Dendriform pulmonary ossification
in a case of usual interstitial pneumonia
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Section: Chest imaging
Area of Interest: Lung
Procedure: Computer Applications-General
Imaging Technique: CT
Special Focus: Calcifications / Calculi Case Type:
Clinical Cases
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Patient: 66 years, male

Clinical History:
A 66-year-old male patient was evaluated for known IPF (idiopathic pulmonary fibrosis), diagnosed 1 year ago. Pulmonary function testing demonstrated restrictive disease with forced expiratory volume in 1 second of 60% of predicted value, vital capacity of 58% and diffusing capacity for carbon monoxide of 38%.

Imaging Findings:
Chest CT showed the typical pattern of UIP, revealing subpleural reticulation, cystic honeycombing with predominant basal and subpleural distribution and bronchiectasis (Fig. 1, 2). Other findings were fine irregularities of the pleural surfaces suggesting interface sign (Fig. 2b). After evaluation through mediastinal window multiple calcifications with predominant branching and reticular appearance were noted within the fibrotic areas, with predominance in the right lung (Fig. 3); other tiny calcifications with subpleural predominance were also present (Fig. 3e, 3g). In accordance with the literature, a further evaluation was made through "osteoporosis" window (width 818, level 273), that confirmed the calcific nature of the findings (Fig. 4). The diagnosis of dendriform pulmonary ossification in the setting of a known UIP pattern was made.

Discussion:
Dendriform Pulmonary ossification (DPO) is the less common form of diffuse pulmonary ossification, a rare condition that includes also the more frequent nodular pattern, usually affects men between 40 and 60 years, and is characterized by the presence of mature heterotopic bone in the lung parenchyma [1, 2]. DPO is characterized by branching mature bone within the interstitium, maybe related to chronic tissue injury resulting in enzyme activation and induction of osteogenic factors [3]. The presence of diffuse pulmonary ossification itself is not related to any symptoms, and the clinical features lead to the eventual associated respiratory diseases. In fact, although DPO may be idiopathic, it also may be present in many respiratory diseases, such as COPD, adult respiratory distress syndrome and OP; however, the main association described in the literature is idiopathic pulmonary fibrosis (IPF) [4]. IPF represents the clinical syndrome associated with the morphologic pattern of UIP, that is characterized on chest CT by reduction of lung volumes, subpleural reticular opacities, macrocystic honeycombing, and traction bronchiectasis, the extent of which increases from the apex to the bases of the lungs [5]. DPO appear on chest radiograph like fine, branching reticular opacities, usually peripheral and basal. When
associated to fibrosis, on chest CT DPO consists of dense reticular and nodular opacities within the area of fibrosis. Moreover, Kim et al suggested the importance of the use of an "osteoporosis" window, to recognize true calcification from high attenuation “pseudocalcification” [1].

Mandeloff proposed that 9% of patients with pulmonary fibrosis present DPO, which is related to the chronicity and/or severity of the disease [1]. Other authors suggested that the presence of DPO may be considered to be a helpful factor in distinguishing between Usual Interstitial Pneumonia (UIP) and Non-Specific Interstitial Pneumonia (NSIP), because the first one may have DPO as opposed to the second one [6]. However, because of its rarity, DPO is not considered to be a diagnostic criterium for UIP diagnosis.

In our case, the patient already had the diagnosis of UIP on the basis of radiological features, and the presence of DPO was an additional finding on follow-up chest CT. In particular, the presence of reticular abnormalities, honeycombing with basal and subpleural distribution (associated with bronchiectasis), and the absence of features listed as inconsistent with UIP pattern had allowed the diagnosis of UIP without need of biopsy, in agreement with the diagnostic criteria proposed by American Thoracic Society [7].

**Differential Diagnosis List:** Dendriform pulmonary ossification in a case of usual interstitial pneumonia, Pulmonary alveolar microlithiasis (PAM), Metastatic pulmonary malignancy, Non-malignant metastatic pulmonary calcification (renal failure, hyperparathyroidism), Occupational lung disease, Granulomatous disease

**Final Diagnosis:** Dendriform pulmonary ossification in a case of usual interstitial pneumonia

**References:**


Figure 1

**Description:** Chest CT image shows bilateral subpleural reticulation and right subpleural areas of honeycombing and focal left subpleural area of honeycombing. Fine irregularities of pleural surfaces suggesting "interface sign" are also seen (arrows). **Origin:** C Tricarico, Radiological Center “Raggi X”, Modugno, Italy

**Description:** Chest CT image shows bilateral subpleural reticulation and bilateral subpleural honeycombing. **Origin:** C Tricarico, Radiological Center “Raggi X”, Modugno, Italy
Description: Chest CT image shows bilateral subpleural reticulation and honeycombing, both more evident than the more cranial sections, suggesting apico-basal gradient. Bronchiectasis are also present (arrows). Origin: C Tricarico, Radiological Center "Raggi X", Modugno, Italy

Description: Chest CT image shows bilateral basal extensive honeycombing. Origin: C Tricarico, Radiological Center "Raggi X", Modugno, Italy
**Figure 2**

**a**

**Description:** Chest CT coronal image clearly shows the apico-basal gradient of honeycombing areas, presenting with main subpleural distribution. **Origin:** C Tricarico, Radiological Center “Raggi X”, Modugno, Italy

**b**

**Description:** Chest CT MinIP image clearly shows bilateral basal bronchiectasis within honeycombing areas. **Origin:** C Tricarico, Radiological Center “Raggi X”, Modugno, Italy
Description: Chest CT MinIP image clearly shows bilateral basal bronchiectasis within honeycombing areas. Origin: C Tricarico, Radiological Center "Raggi X", Modugno, Italy
Description: Axial chest CT MIP image shows subpleural calcifications with branching and reticular appearance in the right lung. Other similar calcifications, less extensive, are present in the left lung.

Origin: Tricarico C, Radiological Center "Raggi X", Modugno, Italy
Description: Axial chest CT MIP image shows subpleural calcifications with branching and reticular appearance in the right lung. Other similar calcifications, less extensive, are present in the left lung.

Origin: Tricarico C, Radiological Center "Raggi X", Modugno, Italy

Description: Axial chest CT MIP image shows bilateral calcifications with branching and reticular appearance.

Origin: Tricarico C, Radiological Center "Raggi X", Modugno, Italy
**Description:** Axial chest CT MIP image shows bilateral subpleural tiny calcifications. **Origin:** Tricarico C, Radiological Center "Raggi X", Modugno, Italy

**Description:** Coronal chest CT MIP image shows subpleural calcifications with branching and reticular appearance with predominance in the right lung. **Origin:** Tricarico C, Radiological Center "Raggi X", Modugno, Italy
Description: Coronal chest CT MIP image reveals subpleural calcifications with branching and reticular appearance, showing predominance in the right lung. Other subpleural tiny calcifications are also present. Origin: Tricarico C, Radiological Center "Raggi X", Modugno, Italy

Description: Sagittal chest CT MIP image shows subpleural calcifications with branching and reticular appearance in the right lung. Origin: Tricarico C, Radiological Center "Raggi X", Modugno, Italy
Description: Sagittal oblique chest CT MIP image shows subpleural calcifications with branching and reticular appearance in the right lung. Origin: Tricarico C, Radiological Center "Raggi X", Modugno, Italy
**Figure 4**

**a**

**Description:** Axial chest CT MIP image confirms subpleural calcifications with branching and reticular appearance in the right lung. Other similar calcifications, less extensive, are present in the left lung.

**Origin:** Tricarico C, Radiological Center “Raggi X”, Modugno, Italy

**b**

**Description:** Axial chest CT MIP image confirms subpleural calcifications with branching and reticular appearance in the right lung. Other similar calcifications, less extensive, are present in the left lung.

**Origin:** Tricarico C, Radiological Center “Raggi X”, Modugno, Italy
Description: Axial chest CT MIP image confirms subpleural calcifications with branching and reticular appearance in the right lung. Other similar calcifications, less extensive, are present in the left lung. 
Origin: Tricarico C, Radiological Center "Raggi X", Modugno, Italy

Description: Axial chest CT MIP image shows bilateral calcifications with branching and reticular appearance. Origin: Tricarico C, Radiological Center "Raggi X", Modugno, Italy
**Description:** Axial chest CT MIP image confirms bilateral subpleural tiny calcifications. **Origin:** Tricarico C, Radiological Center "Raggi X", Modugno, Italy

**Description:** Coronal chest CT MIP image confirms subpleural calcifications with branching and reticular appearance with predominance in the right lung. **Origin:** Tricarico C, Radiological Center "Raggi X", Modugno, Italy
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