Clinical History:

A 45-year-old man was admitted to the hospital with one-year history of dry, non-resolving cough and fever. Chest radiograph (Fig. 1) was performed followed by thoracic CT scan (Fig. 2) and EBUS (Endobronchial Ultrasound) biopsy. Histopathology was positive for non-necrotic epithelial granulomas.

Imaging Findings:

Chest radiograph (Fig. 1) revealed diffused, multiple small nodular opacities predominantly located in the upper lung lobes. There was a moderate bilateral hilar lymphadenopathy.

CT scan (Fig. 2) showed bilateral hilar, lymph node enlargement. There were numerous well-defined small nodules predominantly seen in a perilymphatic distribution in the upper and middle lung zones. Locally they tended to coalesce together forming consolidations, primarily in both upper and middle lung zones.

Discussion:

Sarcoidosis is a granulomatous multisystem disease of unknown aetiology. Even though non-necrotising granulomas characteristic for this disease may be present in any organ, thoracic involvement is most common and is responsible for most of morbidity and mortality. [1]

Sarcoidosis can manifest in highly characteristic manner as a Lofgren’s or Heerfordt’s syndrome; however, in most cases initial symptoms are non-specific or even absent at all. Incidental abnormal chest radiograph is not an uncommon first finding. [2]

Most common chest radiograph findings include hilar and mediastinal lymphadenopathy followed by interstitial lung disease. Pattern of chest radiological abnormalities is a basis for classic sarcoidosis classification. (Fig. 3) [3]

Stage 2, observed in 25-30% of first time presenting patients, is described as a hilar and mediastinal lymph node enlargement associated with pulmonary abnormalities. Lymphadenopathy pattern is similar to that of stage 1 disease (Fig. 4), where 85-90% patients have symmetric, bilateral, well-defined, enlarged hilar lymph nodes. In 75% of cases mediastinal lymphadenopathy is also present. [4]

Small nodules are the most common parenchymal changes, present in approximately 75-90% of patients. Although these lesions are predominantly found in the upper and middle lung zones, they can also occur in the lower lung zones. Nodules are primarily seen in peribronchovascular and supleural localisation, less frequently in the interlobular septa. In rare cases of patients with extensive disease, micronodules can appear to be randomly distributed. Even though they are initially individual lesions, they can coalesce over time forming larger entities. Such changes, observed in 15-25% of patients, take appearance of irregular consolidation measuring 1-4 cm. They can have airbronchogram and in solitary cases cavitate - which should raise question of fungal or mycobacterial
infection. On periphery of consolidation individual small nodules can be spotted - an image named “galaxy sign”. Even though these consolidations are commonly called “alveolar sarcoidosis”, in fact they are the result of numerous interstitial micronodules coalescing together. [5]
Airway abnormalities are relatively common in sarcoidosis, observed in 65% of patients. Most common manifestation is bronchial wall thickening and small endobronchial lesions. Hardly ever they lead to lobar or segmental atelectasis. [4]
Pleural involvement is uncommon, it can present as a pleural thickening or pleural effusion. Effusions are typically minimal and usually resolve spontaneously in 2-3 months. However, there have been singular reports of massive pleural effusions. [5]

Take home message
Small nodules in perilymphatic distribution in association with symmetric bilateral hilar lymphadenopathy is a classic appearance of stage 2 sarcoidosis.
Alveolar sarcoidosis is a term describing coalescing interstitial small nodules.

**Differential Diagnosis List:** Stage 2 sarcoidosis, Infectious: Tuberculosis, Mycoplasmosis, Histoplasmosis, Blastomycosis, Coccidiomycosis, Cat scratch disease, Malignancy: Lymphangiosis carcinomatosa, Lymphoma, Cancer, Inorganic dust diseases: Beryllosis, Silicosis, Other: Hypersensitivity pneumonitis, Drug reactions, Amyloidosis

**Final Diagnosis:** Stage 2 sarcoidosis

**References:**

Description: There is a moderate bilateral hilar lymphadenopathy. There are diffused, multiple small nodular opacities predominantly located in the upper lung lobes Origin: Department of Radiology, National Institute of Tuberculosis and Lung Diseases, Warsaw, Poland.
Description: There is a moderate bilateral hilar lymphadenopathy. There are diffused, multiple small nodular opacities predominantly located in the upper lung lobes. Origin: Department of Radiology, National Institute of Tuberculosis and Lung Diseases, Warsaw, Poland.
Description: Mediastinal window axial scan. There is hilar node enlargement. There are disseminated small pulmonary consolidations. Origin: Department of Radiology, National Institute of Tuberculosis and Lung Diseases, Warsaw, Poland.
**Description:** Pulmonary window axial scan. There are multiple small, well-defined nodules presenting perilymphatic distribution. They locally coalesce together forming bigger consolidations. Galaxy sign can be seen. **Origin:** Department of Radiology, National Institute of Tuberculosis and Lung Diseases, Warsaw, Poland.
Description: Pulmonary window coronal reconstruction. There are multiple small, well-defined nodules primarily seen in upper and middle lung zones. Locally they coalesce together forming bigger consolidations. Origin: Department of Radiology, National Institute of Tuberculosis and Lung Diseases, Warsaw, Poland.
**Figure 3**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal chest X ray</td>
</tr>
<tr>
<td>1</td>
<td>Hilar lymphadenopathy</td>
</tr>
<tr>
<td>2</td>
<td>Pulmonary infiltration and hilar lymphadenopathy</td>
</tr>
<tr>
<td>3</td>
<td>Pulmonary infiltration</td>
</tr>
<tr>
<td>4</td>
<td>Fibrosis</td>
</tr>
</tbody>
</table>

**Description:** Sarcoidosis staging on the basis of the chest radiograph. **Origin:** Jacek Wakulinski, Department of Radiology, National Institute of Tuberculosis and Lung Diseases, Warsaw, Poland.
Figure 4

Description: 1) Hilar lymph nodes 95% 2) Right superior mediastinal (paratracheal) lymph nodes 75%
3) Left superior mediastinal (aortopulmonary window) lymph nodes 50% 4) Subcarinal lymph nodes
20%

Origin: Jacek Wakulinski, Department of Radiology, National Institute of Tuberculosis and Lung Diseases, Warsaw, Poland.