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RESEARCH ARTICLE

TO DETERMINE FREQUENCIES OF DIFFERENT RADIOLOGICAL PATTERNS OF INTERSTITIAL LUNG DISEASES ON HRCT

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ABSTRACT

Introduction: The use of hrct has an established role in the detection and in the differential diagnosis of interstitial lung diseases (ilds). In selected cases, a specific hrct pattern suffices for the presumptive diagnosis, even in the absence of histological confirmation. The major abnormality in ilds is disruption of the lung parenchyma.
Objectives: To Determine Frequencies Of Different Radiological Patterns Of Interstitial Lung Diseases On Hrct.
Study design: Cross-Sectional Survey. Setting: Department Of Diagnostic Radiology, King Edward Medical University/Mayo Hospital, Lahore. duration of study: Study Was Carried Out Over A Period Of Six Months From 16-05-2009 To 30-11-2009. subjects and methods: total 65 cases of interstitial lung diseases were included in this study. Hrct examinations were performed using 1.0- or 1.5 mm thick sections taken at 1 cm intervals throughout the entire lungs during inspiration in the supine position and through the caudal 10 cm of the lungs at 2–3 cm increments in the prone position.
Results: the range of age was from 30 years to 70 years and mean age was 45.8±7.7 years. There were 23 (35.4%) males and 42 (64.6%) females. Hrct patterns were as follows: nodular 29 (44.6%), reticular 21 (32.3%) honeycombing 15 (23.1%).
Conclusion: in this study, we have found out prevalence of different patterns of ild on hrct . Therefore, without surgical lung biopsy we can obtain prevalence of different disease on the basis of hrct.

INTRODUCTION

Interstitial lung disease (ILD) represents a heterogeneous group of non infectious, diffuse parenchymal lung disorders. Because there are more than 150 clinical conditions or causes associated with ILD, an accurate diagnosis is essential to determine prognosis and appropriate therapeutic intervention. Surgical lung biopsy (SLB) is the gold standard for the diagnosis of ILD . With current advances, the need for SLB in every patient with suspected ILD has been recently questioned (Quigley and Hansell, 2006). HRCT (high resolution computed tomography) scan is regarded as the imaging modality of choice to evaluate patients with known or suspected ILD (Vikgren *et al*., 2007). By identifying the presence of certain characteristics, radiologists have developed a clearer understanding of HRCT patterns that helps in the diagnostic evaluation, clinical decision-making, and prognosis of patients with ILD (Sung *et al*., 2007). The morphological changes seen on HRCT in a large group of ILD are linear and reticular opacities. HRCT enables evaluation of linear and reticular opacities invisible on chest radiographs and even on conventional CT.

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They are typical of both active inflammatory changes, potentially treatable and irreversible pulmonary fibrosis. The linear opacities without evident lung architecture distortion suggest active process, whilst cystic changes, honeycombing and evident lung distortion suggest presence of irreversible fibrosis (Pasławski *et al*., 2003). In HRCT the lung interstitium may be evaluated at the level of the smallest functional unit, namely pulmonary lobule (Shaukat *et al*., 2003). Nodular changes are amongst the most frequent morphological changes in ILD (55%) (Raghu and Brown, 2004). Linear and reticular patterns accounts for almost 33% and honeycombing is present in almost 12% of the cases (Raghu and Brown, 2004). HRCT enables imaging of nodular changes in miliary tuberculosis, before they are visible on radiographs .Perilymphatic nodules are typical in sarcoidosis, lymphangitic spread of carcinoma and pneumoconiosis. The assessment of character and localization of nodules in ILD is not sufficient in reliable differentiation, but may be helpful in differential diagnosis in association with other HRCT findings (Shaukat *et al*., 2003). The plain chest radiograph and HRCT features of idiopathic pulmonary fibrosis (IPF) are important patterns to recognize because, next to sarcoidosis, IPF is the most common ILD (Souza *et al*., 2006).

The three most common types of occupational ILD are asbestosis, chronic silicosis, and coal worker's pneumoconiosis (CWP). (American Thoracic Society, 2004) When responding to any injury, whether from a specific exposure (e.g., asbestos, nitrofurantoin, moldy hay), systemic connective tissue disease (e.g., rheumatoid arthritis), or unknown injury (e.g., idiopathic pulmonary fibrosis), the lung must respond to the damage and repair itself. Unfortunately, if the initiating injury is not halted, progressive tissue damage can lead to worsening physiologic impairment and even death (King, 2005). Many of the ILDs have similar clinical features and are not easily distinguished on examination. Dyspnea and nonproductive cough are the most common reasons patients seek medical attention (Hunninghake *et al*., 2003). With increasing role of HRCT we can diagnose the ILD without invasive procedures. However, no local data is available about the prevalence of different patterns in our setup. We have found out frequencies of different patterns on HRCT in ILD in our setup that can improve disease prognosis. This non invasive technique is helpful for the diagnosis and follow up of patients with ILD.

OBJECTIVES

To determine frequencies of different radiological patterns of interstitial lung diseases on HRCT.

MATERIALS AND METHODS

After informed consent from the patients and approval from the ethical review committee, the cross-sectional validation study was conducted at radiology department of Mayo hospital Lahore for the period of six months. Sample size was 65 patients and sampling technique was non probability consecutive sampling. Patients with clinical diagnosis of interstitial lung disease with X-ray findings of interstitial lung disease between 30 and 70 years were included in the study with an average age of 45 years. Patients with other associated pulmonary diseases were excluded from the study. All subjects in the study sample were investigated with HRCT. HRCT examinations were performed using 1.0 or 1.5-mm-thick sections taken at 1 cm intervals throughout the entire lungs during inspiration in the supine position and through the caudal 10 cm of the lungs at 2–3-cm increments in the prone position. A thoracic radiologist analyzed lobes on HRCT. All this information was collected through a specially designed proforma. The data was entered into SPSS version 11.0 and analyzed through it. Numerical data like age, duration of disease was presented as simple descriptive statistics giving mean and standard deviation. Different patterns of HRCT were described as frequencies and percentages.

RESULTS

A total of 65 patients were included in this study.The range of age was from 30 to 70 years and mean age was 45.8±7.7 years (Table-1). There were 23 (35.4%) males and 42 (64.6%) females (Table-2). Distribution of cases by duration of disease shows that 22 patients (33.8%) had duration 1-5 years, 36 patients (55.4%) had duration 6-10 years and 7 patients (10.8%) belonged to duration of 11-20 years (Table-3). HRCT patterns were as follows: Nodular 29 (44.6%), reticular 21 (32.3%) while honeycombing 15 (23.1%) (Table-4).

Table1. Distribution of cases by age

Age (Year)	Number	Percentage
30-40	16	24.6
41-50	34	52.3
51-60	09	13.9
61-70	06	09.2
Total	65	100.0
Mean±SD	45.8±7.7	

Table 2. Distribution of cases by sex

Sex	Number	Percentage
Male	23	35.4
Female	42	64.6
Total	65	100.0

Table 3. Distribution of cases by duration of disease

Duration (Year)	Number	Percentage
1-5	22	33.8
6-10	36	55.4
11-20	07	10.8
Total	65	100.0

Table 4. Distribution of cases by HRCT pattern

HRCT pattern	Number	Percentage
Nodular	29	44.6
Reticular	21	32.3
Honeycombing	15	23.1
Total	65	100.0

DISCUSSION

Over the last few years, the abnormal patterns of ILD on HRCT scans are being increasingly recognized as diagnostic patterns leading to increasing use of HRCT scans in conjunction with clinical assessment suggesting that an accurate diagnosis of ILD can be made without surgical lung biopsy (SLB) (Grenier *et al*., 1994). An accurate diagnosis of ILD is vital not only to direct appropriate therapy and determine prognosis, but also to design studies and clinical trials of ILDs. In current study, HRCT patterns were as follows: Nodular 29 (44.6%), reticular 21 (32.3%) while honeycombing 15 (23.1%). HRCT scans do provide a greater number of accurate diagnoses for ILD than do standard radiographs. In a study including both radiologists and chest clinicians as image readers, standard chest radiographs and CT scans from 134 patients with established diagnoses of ILD were reviewed separately. As a first choice for diagnosis, the reader was correct in 38% of cases when reviewing conventional radiographs and in 46% with CT scans (Remy-Jardin *et al*., 1993). The HRCT scan can examine the lung parenchyma so minutely that the appearance of "ground glass" in the HRCT scan is equated histologically with a cellular reaction (Remy-Jardin *et al*., 1993) whereas a "reticular nodular" appearance denotes more advanced, less cellular fibrotic areas. Moreover, CT scans can define areas of lung most involved with inflammation so that biopsies can be directed to these locations (Herbert and Reynolds, 1998). Remy-Jardin *et al* demonstrated that HRCT was the only technique that allowed assessment of the presence of areas of ground-glass attenuation (Remy-Jardin *et al*., 1991). In our study we found out that in our population nodular pattern is 44.6%, reticular is 32.3% and honeycombing is 23.1%.

Therefore, in our setup nodular pattern is more prevalent than reticular pattern and honeycombing. It is increasingly accepted that the diagnosis of ILDs requires a multidisciplinary approach with the reconciliation of clinical, radiological and histological findings. Therefore, it is extremely important to have the most accurate observer agreement on the diagnoses based on HRCT scans (Thomeer *et al*., 2008; Bradley *et al*., 2008). Honeycombing occurs in 24-90% of patients and the frequency of this finding varies with the severity or stage of the disease (American Thoracic Society , 2002; Franquet *et al*., 1998). In our study it was seen in 23.1% of cases. The accuracy of a confident diagnosis of ILD made on HRCT by a trained observer appears to be about 90% (King *et al*., 2000).

Conclusion

In this study we found out prevalence of different patterns of ILD on HRCT. So without surgical lung biopsy we can get prevalence of different diseases on the basis of HRCT. The disease which give rise to nodular pattern are most prevalent in our setup. This non invasive technique is helpful for the diagnosis and follow up of patients with ILD.

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