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ORIGINAL ARTICLE

Correlation of high resolution CT patterns with pulmonary function tests in patients with interstitial lung diseases



Khaled Hussein^a, Lamiaa H. Shaaban^{a,*}, Ehab Mohamed^b

^a Chest Department, Assiut University Hospital, Assiut, Egypt

^b Diagnostic Radiology Department, Assiut University Hospital, Assiut, Egypt

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KEYWORDS

High resolution CT (HRCT);
Interstitial lung diseases (ILDs);
Pulmonary function

Abstract *Background:* Interstitial lung diseases (ILDs) refer to a broad category of lung diseases characterized by exertional dyspnea, different interstitial patterns on high resolution computed tomography (HRCT), and abnormal pulmonary functions.

The aim of this study: This is to correlate the radiological pattern and extent of involvement of ILDs with pulmonary function tests and verify the radiological functional relationship.

Patients and methods: This is a prospective descriptive study which was conducted upon 44 patients aged ≥ 18 years, who were diagnosed to have interstitial lung diseases (ILDs), all of them were admitted to Chest Department, Assiut University Hospitals between June 2014 and May 2015. They were classified into three groups according to the predominant pattern on HRCT: **Group I:** Fibrotic pattern including reticular pattern and/or honeycombing, **Group II:** Ground glass pattern, **Group III:** Nodular pattern. Pulmonary function tests including; forced spirometry, total lung capacity (TLC), residual volume (RV) and diffusing capacity for carbon monoxide (DLCO) also O_2 saturation via pulse oximetry were done for all patients.

Results: In this study 44 patients with ILDs were included, their mean age was 45.7 years, most of them were male (63.6%) and non smoker (59.1%) with mean SpO_2 87.8%. the most frequent HRCT pattern was the fibrotic one including reticular and honey combing (45.5%) followed by ground glass pattern (36%) and the least frequent one was the nodular pattern (18.2%). There was significant positive correlation between TLC and DLCO in fibrotic pattern (P value = 0.000), while no correlation could be detected between them in the other two patterns. Moreover, there was a significant positive correlation between DLCO and SpO_2 in all different patterns (P value = 0.000).

Conclusion: HRCT patterns and degree of lung involvement of ILDs correlate with pulmonary function parameters. Lung volumes are lower in fibrotic lesion regardless the degree of lung involvement,

* Corresponding author.

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while DLCO among different patterns were dependent upon the degree of lung involvement. Restrictive pulmonary dysfunction correlate with gas exchange in fibrotic pattern while in ground glass one, gas exchange is independent on lung volumes.

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Introduction

Interstitial lung diseases (ILDs) refer to a broad category of lung diseases rather than a specific disease entity. These disorders are characterized by exertional dyspnea, interstitial patterns on high resolution computed tomography (HRCT), and abnormal pulmonary functions with restrictive ventilatory defect and decreased diffusing capacity for carbon monoxide (DLCO) [1,2].

Recent classification of ILDs recommended the utilization of four categories: (1) ILDs of a known cause (such as drugs, associated with a collagen vascular disease, environmental exposure, etc.); (2) granulomatous ILDs (such as sarcoidosis); (3) rare ILDs with well-defined clinicopathologic features (such as pulmonary histiocytosis-x, lymphangiomyomatosis); and (4) the idiopathic interstitial pneumonias (IIPs) [3]. IIPs are further subdivided into seven subtypes. Of these, the most common patterns are usual interstitial pneumonia (UIP) called idiopathic pulmonary fibrosis (IPF) and nonspecific interstitial pneumonia (NSIP) [4].

The most common HRCT patterns seen in ILDs are the linear/reticular opacities, cystic lesions, ground-glass opacities and nodular pattern.

Pulmonary function testing is often used and recommended in the management of patients with ILDs [5]. The pattern of lung function impairments does not allow a specific diagnosis to be made, but rather enables one to assess the severity of lung involvement. The pattern and quantitative relationships of the impairments of lung volumes and DLCO also allow defining coexisting complication like pulmonary hypertension [6].

A Few studies were conducted to correlate HRCT pattern with pulmonary functions. Hansell et al. tried to correlate the pattern and extent of abnormalities on HRCT with pulmonary function tests in subacute and chronic hypersensitivity pneumonitis and concluded that areas of decreased attenuation and mosaic pattern are an important CT finding that correlated to obstructive functional abnormalities [7]. Also, more recent studies were conducted to correlate HRCT pattern and pulmonary function tests in scleroderma [8], and rheumatoid arthritis [9].

The aim of this study is to correlate the radiological pattern and extent of involvement of ILDs with pulmonary function tests and verify the radiological functional relationship.

Patients and methods

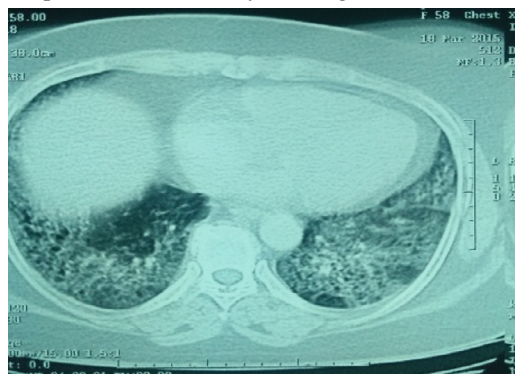
This is a prospective descriptive study which was conducted upon 44 patients aged ≥ 18 years, who were diagnosed to have interstitial lung diseases (ILDs) with their high

resolution computed tomography (HRCT) of the chest had one or more of the following patterns: Fibrotic pattern (reticular and/or honeycombing), ground glass pattern, and nodular pattern. All of them were admitted to Chest Department, Assiut University Hospitals between June 2014 and May 2015.

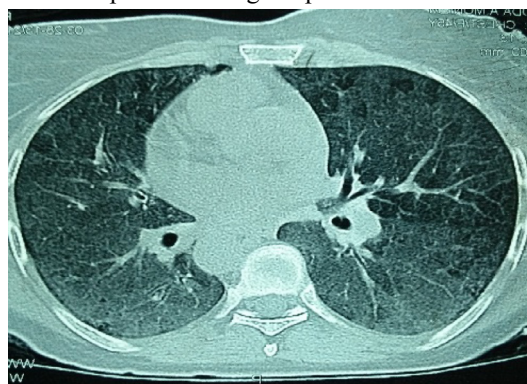
Exclusion criteria were pregnancy; acute exacerbation of IPF; consolidation; predominant cystic pattern as lymphangiomyomatosis and pulmonary langerhans histiocytosis; primary pulmonary hypertension; diabetes mellitus; and cardiac disease.

They were classified into three groups according to predominant pattern on HRCT:

- Group I: Fibrotic pattern including reticular pattern and/ or honeycombing.



- Group II: Ground glass pattern



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