significantly more often in lymphoma than sarcoidosis, providing a diagnostic accuracy of 84%. Complete obliteration occurred only in lymphoma. These findings suggest that virtual CT bronchoscopy offers a useful noninvasive adjunct for differentiating lymphoma from sarcoidosis, while complete obliteration of the carinal ridge strongly favors lymphoma over sarcoidosis.*

Keyword: Virtual CT bronchoscopy; Sarcoidosis; Lymphoma; Mediastinal lymph nodes; Subcarinal lymph node; Computed tomography; Differential diagnosis

1. Introduction

Differentiation of sarcoidosis and lymphoma is quite important in view of the entirely different treatment and prognosis of the two diseases. Histopathological examination remains the most reliable differentiation. However, in clinical practice, noninvasive differentiating signs may be needed. The present study describes a new diagnostic sign for differentiation of sarcoidosis and lymphoma on virtual CT bronchoscopy.

2. Material and Methods

The contrast-enhanced CT examinations of 100 patients with histologically verified subcarinal lymph node enlargement (50 with sarcoidosis and 50 with lymphoma) were retrospectively analyzed. The inclusion criterion was enlarged subcarinal lymph nodes on contrast-enhanced CT. The subcarinal lymph nodes were considered enlarged when they were matted together or when they had a short axis larger than 10 mm. The study protocol has been approved by the ethical committee of the institution.

Virtual CT bronchoscopy was performed from the original CT data of the patients on a dedicated workstation (Synapse 3D, Fujifilm, Japan). The virtual bronchoscopy videos were evaluated by an experienced radiologist who was blinded to the final diagnosis and the sectional CT images. The radiologist was asked to note whether the carinal ridge between the main bronchi was normal, partially widened or completely obliterated. The diagnostic performance of the virtual bronchoscopy findings was evaluated by the Chi-square test.

3. Results

The appearance of the carinal ridge on the virtual CT bronchoscopy in patients with lymphoma and sarcoidosis is described in table 1.

The carinal ridge was partially widened or completely obliterated in 40 patients with lymphoma (80%) and normal in 10 patients (20%). On the other hand, it was partially widened or completely obliterated in 6 patients with sarcoidosis (12%) and normal in 44 patients (88%) (Fig 1,2). The difference between the two groups was statistically significant ($p < 0.01$). The finding has sensitivity, specificity, positive predictive value, negative predictive value and accuracy of 80%, 88%, 87%, 81% and 84%, respectively.

The carinal ridge was completely obliterated in 28 patients with lymphoma (56%) and normal or partially widened in 22 patients (44%). On the other hand, no patients with sarcoidosis had complete obliteration of the carinal ridge. All the 50 sarcoidosis cases had either normal or partially widened carinal ridge. The difference between the two groups was statistically significant ($p < 0.01$).

4. Discussion

Previous studies have introduced certain diagnostic features to differentiate between sarcoidosis and lymphoma in patients with mediastinal lymph node enlargement. These diagnostic features were based on the topographical distribution of the enlarged lymph nodes, intranodal calcification, central cavitation, and coalescence (1). Other studies have concentrated on the difference in diffusion restriction on MRI, the difference in uptake of FDG on PET/CT and radiomics analysis on CT (2). To the best of our knowledge, the obliteration of the carinal ridge has not been previously evaluated as a possible differentiating sign between subcarinal lymphoma and sarcoidosis, neither on endoscopy nor on virtual CT bronchoscopy.

One of the limitations of the present study is the absence of cases of sarcoidosis-lymphoma syndrome in the included patients. Sarcoidosis-lymphoma syndrome is the coexistence of the two diseases in the same patient (3). It may represent a confounding factor for the differentiation of the two diseases.

A hypothesis to explain the obliteration of the carinal ridge in lymphoma and not in sarcoidosis is that the sarcoidosis lymph nodes may have softer consistency in comparison to the lymphoma lymph nodes, making their pressure effect on adjacent structures less pronounced.

5. Conclusion

Virtual CT bronchoscopy provides a useful supplementary imaging method for differentiating lymphoma from sarcoidosis in patients with subcarinal lymph node enlargement. Partial widening or complete obliteration of the carinal ridge demonstrates good diagnostic performance, while complete obliteration makes sarcoidosis highly unlikely. These findings support the value of the proposed carinal ridge sign as a practical noninvasive adjunct to routine CT assessment.

References

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Table 1: The appearance of the carinal ridge on the virtual CT bronchoscopy in patients with lymphoma and sarcoidosis.

	Lymphoma n=50 (100%)	Sarcoidosis n=50 (100%)
Normal carinal ridge	10 (20%)	44 (88%)
Partially widened carinal ridge	28 (54%)	6 (12%)
Completely obliterated carinal ridge	22 (44%)	0 (0%)



Figure 1 (a)

Coronal reconstruction of contrast-enhanced CT shows large subcarinal, hilar and superior mediastinal lymph node enlargement in a patient with histologically proven sarcoidosis.

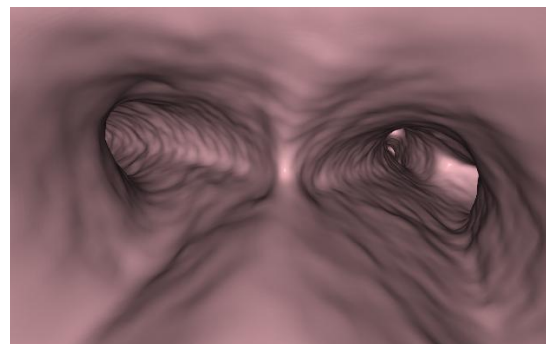


Figure 1 (b)

Virtual CT bronchoscopy of the same patient shows normal carinal ridge.

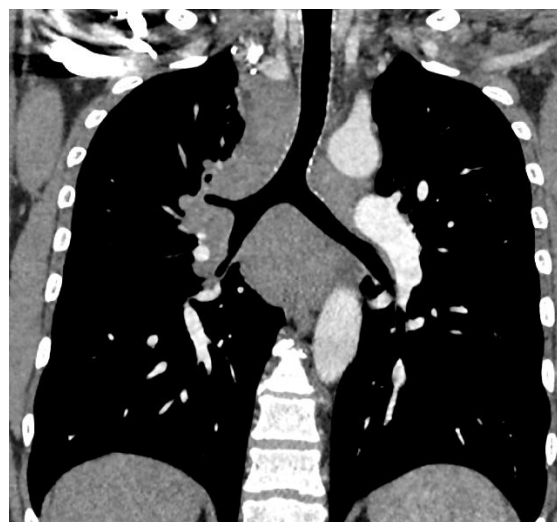


Figure 2 (a)

Coronal reconstruction of contrast-enhanced CT shows large subcarinal, hilar and superior mediastinal lymph node enlargement in a patient with histologically proven lymphoma.

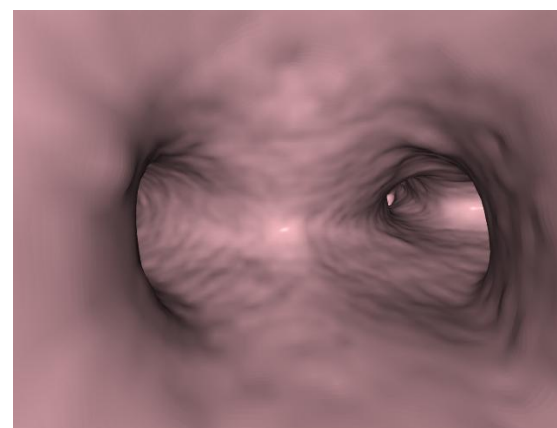


Figure 2 (b)

Virtual CT bronchoscopy of the same patient shows complete obliteration of the carinal ridge.