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Case Report

DIPNECH Mimicking Small Airways Disease: Multimodal Imaging Diagnosis in a Non-Smoking Elderly Woman

Zineb Labbi*, Houda Bennani, Zaynab Iraqi Houssaini, Ola Messaoud, El Aoufir Omar and Jrondi Laila

Department of Emergency Radiology, Ibn Sina University Hospital, Faculty of Medicine of Rabat, Rabat, Morocco

***Corresponding Author:** Zineb Labbi, Department of Emergency Radiology, Ibn Sina University Hospital, Faculty of Medicine of Rabat, Rabat, Morocco.

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Abstract

Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia (DIPNECH) is a rare pulmonary disorder typically affecting non-smoking women, and characterized by a proliferation of neuroendocrine cells combined with small airways disease. Diagnosis is frequently delayed due to nonspecific symptoms and imaging overlap with other conditions.

We present a case of a 73-year-old woman with progressive exertional dyspnea and incidental discovery of multiple bilateral pulmonary nodules. High-resolution CT (HRCT) demonstrated bilateral solid nodules, mosaic perfusion, and bronchial wall thickening. Pulmonary function tests showed moderate irreversible obstruction. PET-CT showed absent or faint uptake. Bronchoscopy and microbiological workup were non- contributory. The constellation of radiologic features, chronicity, and exclusion of alternative etiologies led to the diagnosis of DIPNECH.

DIPNECH remains underdiagnosed due to its nonspecific clinical presentation. Imaging plays a pivotal role, especially HRCT findings of small bilateral nodules and mosaic attenuation. Pulmonary function testing typically shows non-reversible obstructive patterns. Lung biopsy is diagnostic but may be avoided in characteristic cases.

This case emphasizes the importance of recognizing the imaging patterns of DIPNECH, particularly in women with chronic dyspnea and mosaic lung appearance. Long-term imaging comparison can support diagnosis in the absence of biopsy.

Keywords: *Diffuse Idiopathic Pulmonary Neuroendocrine Cell Hyperplasia (DIPNECH); High-Resolution CT (HRCT); PET-CT*

Introduction

Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia (DIPNECH) is a rare lung disease characterized by the proliferation of neuroendocrine cells in the bronchial epithelium. Although considered an early lesion of pulmonary carcinoid tumors, DIPNECH can also present with symptoms due to small airway obstruction and constrictive bronchiolitis. It primarily affects middle-aged, non-smoking women, but its clinical recognition remains poor due to overlap with more common airway diseases such as asthma and COPD (chronic obstructive pulmonary disease).

Case Presentation

A 73-year-old non-smoking woman presented with slowly progressive exertional dyspnea (mMRC grade II). She denied cough, wheeze, or systemic symptoms. Pulmonary nodules were initially detected on a spinal CT following trauma in 2023.

Retrospective review of a chest CT from 2013 revealed few small nodules in the middle lobe. Serial CT scans from 2013 to 2024 showed gradual increase in number and size of bilateral solid nodules (maximum diameter: 13 mm), involving the middle lobe, lingula, and posterior segments of both lungs.

High-resolution CT demonstrated bilateral small solid nodules, many with endobronchial location (Figure 2 and 3). Patchy mosaic perfusion was also found, consistent with air trapping (Figure 1). A mild diffuse bronchial wall thickening (Figure 4) was observed bilaterally with no significant lymphadenopathy or pleural effusion.

Figure 1: *Expiratory HRCT slice showing patchy perfusion mosaic with air trapping consistent with constrictive bronchiolitis.*

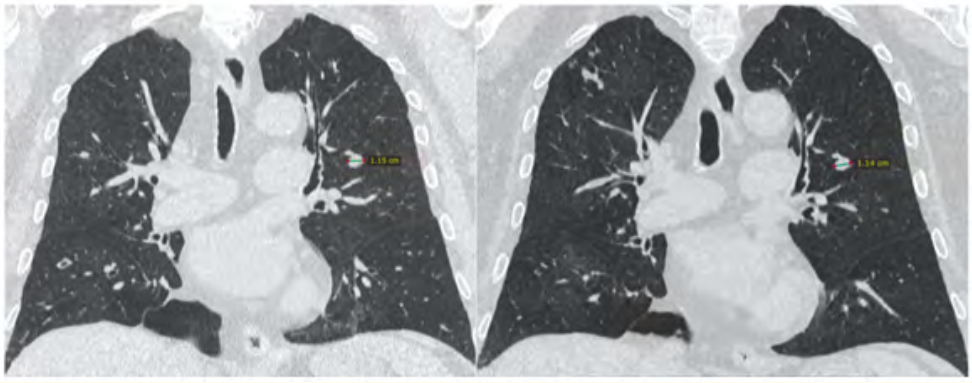

Figure 2: *Coronal CT reformation displaying left upper lobe pulmonary nodule showing strict stability in 6 months apart control CT.*

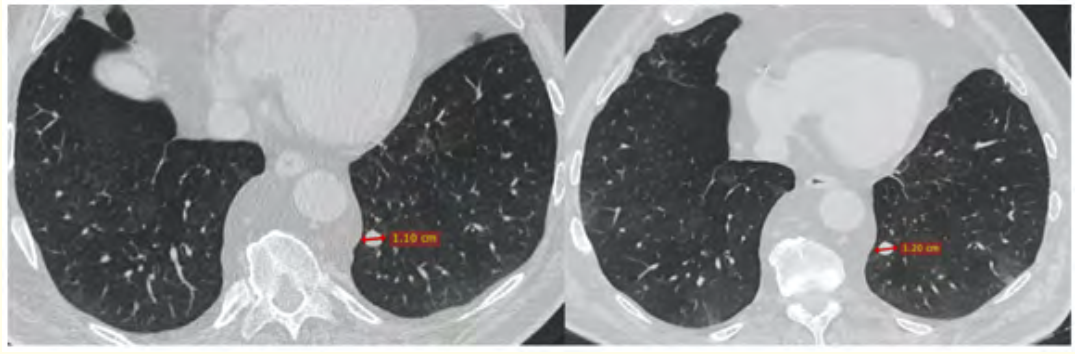

Figure 3: *Axial CT showing endobroncheal posterior lobe nodule stability in 1 year apart evaluation.*

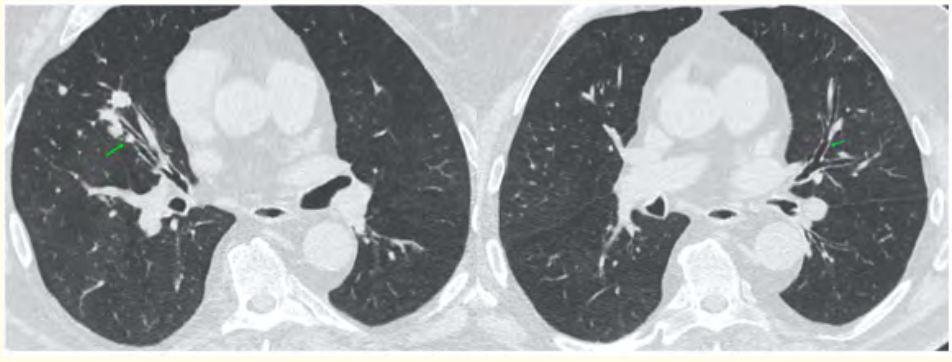

Figure 4: *Axial CT showing diffuse bronchial thickening with endobronchial impaction (green arrow).*

PET-CT revealed no hypermetabolic activity. Pulmonary function tests showed moderate non-reversible obstruction (FEV1: 47%), preserved total lung capacity (TLC: 104%), and decreased DLCO (53%). Bronchoscopy and microbiological studies were non-contributory. A short empirical course of antibiotics (ceftazidime) was ineffective. Pulmonary rehabilitation was started but stopped due to unrelated diplopia.

Given the radiologic pattern, chronicity, and exclusion of alternate causes, the diagnosis of DIPNECH was made. The case was discussed in a multidisciplinary interstitial lung disease (ILD) board and surveillance was planned.

Discussion

DIPNECH is a rare lung condition characterized by an abnormal proliferation of pulmonary neuroendocrine cells (PNECs). According to the World Health Organization, this cell overgrowth can give rise to small clusters known as tumorlets, and in some cases, typical carcinoid tumors [1].

Even though DIPNECH is uncommon, it's likely underdiagnosed. That's partly because its symptoms often resemble more familiar respiratory conditions like asthma or COPD, which can delay recognition [2]. Most patients are middle-aged or older women who have never smoked. The typical presentation includes a chronic cough, shortness of breath on exertion, and occasionally wheezing. These symptoms are linked to inflammation and narrowing of the small airways-specifically a form of constrictive bronchiolitis-driven by neuroendocrine cell activity and accompanying fibrosis [2,3].

Pulmonary function tests often show obstructive changes that don't respond to bronchodilators. Lung volumes are usually preserved, but gas exchange-especially the diffusing capacity (DLCO)-tends to be reduced.

High-resolution CT (HRCT) scans play a key role in diagnosis. Imaging tools usually identify multiple infra- centimetric lung nodules, airway wall thickening, and areas of mosaic attenuation, which reflect uneven ventilation and airflow obstruction. In this particular patient, serial CT imaging over more than a decade showed a slow increase in both the number and size of nodules, along with classic features like air trapping and patchy lung perfusion [3,4].

Although a lung biopsy remains the gold standard for diagnosis-confirming diffuse neuroendocrine cell proliferation, sometimes with tumorlets-a confident diagnosis can sometimes be made based on clinical presentation and imaging, especially when the disease progresses slowly and there are no signs of metastasis or abnormal PET-CT findings [3,4].

There's no standardized treatment protocol for DIPNECH. Management is usually supportive, aimed at relieving symptoms. Inhaled therapies may help some patients, though results vary. In select cases- especially with worsening symptoms or suspected tumor activity- somatostatin analogs like octreotide are considered [5]. Surgery may be appropriate when there's concern about malignancy or when the diagnosis remains unclear.

In this case, the diagnosis of DIPNECH was supported by the classic combination of clinical features, imaging findings, and a long-term stable disease course. The lack of infection, malignancy, or abnormal metabolic activity on PET further strengthened the diagnosis without requiring invasive procedures.

Conclusion

Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia (DIPNECH) may be rare, but it's an important condition to consider- especially in women who show up with persistent shortness of breath and multiple small nodules scattered throughout both lungs. Spotting its unique radiologic patterns and understanding how these changes typically look over time can go a long way toward making a diagnosis without needing invasive procedures. Diagnosing DIPNECH early can help avoid unnecessary treatments and make sure patients get the right kind of follow-up care-particularly since there's a risk it could progress into carcinoid tumors.

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