Section: Radio-Diagnosis

Original Research Article

ROLE OF HIGH-RESOLUTION COMPUTED TOMOGRAPHY IN EVALUATION OF DIFFUSE LUNG DISEASES

Devendra Rahangdale[1], Pankaj Arora[1], Shishir Agrawal[2]

[1]Associate Professor, Department of Radio-Diagnosis, Sri Rawatpur Sarkar Institute of Medical Sciences, Naya Raipur, Chhattisgarh, India
[2]Senior Resident, Department of Radio-Diagnosis, Sri Rawatpur Sarkar Institute of Medical Sciences, Naya Raipur, Chhattisgarh, India.

Received : 11/10/2025
Received in revised form : 30/11/2025
Accepted : 17/12/2025

Keywords:
High-resolution computed tomography, interstitial lung disease, idiopathic pulmonary fibrosis, tuberculosis, diffuse lung disease, HRCT chest.

Corresponding Author:
Dr. Devendra Rahangdale,
Email: drdevendra2380@gmail.com

DOI: 10.47009/jamp.2025.7.6.191

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (6); 1026-1032

ABSTRACT

Background: Diffuse and interstitial lung diseases (ILDs) represent a diverse group of pulmonary disorders affecting the lung parenchyma diffusely and often chronically. Accurate early diagnosis is crucial for guiding therapy and improving prognosis, yet conventional radiography lacks sensitivity in detecting subtle parenchymal changes. This study aimed to evaluate the diagnostic utility of High-Resolution Computed Tomography (HRCT) in identifying, characterizing, and classifying various diffuse lung diseases and to compare its sensitivity with conventional chest radiography. **Materials and Methods:** A cross-sectional observational study was conducted on 100 patients with clinically suspected or confirmed ILD at the Department of Radiodiagnosis, Sri Rawatpur Sarkar Institute of Medical Sciences, Naya Raipur, over 15 months. HRCT was performed using a CANON Aquilion Start 32-slice CT scanner with 1-mm collimation and high-spatial-frequency reconstruction. Demographic, clinical, and imaging data were analyzed statistically. **Result:** Tuberculosis (28%) and idiopathic pulmonary fibrosis (24%) were the most common etiologies, followed by bronchiectasis (20%) and pulmonary edema (10%). Ground-glass opacities (54%), reticulations (50%), bronchiectasis (42%), and honeycombing (28%) were predominant HRCT findings. HRCT identified abnormalities in 16% of cases that appeared normal on chest X-ray, demonstrating its superior diagnostic sensitivity. **Conclusion:** HRCT provides excellent anatomical detail and diagnostic accuracy in the evaluation of diffuse lung diseases, enabling differentiation between active and fibrotic processes and guiding clinical management. It remains the gold standard noninvasive imaging modality for assessing ILDs.

INTRODUCTION

Diffuse lung diseases encompass a broad spectrum of disorders characterized by widespread involvement of both lungs, though the pathological changes may not be uniform across all regions. These conditions are often referred to as infiltrative lung diseases because many of them lead to diffuse infiltration of the pulmonary parenchyma.[1,2] The pulmonary interstitium, composed of connective tissue fibers that form the framework of the lungs—including the interlobular septa, alveolar walls, and peribronchovascular interstitium—plays a central role in these diseases.[3] Interstitial lung diseases (ILDs) are typified by thickening of the alveolar septa, fibroblast proliferation, and collagen deposition, which, if progressive, culminate in pulmonary fibrosis.

Traditional chest radiography has significant limitations in accurately evaluating diffuse lung involvement and defining parenchymal abnormalities. The advent of computed tomography (CT) markedly improved visualization, but it was the development of high-resolution computed tomography (HRCT) in 1985 by Zerhouni et al. that revolutionized the imaging of diffuse lung diseases.[4] HRCT provides unparalleled structural detail of lung parenchyma, allowing precise characterization of morphological patterns. When correlated with clinical findings, distribution of abnormalities, and laboratory data, HRCT patterns can greatly refine differential diagnosis and often suggest a specific disease entity.[5,6]

Compared with conventional CT, HRCT uses thin collimation and a high spatial frequency reconstruction algorithm (bone algorithm), providing exceptional spatial resolution akin to gross pathological sections. It is instrumental in detecting both normal and abnormal interstitial structures and in assessing the extent and activity of

ISSN (O): 2687-5365; ISSN (P): 2753-6556

diffuse lung diseases. HRCT also assists in determining disease presence, type, and progression, identifying optimal biopsy sites, and evaluating response to therapy. Thus, HRCT serves as an indispensable tool for comprehensive evaluation and management of diffuse lung diseases.

MATERIALS AND METHODS

Following approval from the Institutional Ethics Committee, this cross-sectional observational study was conducted in the Department of Radiodiagnosis at Sri Rawatpur Sarkar Institute of Medical Sciences, Naya Raipur over a period of 15 months. The study included patients with clinically suspected or previously diagnosed interstitial lung disease (ILD) who underwent High-Resolution Computed Tomography (HRCT) evaluation.

A total of 100 patients were enrolled. The sample size was calculated using an effect size of 0.40, a confidence level of 95%, and a statistical power of 80%, ensuring adequate representativeness and analytical precision. The sample size was feasible given the department's consistent inflow of respiratory cases requiring HRCT evaluation. Informed written consent was obtained from all participants prior to inclusion in the study.

Inclusion Criteria

- Patients with a clinical history suggestive of interstitial lung disease.
- Known cases of interstitial lung disease referred for HRCT evaluation.
- Patients with abnormal chest radiographs demonstrating interstitial patterns.
- Individuals with restrictive patterns on pulmonary function testing.

Exclusion Criteria

- Patients unwilling to provide informed consent.
- Individuals with contraindications to CT scanning (e.g., pregnancy).

Imaging Methodology

All participants underwent non-contrast HRCT of the thorax using a CANON Aquilion Start 32-slice CT scanner. Each scan was performed with the patient in a supine position and both arms raised above the head, ensuring optimal image quality and minimizing motion artifacts.

1. A digitized anteroposterior (AP) scanogram was obtained during full inspiration.
2. Patients were instructed beforehand to hold their breath during deep inspiration and expiration as required.
3. Axial sequential scans of 1 mm slice thickness were acquired at 10 mm intervals from the lung apices to the domes of the diaphragm during full inspiration.
4. Prone scans were performed when necessary to differentiate true parenchymal abnormalities from dependent opacities.
5. Expiratory scans were obtained in selected cases to detect air trapping.

Scanning Parameters

Parameter	Specification
Position	Supine
Tube Voltage (kVp)	120–140
Tube Current (mAs)	129–150
Collimation	1 mm
Scan Time	1 second
Matrix Size	512 × 512
Scan Range	From lung apices to domes of diaphragm
Reconstruction Algorithm	High spatial frequency (bone) algorithm

Window Settings

Parameter	Range
Window Width	1200–1600 Hounsfield Units (HU)
Window Level	–600 to –800 Hounsfield Units (HU)

Clinical Assessment and Data Collection

Each patient's clinical information was recorded in a predesigned proforma. Data included demographic variables (age, sex), clinical history, radiographic findings, and HRCT observations. HRCT scans were systematically reviewed for alveolar and interstitial patterns, distribution of abnormalities, presence of fibrosis or honeycombing, and disease extent. Correlation with clinical presentation, pulmonary function tests, and radiographic findings was performed to refine the diagnostic impression.

Statistical Analysis

Collected data were tabulated in Microsoft Excel 2010 and analyzed using IBM SPSS Statistics version 26.0. Descriptive statistics were used to summarize the dataset—mean and standard deviation (SD) for continuous variables and frequency with percentage for categorical data. The Chi-square test was applied to assess associations between categorical variables such as HRCT pattern and clinical diagnosis. Correlation analysis between quantitative variables (e.g., disease extent and symptom duration) was performed using Pearson's or Spearman's coefficients, depending on data distribution. A p-value < 0.05 was considered statistically significant.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

RESULTS

A total of 100 patients with clinically suspected or confirmed diffuse lung diseases were evaluated using High-Resolution Computed Tomography (HRCT) in the Department of Radiodiagnosis, Sri Rawatpur Sarkar Institute of Medical Sciences, Naya Raipur over a period of 15 months.

Age and Sex Distribution: The highest number of patients (20%) presented in the 51–60 years age group, followed by 18% each in the 41–50 years and 61–70 years age groups. The youngest patient was 7 years old, and the oldest was 78 years. Out of 100 patients, 64 (64%) were males and 36 (36%) were females, showing a male predominance. Diffuse lung diseases were thus slightly more common among males, particularly in the age range of 41–70 years, which accounted for the majority of cases (56%). Males outnumbered females in all major age groups, with the highest male preponderance noted between 51–70 years. [Table 1]

Table 1: Age and Sex Distribution of Patients

Age Group (years)	Total Patients	Male	%	Female	%
<10	1	1	100	0	0
11–20	6	4	66.7	2	33.3
21–30	5	4	80	1	20
31–40	10	6	60	4	40
41–50	18	10	55.6	8	44.4
51–60	20	12	60	8	40
61–70	18	13	72.2	5	27.8
71–80	12	8	66.7	4	33.3
Total	100	64	64	36	36

Etiological Diagnosis: In the present study, tuberculosis was the most common cause of diffuse lung disease, observed in 28 (28%) patients, followed by idiopathic pulmonary fibrosis (IPF) in 24 (24%), bronchiectasis in 20 (20%), and pulmonary edema in 10 (10%) cases. Less common entities included emphysema (8%), progressive systemic sclerosis (4%), usual interstitial pneumonia (2%), desquamative interstitial pneumonia (2%), and hematogenous metastases (2%). Tuberculosis was most common among patients aged 51–60 years, whereas IPF was more frequently observed between 61–70 years. [Table 2]

Table 2: Distribution of Cases According to Etiological Diagnosis

Diagnosis	No. of Cases	Percentage (%)
Tuberculosis	28	28
Idiopathic Pulmonary Fibrosis (IPF)	24	24
Bronchiectasis	20	20
Pulmonary Edema	10	10
Emphysema	8	8
Progressive Systemic Sclerosis	4	4
Usual Interstitial Pneumonia (UIP)	2	2
Desquamative Interstitial Pneumonia (DIP)	2	2
Hematogenous Metastases	2	2
Total	100	100

Clinical Presentation: Out of 100 patients, 78 (78%) presented primarily with dyspnea, commonly associated with IPF and tuberculosis. 22 (22%) patients reported cough, fever, or chest pain as their main complaint. Two patients with miliary tuberculosis were HIV seropositive.

Morphological and HRCT Findings: The predominant HRCT finding across the study population was ground-glass opacity (54%), followed by reticular pattern (50%), bronchiectasis (42%), and honeycombing (28%).

- **Idiopathic Pulmonary Fibrosis (IPF):** Bilateral irregular linear opacities producing a reticular pattern and honeycombing, predominantly in peripheral and basal lung regions.
- **Tuberculosis:** Active miliary disease showed diffuse nodularity, while old healed cases demonstrated bronchiectasis, fibrosis, cavities, and broncho-vascular distortion. Endobronchial spread displayed the classic tree-in-bud appearance.
- **Bronchiectasis:** Cystic bronchiectasis was the most common morphological subtype.
- **Pulmonary Edema:** Patchy ground-glass opacities with smooth interlobular septal thickening.
- **Progressive Systemic Sclerosis:** Diffuse ground-glass opacities with small cysts.
- **Emphysema:** Centrilobular and paraseptal emphysema with multiple small lucencies, more marked in upper lobes.
- **Desquamative Interstitial Pneumonia (DIP):** Diffuse bilateral ground-glass opacities.
- **Usual Interstitial Pneumonia (UIP):** Diffuse ground-glass pattern with honeycombing.
- **Hematogenous Metastases:** Multiple randomly distributed nodules of varying sizes across both lungs.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 3: HRCT Findings in 100 Patients with Diffuse Lung Disease

HRCT Findings	IPF	TB	Bronchiectasis	PE	Emphysema	PSS	DIP	HM	UIP	Total (%)
Reticular	24	12	4	3	-	4	-	-	-	47
Nodular	-	16	4	-	-	-	2	2	-	24
Ground-glass opacity	10	12	8	10	2	4	2	2	2	52
Honeycombing	20	-	2	-	-	-	-	-	2	24
Bronchiectasis	16	-	20	-	-	2	-	-	2	40
Cysts	8	-	2	-	4	-	2	-	-	16
Cavities	-	12	-	-	-	-	-	2	-	14
Pleural Effusion	-	8	2	4	-	-	-	-	-	14
Lymphadenopathy	-	6	4	-	2	-	-	-	-	12

Lung Involvement: Diffuse lung diseases were predominantly bilateral, with 92% of patients showing bilateral involvement and only 8% demonstrating unilateral disease.

Table 4: Lung Involvement in Diffuse Lung Disease

Involvement	No. of Patients	Percentage (%)
Unilateral	8	8
Bilateral	92	92

Comparison of HRCT and Chest Radiography: Out of 100 patients, 84 (84%) showed abnormal findings on both chest radiograph and HRCT. However, 16 patients (16%) who appeared normal on chest X-ray demonstrated definitive abnormalities on HRCT. No patient with an abnormal chest X-ray had a normal HRCT. Thus, HRCT proved to be 16% more sensitive than chest radiography in detecting diffuse parenchymal lung abnormalities.

Table 5: Sensitivity of HRCT Compared with Chest Radiography

Observation	No. of Patients	Percentage (%)
Normal Chest X-ray, Abnormal HRCT	16	16
Abnormal Chest X-ray, Abnormal HRCT	84	84
Abnormal Chest X-ray, Normal HRCT	0	0

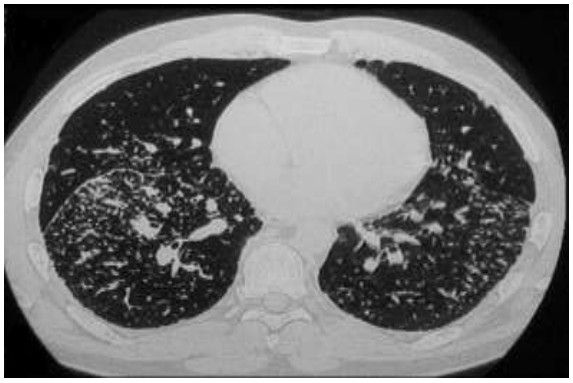

Figure 1: Perilymphatic nodules are interstitial nodules in sarcoidosis.

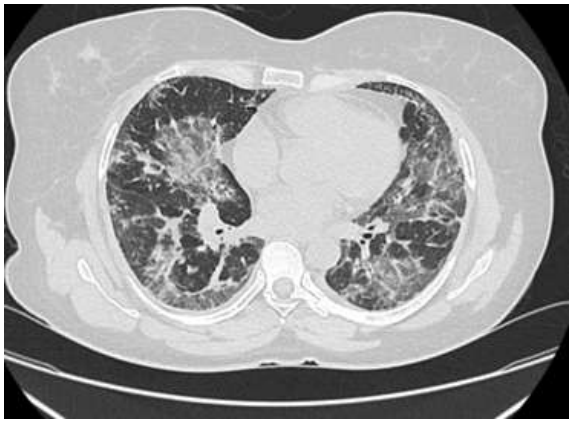

Figure 2: Non-specific interstitial pneumonia. (NSIP) reveals fibro-septal thickening, reticular opacities with relative sub pleural sparing and ground glass opacities in bilateral lower lobes.

In this study of 100 patients, HRCT significantly enhanced the detection and characterization of diffuse lung diseases compared with conventional radiography. Tuberculosis and idiopathic pulmonary fibrosis were the most frequent causes, with predominant HRCT features of ground-glass opacities, reticular changes, and honeycombing, reflecting the diagnostic value of HRCT in identifying both early and advanced parenchymal abnormalities.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

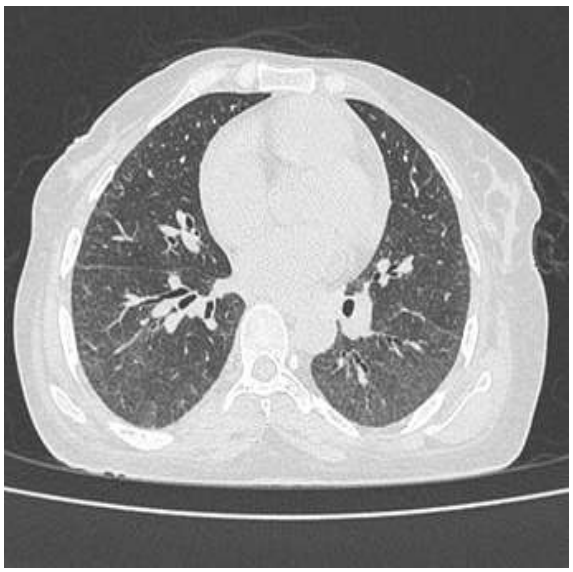

Figure 3: Inter/intra lobular septal thickening with ground glass opacities in bilateral lower lobes and middle lobe-findings of early features of ILD

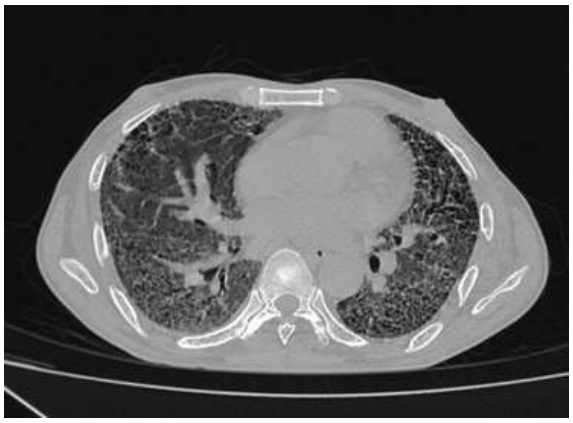

Figure 4: UIP pattern reveals inter/ intra lobular septal thickening with fibrotic changes, honeycombing and traction bronchiectasis in bilateral lung predominantly in the sub pleural location.

DISCUSSION

A total of 100 patients with clinically suspected or diagnosed interstitial lung diseases (ILDs) were evaluated using High-Resolution Computed Tomography (HRCT) over a 15-month period in the Department of Radiodiagnosis, Sri Rawatpur Sarkar Institute of Medical Sciences, Naya Raipur. HRCT scans were performed with 1-mm sections at 10-mm intervals from the thoracic inlet to the diaphragm and reconstructed using a high-spatial-frequency (bone) algorithm to obtain detailed visualization of the pulmonary interstitium and parenchymal architecture.

In this study, 28% of patients were diagnosed with pulmonary tuberculosis. Among them, fifteen were previously treated and presented with signs of disease reactivation, while thirteen were newly diagnosed. Cavitary lesions were a consistent finding in reactivation cases and were often accompanied by pleural thickening (10 patients) and mediastinal lymphadenopathy (4 patients), findings consistent with the descriptions of Im JG et al.[7] Among the new cases, miliary tuberculosis was identified in nine patients, showing multiple, randomly distributed 1–3 mm nodules predominantly in the perivascular and subpleural regions, in agreement with Hong SH et al. and Voloudaki AE et al.[8,9] The remaining cases demonstrated tree-in-bud opacities, patchy consolidation, and focal cavitation, representing bronchogenic dissemination of disease, as reported by Im JG et al.[7] These findings reaffirm HRCT's diagnostic superiority in detecting and differentiating active tuberculosis, post-treatment sequelae, and miliary spread, where chest radiography often fails to provide adequate information.

Idiopathic Pulmonary Fibrosis (IPF) accounted for 24% of cases. Although chest radiographs generally revealed a coarse reticular pattern in the lower zones, HRCT provided a far more comprehensive assessment of disease distribution and severity. All patients demonstrated subpleural and posterior basal predominance, with one-third also showing middle and upper lobe involvement, suggesting an ascending pattern of fibrotic progression. These results are in accordance with those of Battista G et al,[5] and Lim MK et al.[10] The most characteristic HRCT finding was honeycombing, defined as stacked, thick-walled cystic air spaces arranged in layers in the posterior basal regions, consistent with the description by Nishiyama O et al.[11] Other observed findings, such as intralobular interstitial thickening, irregular interlobular septal thickening, and traction bronchiectasis, reflected advanced fibrotic remodeling of the lung parenchyma.

Bronchiectasis was identified in 20% of patients, most frequently involving the right middle lobe and left lower lobe. HRCT clearly demonstrated both lobar and segmental dilatation, in line with the observations of Cooke JS et al.[12] The characteristic "signet-ring" appearance, representing dilated bronchi with adjacent pulmonary arteries, was observed in twelve patients, similar to the findings of Grenier P et al.[13] Morphologically, the bronchiectatic changes were classified as cylindrical in 8 patients, varicose in 6, and cystic in 10, corresponding to the classification described by Reid LM.[14]

Pulmonary edema was found in 10 patients (10%), showing HRCT features of diffuse ground-glass opacities with smooth and uniform interlobular septal thickening, most prominent in the perihilar regions. These findings are consistent with previous studies by Storto ML et al,[15] and Ribeiro CM et al,[16] which emphasized HRCT's usefulness in differentiating cardiogenic pulmonary edema from interstitial pneumonitis.

Emphysema was observed in 8% of patients. Six patients exhibited centrilobular emphysema, characterized by multiple, ill-defined small lucencies within secondary lobules, whereas two

ISSN (O): 2687-5365; ISSN (P): 2753-6556

patients demonstrated paraseptal emphysema involving the upper lobes. These features correlate with the patterns described by Stern EJ and Frank MS, Webb WR et al., and Murata K et al,[18–20] confirming HRCT as the gold standard for detecting early and localized emphysematous changes.

Progressive Systemic Sclerosis (Scleroderma) was diagnosed in 4% of cases. HRCT revealed diffuse ground-glass opacities with cystic changes, predominantly in subpleural and lower-zone regions, indicative of fibrosing alveolitis. These observations align with the findings of Chan TY et al,[21] Devenyi K et al., and JM Seely et al,[17,22] which described the basal and subpleural distribution typical of scleroderma-related lung involvement.

Desquamative Interstitial Pneumonia (DIP) was identified in 2% of patients. HRCT demonstrated diffuse bilateral ground-glass attenuation with an apico-basal gradient, accompanied by subtle centrilobular nodules, thin-walled cysts, and mild precarinal lymphadenopathy. The chest radiograph was normal in both cases. These findings are characteristic of early-stage DIP and emphasize HRCT's sensitivity in detecting subtle alveolar inflammation that may not be evident on chest radiography.

Usual Interstitial Pneumonia (UIP) was seen in 2% of patients, showing classic HRCT features of diffuse ground-glass opacity, reticular thickening, honeycombing, and traction bronchiectasis, predominantly involving the lower lobes. The coexistence of bronchiectasis in the right middle and left lower lobes reflected end-stage fibrotic change, consistent with histopathological UIP patterns.

Hematogenous pulmonary metastases were found in 2% of patients, appearing as multiple, well-defined nodules of varying sizes with a random bilateral distribution. HRCT allowed accurate differentiation of these metastases from miliary tuberculosis and sarcoidosis by demonstrating the absence of perilymphatic or centrilobular nodular distribution.

When HRCT findings were compared with chest radiography, 16% of patients with normal X-rays exhibited distinct parenchymal abnormalities on HRCT. All patients with abnormal radiographs also showed abnormal HRCT findings. These results indicate that HRCT is approximately 16% more sensitive than conventional chest radiography in detecting early or subtle parenchymal involvement, in agreement with the conclusions of Pingile BK et al.[1]

Overall, this study underscores the invaluable role of HRCT in the evaluation of diffuse and interstitial lung diseases. Its ability to define parenchymal patterns, assess disease activity, and differentiate between various etiologies makes it a cornerstone in the diagnostic workup of ILD. The high spatial resolution and cross-sectional imaging capability enable early detection, accurate characterization, and detailed assessment of disease distribution, which are critical for clinical management, prognostication, and monitoring treatment response.

CONCLUSION

High-Resolution Computed Tomography (HRCT) has proven to be an indispensable diagnostic tool in the comprehensive evaluation of interstitial and diffuse lung diseases. In this study involving 100 patients, HRCT demonstrated superior diagnostic accuracy compared with conventional chest radiography, revealing parenchymal abnormalities in 16% of cases that appeared normal on X-ray. This highlights its unparalleled sensitivity in detecting early or subtle interstitial changes that would otherwise go unnoticed.

The most frequently encountered etiologies were tuberculosis and idiopathic pulmonary fibrosis (IPF), together accounting for more than half of the cases. HRCT effectively characterized a wide spectrum of pulmonary pathologies—including bronchiectasis, emphysema, pulmonary edema, and autoimmune-related interstitial disease—through distinct morphological patterns such as ground-glass opacities, reticulations, honeycombing, and tree-in-bud appearances. These findings were crucial for differentiating active from chronic disease, identifying disease extent, and selecting appropriate biopsy sites.

The ability of HRCT to delineate the distribution, type, and progression of interstitial involvement makes it a cornerstone in modern pulmonary imaging. It not only assists in establishing an accurate diagnosis but also plays a vital role in monitoring treatment response, assessing disease activity, and guiding long-term prognosis. Given its high spatial resolution and noninvasive nature, HRCT should be considered the imaging modality of choice for evaluating patients with suspected or established diffuse parenchymal lung disease.

In conclusion, HRCT bridges the gap between clinical suspicion and definitive diagnosis, transforming the management of interstitial lung diseases from one of uncertainty to precision-based care. It remains the gold standard imaging technique for characterizing lung parenchymal disorders, offering invaluable insights that directly influence patient outcomes and therapeutic decision-making.

REFERENCES

1. Pingile BK, Kolan R, Vadlamudi S, Nagrale HR. Role of high resolution computed tomography in evaluation of diffuse lung diseases. Int J Res Med Sci 2016;4:1099-106
2. Elicker BM, Kallianos KG, Henry TS. The role of high-resolution computed tomography in the follow-up of diffuse lung disease: Number 2 in the Series "Radiology" Edited by Nicola Sverzellati and Sujal Desai. Eur Respir Rev. 2017 Jun 14;26(144):170008.
3. Grainger and Allison's Diagnostic Radiology,Interstitial Lung Disease, Fourth edition,2001,VOL 1 pg no:491.
4. Zerhouni EA, Naidich DP, Stitik FP Khouri NF, Siegelman SS. Computed Tomographyof pulmonary parenchyma: part-2: Interstitial disease. J Thoracimag. 1985;1(1):54-64.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

5. Battista G, Zompatori M, Fasano L, Pacilli A, Basile B. Progressive worsening of idiopathic pulmonary fibrosis. High resolution computed tomography (HRCT) study with functional correlation. Radiol Med. 2003;105(1-2):2-11.
6. Ribeiro CM, Marchiori E, Rodrigues R, Gasparetto E, Souza AS Jr, Escuissato D, et al. Hydrostatic pulmonaryedema: high-resolution computed tomography aspects. J Bras Pnemol. 2006;32(6):515-22.
7. Im JG, Itoh H, Shim YS, Lee JH, Ahn J, Han MC, et al. Pulmonary tuberculosis : CT findings in early active disease and sequential change with antituberculous therapy. Radiology. 1993(186):653-60.
8. Hong SH, Im JG, Lee JS, Song JW, Lee HJ, Yeon KM. High resolution CT findings ofmiliary tuberculosis. J Comput Assist Tomogr. 1998;22(2):220-4.
9. Voloudaki AE, Tritou IN, Magkanas EG, Chalkiadakis GE, Siafakas NM, Gourtsoyiannis NC et al. HRCT in miliary lung disease. ActaRadiol. 1990;40(4):451-6.
10. Lim MK, Im JG, Ahn JM, Kim JH, Lee SK, Yeon KM. Idiopathic pulmonary fibrosis versus pulmonary involvement of collagen vascular disease: HRCT findings. J Korean Med Sci. 1997;12(6):492-8.
11. Munk PL, Müller NL, Miller RR, Ostrow DN. Pulmonary lymphangitis carcinomatosis: CT and pathologic findings. Radiology. 1988;166(3):705-9.
12. Cooke JS, Curie DC, Morgan AD, Kerr IH, Delany D, Strickland B, et al. Role of computed tomography in diagnosis of bronchiectasis. Thorax. 1987;(42):272-7.
13. Grenier P, Maurice F, Musset D, Menu Y, Nahum H. Bronchiectasis- assessment by thin section CT. Radiology. 1986;(161):95-9.
14. Reid LM. Reduction in bronchial wall subdivision in bronchiectasis. Thorax. 1950;(5):283-6.
15. Storto ML, Kee ST, Golden JA, Webb WR. Hydrostatic pulmonary edema: High resolution CT findings. AJR Am J Roentgenol. 1995;165(4):817 20.
16. Ribeiro CM, Marchiori E, Rodrigues R, Gasparetto E, Souza AS Jr, Escuissato D, et al. Hydrostatic pulmonaryedema: high-resolution computed tomography aspects. J Bras Pnemol. 2006;32(6):515-22.
17. Devenyi K, Czirjak L. High resolution computed tomography for the evaluation of lung involvement in 101 patients with scleroderma. ClinRheumatol. 1995;14(6):633-40.
18. Stern EJ, Frank MS. CT of the lungs in patients with pulmonary emphysemas: Diagnosis, quantification and correlation with pathologic and physiologic findings. AJR Am J Roentgenology.1994(162):791 8.
19. Webb WR, Stein MG, Finkbeiner WE, Im JG, Lynch D, Gamsu G. Normal and diseased isolated lungs: high-resolution CT. Radiology. 1988;166:81 7.
20. Murata K, Itoh H, Todo G, Kanaoka M, Noma S, Itoh T et al. Centrilobular lesions of the lung: demonstration by high-resolution CT and pathologic correlation. Radiology. 1986;161(3):641-5.
21. Chan TY, Hansell DM, Rubens MB, du Bois RM, Wells AU. Cryptogenic fibrosingalveolitis and the fibrosingalveolitis of systemic sclerosis: Morphologic differences on computed tomographic scan. Thorax. 1997;52(3):265-70.
22. Seely JM, Jones LT, Wallace C, Sherry D, Effmann EL . Systemic sclerosis: using high resolution CT to detect lung disease in children. AJR Am J Roentgenol. 1998;170(3):691-7. 20.

ISSN (O): 2687-5365; ISSN (P): 2753-6556