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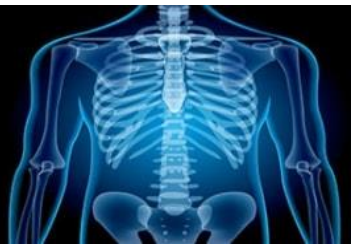

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Interstitial lung disease characterization using high resolution computed tomography in tertiary care facilities

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Abstract
Background and Aim: Interstitial lung diseases encompass diffuse involvement of parenchymal tissue of lung. Before the use of computed tomography for diagnosis of diseases, radiography was the only existing imaging procedure available for diagnosis of interstitial lung diseases, which had substantial drawbacks when compared to the former. Present study was done with objectives to evaluate the role of high resolution computed tomography in interstitial lung disease and to characterize and classify various ILD according to their HRCT appearance.
Material and Methods: The present study is a descriptive cross-sectional conducted in the Department of Radiodiagnosis, of a tertiary care teaching hospital in Gujarat. One Hundred patients were included during the study period. . Patients having pulmonary symptoms related to any acute/chronic interstitial or diffuse pulmonary disease with significant radiographic findings of chest and willing to participate in the study were recruited in the study. The demography (age, gender), history and chest radiograph findings of patients were recorded.
Results: In our study, 60 patients were diagnosed as idiopathic interstitial lung disease and 40 patients were diagnosed as non-idiopathic interstitial lung disease where the cause of interstitial lung disease was known, out of which 19 patients were diagnosed as silicosis, 12 patients as hypersensitive pneumonitis, 4 patient was a diagnosed case of scleroderma and 5 patients were suffering from rheumatoid arthritis. Among 40 cases most of them were IPF/UIP, followed by AIP. Honey combing is predominantly confined to UIP/IPF, Traction bronchiectasis is predominantly seen in UIP/IPF, Ground glass opacity is mostly seen in NSIP followed by AIP.
Conclusion: The different HRCT findings and the location of these findings in the lung often enable a specific diagnosis of ILD to be made in a given patient obviating the need for lung biopsy. HRCT is a non-invasive imaging modality for evaluation of lung parenchyma. The high spatial resolution makes HRCT superior to other imaging modalities. Hence any case with suspected interstitial lung disease should always be subjected to HRCT to reach the final diagnosis.

Keywords: High Resolution Computed Tomography, Ground Glass Opacity, Lung, Interstitial Lung Disease

Introduction
Diffuse parenchyma lung illness (DPLD) incorporates a heterogeneous group of disorders, described by a range of inflammatory and fibrotic changes influencing alveolar walls and air spaces [1]. They involve more than 200 elements which incorporate a wide range of infections, numerous extraordinary and large numbers of obscure etiology [2, 3]. Before the use of computed tomography for diagnosis of diseases, plain radiography was the only existing imaging procedure available for diagnosis of interstitial lung diseases, which had substantial drawbacks as compared to the former. HRCT, as an imaging procedure was first introduced by Todo G *et al.* [4] However, various patterns of diseases of pulmonary parenchymal tissue and use of HRCT to differentiate diffuse pulmonary diseases were first described by Zerhouni EA *et al.* [5] Later, these patterns were confirmed for various diffuse lung diseases by a pair comprising of a radiologist and a pathologist. HRCT is a noninvasive test used to distinguish between different types interstitial lung diseases. It is also superior to plain X-ray chest. Before the advent of HRCT, biopsy was necessary for diagnosis of the pathology of lung parenchyma, which has now become needless. Similar studies have been conducted in urban part [6-8].

Various HRCT findings, taken together, can represent typical patterns. These patterns, in conjunction with the anatomical distribution of findings and with clinical data, can narrow the differential diagnosis of diffuse interstitial lung disease and, in many cases, indicate the correct diagnosis with a high degree of accuracy [9].

Present study was done with objectives to evaluate the role of high resolution computed tomography in interstitial lung disease and to characterize and classify various ILD according to their HRCT appearance.

Material and Methods

The present study is a descriptive cross-sectional conducted in the Department of Radiodiagnosis, of a tertiary care teaching hospital in Gujarat. One Hundred patients were included during the study period.

Permission from the Institutional ethical committee was obtained prior to the study and informed consent of study objects was taken before HRCT chest was done. All patients who underwent HRCT and satisfied the selection criteria were included in the study.

Inclusion criteria

Suspected cases of diffuse parenchymal lung disease by clinical history, physical examination, radiographic findings and appropriate laboratory investigations. Cases of all age groups irrespective of sex.

Known cases of lung malignancies and previously treated cases of diffuse parenchymal lung disease are excluded from the study.

The chest was scanned from lung apices above to domes of diaphragm below. The digitalized scanogram (antero-posterior) was retrieved by asking the patients to maintain the position in full inspiration. The axial scans were taken at every ten mm distance. Any abnormalities in the form of opacities were confirmed as normal or abnormal by obtaining scans in prone position. In order to demonstrate, trapped air scans were performed at the deep expiration. The demography (age, gender), history and chest radiograph findings of patients were recorded.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

Table 1: Lobar distribution of ILDs

ILD	UL N (%)	ML/Lingular Lobe N (%)	LL N (%)	Diffuse N (%)
UIP/IPF	0	7	12	1
NSIP	0	1	5	0
AIP	2	1	0	5
HP	1	0	1	2
COP	1	2	3	0
SILICOSIS	4	1	0	1
Total	8	11	21	9

Results and Discussion

In the present study, 100 patients were eligible as per the inclusion and exclusion criteria and were included in the study. Of these, 58 (58%) were males and 42 (42%) were females. The average age of females (44.5±14.2 years) was less as compare to that of males (47.45±18.2 years). In our study, 60 patients were diagnosed as idiopathic interstitial lung disease and 40 patients were diagnosed as non-idiopathic interstitial lung disease where the cause of interstitial lung disease was known, out of which 19 patients were diagnosed as silicosis, 12 patients as hypersensitive pneumonitis, 4 patient was a diagnosed case of scleroderma and 5 patients were suffering from rheumatoid arthritis.

Interstitial lung diseases are a group of heterogeneous disorders which differ significantly in their presentation, treatment, and prognosis. These issues can show up exclusively in the lung, or as either the underlying indication or a critical part of a multisystem disorder. Also, a significant number of these diseases are an outcome of explicit openings that the patient experiences either at the work environment, at home, or from medications or dietary supplements. Interstitial lung diseases are difficult to characterize, diagnose, and treat, thus they can pose a challenge to the practicing pulmonologist. Bronchoalveolar lavage (BAL) has been used to evaluate patients with suspected interstitial lung disease (ILD) to recognize the specific type. HRCT helps in identifying specific radiological patterns which are associated with certain forms of ILD. These imaging patterns have greatly helped the clinician in narrowing down the differential diagnosis.

In our study, out of 40 patients of interstitial lung disease, upper lobe predominance involvement was mostly seen in silicosis (50%), followed by AIP (Acute Interstitial Pneumonia) (25%), HP (Hypersensitivity Pneumonia) (12.5%) and COP (Cryptogenic Organising Pneumonia) (12.5%). Middle lobe/ Lingular predominance was seen in UIP/IPF ((Idiopathic Pulmonary Fibrosis/Usual Interstitial Pneumonia)), followed by NSIP ((Non Specific Interstitial Pneumonia), AIP, COP and Silicosis. Lower lobe predominance was mostly seen in UIP/IPF followed by NSIP, COP and HP. Diffuse involvement of lung was mostly seen in AIP followed by HP, UIP/IPF and Silicosis. (Table 1) This correlates with the findings of Nakata H *et al*., and Müller N L *et al*., who also described a subpleural basal predominance of the disease [7, 8].

Honey combing is confined to UIP/IPF. Traction bronchiectasis is predominantly seen in UIP/IPF, Ground glass opacity is mostly seen in NSIP followed by AIP, HP and COP. Reticular opacities are predominantly seen in UIP/IPF followed by NSIP and Silicosis. Consolidation is predominantly seen in HP and COP. Most of the results in our study were correlating with previous studies [10-17].

Limitation of the study is due to small sample size, we cannot generalize the results to population.

Conclusion

ILD is a broad category of diseases that may present with different but overlapping findings on HRCT. The different HRCT findings and the location of these findings in the lung often enable a specific diagnosis of ILD to be made in a given patient obviating the need for lung biopsy. HRCT is a non-invasive imaging modality for evaluation of lung parenchyma. The high spatial resolution makes HRCT superior to other imaging modalities. Hence any case with suspected interstitial lung disease should always be subjected to HRCT to reach the final diagnosis.

Conflict of Interest
None

Financial Support
Nil

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