Original Research Article

Diagnostic usefulness of low dose spiral HRCT in diffuse lung diseases

Sarvesh Patil[1], Prateek Umrikar[2*], Pratik Gaikwad[3], Rahul Bujade[4]

[1]Assistant Professor, [2,3,4]Resident Doctor, Department of Radiology, Swami Ramanand Teerth Government Medical College and Rural Hospital, Ambajogai, Maharashtra, INDIA.

Email: prateekeuro21@gmail.com

Abstract

Background: These Interstitial lung diseases (ILDs) or diffuse parenchymal lung diseases are heterogeneous group of disorders characterized by varying degrees of inflammation and fibrosis in the lung parenchyma **Aims and Objective:** To study the diagnostic usefulness of low dose spiral HRCT in diffuse lung diseases. **Methodology:** This was a cross sectional study carried out in the Department of Radiology at S.R.T.R G.M.C , Ambajogai during the period of one year i.e. January 2019 to January 2020 in the patients who were suspected of Diffuse Lung Diseases clinically and underwent low dose spiral HRCT. Here the specificity and sensitivity, PPV and NPV and accuracy of the test was calculated by MEDCAL software. **Result:** In our study we have seen that the majority of the patients were in the age group of >60 were 29.27% followed by 50-60 were 24.39%, 40-50 were 21.95%, 30-40 were 17.07%, 20-30 were 7.32%. The majority of the patients were Males i.e. 65.85% and Female were 34.15%. As per the surgical biopsy -histopathology, diagnosis was DLS, the most common diagnosis were Idiopathic interstitial pneumonia in 33.33%, followed by Idiopathic pulmonary fibrosis (IPF) in 24.24%, Rheumatoid arthritis in 18.18%, Systemic sclerosis in 9.09%, Hypersensitivity pneumonitis in 15.15%. The Sensitivity was 96.97% and Specificity was 62.50%; Positive Predictive Value was 91.43%; Negative Predictive Value was 83.33%; Accuracy (*) was 90.24%. **Conclusion:** In our study the spiral HRCT was very useful in the diagnosis of diffuse lung diseases with respect to high sensitivity, specificity and diagnostic accuracy is considered.

Key words: Spiral HRCT, Diffuse Lung Disease(DLD), Interstitial Lung Disease(ILD).

[*]**Address for Correspondence:**
Dr Prateek Umrikar, Resident Doctor, Department of Radiology, Swami Ramanand Teerth Government Medical College and Rural Hospital, Ambajogai, Maharashtra,Pin-431517, INDIA.
Email: prateekeuro21@gmail.com

Received Date: 15/12/2019 Revised Date: 24/01/2020 Accepted Date: 06/02/2020
DOI: https://doi.org/10.26611/10131823

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 12 May 2021

INTRODUCTION

These Interstitial lung diseases (ILDs) or diffuse parenchymal lung diseases are heterogeneous group of disorders characterized by varying degrees of inflammation and fibrosis in the lung parenchyma , Several studies from across the globe have reported on the incidence, prevalence and the relative frequency of ILDs.[1,3] The annual incidence of ILDs has variably been reported between 1 and 31.5 per 100,000.[1,2,4] Clinicians and patients with ILD are understandably frustrated as there is no cause or cure for most of ILDs While the access to computed tomography (CT) scans of chest has surfaced an increased awareness of ILD and the prevalence of ILD in several countries has increased over time,[5,6,7] here we have seen diagnostic usefulness of low dose spiral HRCT in diffuse lung diseases

METHODOLOGY

This was a cross sectional study carried out in the Department of Radiology at S.R.T.R G.M.C , Ambajogai during the period of one year i.e. January 2019 to January 2020 in the patients who were suspected of Diffuse Lung Diseases clinically and underwent low dose spiral HRCT with classical radiological features of diffuse lung disease were considered as DLS on spiral HRCT later the patients also underwent histo-pathological investigation of surgical biopsy ;here the specificity and sensitivity, PPV and NPV and accuracy of the test was calculated by MEDCAL software considering the histo-pathological investigation as gold standard.

How to cite this article: Sarvesh Patil, Prateek Umrikar, Pratik Gaikwad, Rahul Bujade. Diagnostic usefulness of low dose spiral HRCT in diffuse lung diseases. *MedPulse International Journal of Radiology.* May 2021; 18(2): 49-51.
http://www.medpulse.in/Radio%20Diagnosis/

RESULT

Table 1: Distribution of the patients as per the age

Age	No.	Percentage (%)
20-30	3	7.32
30-40	7	17.07
40-50	9	21.95
50-60	10	24.39
>60	12	29.27

The majority of the patients were in the age group of >60 were 29.27% followed by 50-60 were 24.39%, 40-50 were 21.95%, 30-40 were 17.07%, 20-30 were 7.32%.

Table 2: Distribution of the patients as per the sex

Sex	No.	Percentage (%)
Males	27	65.85
Females	14	34.15
Total	41	100.00

The majority of the patients were Males i.e. 65.85% and Females were 34.15%.

Table 3: Distribution as per the surgical biopsy -histopathology diagnosis of DLS (n=33)

Diagnosis	No.	Percentage (%)
Idiopathic interstitial pneumonia	11	33.33
Idiopathic pulmonary fibrosis (IPF)	8	24.24
Rheumatoid arthritis	6	18.18
Systemic sclerosis	3	9.09
Hypersensitivity pneumonitis	5	15.15
Total	**33**	**100.00**

As per the surgical biopsy -histopathology diagnosis of DLS, the most common diagnosis were Idiopathic interstitial pneumonia in 33.33%, followed by Idiopathic pulmonary fibrosis (IPF) in 24.24%, Rheumatoid arthritis in 18.18%, Systemic sclerosis in 9.09%, Hypersensitivity pneumonitis in 15.15%.

Table 4a: Distribution as per the HRCT and Histopathology diagnosis

Low dose spiral HRCT	Histopathology		Total
	DLS	No DLS	
DLS	32	3	35
No DLS	1	5	6
Total	**33**	**8**	**41**

Table 4b: Distribution as per Sensitivity and Specificity and Accuracy

Statistic	Value	95% CI
Sensitivity	96.97%	84.24% to 99.92%
Specificity	62.50%	24.49% to 91.48%
Positive Likelihood Ratio	2.59	1.05 to 6.34
Negative Likelihood Ratio	0.05	0.01 to 0.36
Positive Predictive Value (*)	91.43%	81.31% to 96.32%
Negative Predictive Value (*)	83.33%	40.28% to 97.37%
Accuracy (*)	90.24%	76.87% to 97.28%

From Table 4a and 4b the Sensitivity was 96.97% and Specificity was 62.50%; Positive Predictive Value Was 91.43%; Negative Predictive Value was 83.33%; Accuracy (*) was 90.24%.

DISCUSSION

High-resolution computed tomography (HRCT) is fundamentally a sampling tool used to diagnose and evaluate the severity and anatomic distribution of a diffuse lung disease (DLD). HRCT has been proven to be superior to chest radiography (CXR) and conventional thicker-section computed tomography (CT) images for both detecting and characterizing DLD ([8,9]). Accurate diagnosis of DLD is essential to devise correct management strategy and avoid mistreatment and related consequences ([10]). Many studies discuss the optimal technique. Some studies explored the value of limited HRCT images compared to CXR and standard CT (both limited and entire-lung images) [11,12]. High-resolution computed tomography (HRCT) imaging of the lungs is well-established for diagnosing and managing many pulmonary diseases [13-14]. Optimal methods of acquisition and interpretation of HRCT images require knowledge of anatomy and pathophysiology [8], as well as familiarity with the basic physics and techniques of computed tomography. This parameter outlines the principles for performing high-quality HRCT of the lungs. HRCT is the use of thin-section CT images (0.625-mm to 1.5-mm slice thickness) with a high spatial frequency reconstruction algorithm, to detect and characterize diseases that affect the pulmonary parenchyma and small airways [15]. Following the development and widespread availability of multidetector CT (MDCT) scanners capable of acquiring near-isotropic data throughout the entire thorax in a single breath-hold, 2 general approaches are available for acquiring HRCT images [16] In our study we have seen that the majority of the patients were in the age group of >60 were 29.27% followed by 50-60 were 24.39%, 40-50 were 21.95%, 30-40 were 17.07%, 20-30 were 7.32%. The majority of the patients were Males i.e. 65.85% and Female were 34.15. As per the surgical biopsy -histopathology diagnosis of DLS, the most common diagnosis were Idiopathic interstitial pneumonia in 33.33%, followed by Idiopathic pulmonary fibrosis (IPF) in 24.24%, Rheumatoid arthritis in 18.18%, Systemic sclerosis in 9.09%, Hypersensitivity pneumonitis in 15.15%. The Sensitivity was 96.97% and Specificity was 62.50%; Positive Predictive Value Was 91.43%; Negative Predictive Value was 83.33%; Accuracy (*) was 90.24%. This was similar to B. SUNDARAM [17] they found accuracy for reader 1 (R1) was 81% versus 80%, respectively, for reader 2 (R2) 70% versus 70%, and for reader 3 (R3) 64% versus 59%. Reader accuracy within their top three choices for complete versus limited

examinations was: R1 91% versus 91% of cases, respectively, R2 84% versus 83%, and R3 79% versus 72% of cases. No statistically significant differences were found between the diagnosis methods (P0.28 for first diagnosis and P0.17 for top three choices)

CONCLUSION

In our study the spiral HRCT was very useful in the diagnosis of diffuse lung diseases with respect to high sensitivity, specificity and Diagnostic accuracy is considered.

REFERENCES

1. Coultas DB, Zumwalt RE, Black WC, Sobonya RE. The epidemiology of interstitial lung diseases. Am J Respir Crit Care Med. 1994; 150(4):967–72.
2. Thomeer M, Demedts M, Vandeurzen K. Registration of interstitial lung diseases by 20 centres of respiratory medicine in Flanders. Acta Clin Belg. 2001; 56(3):163–72.
3. Tinelli C, De Silvestri A, Richeldi L, Oggionni T. The Italian register for diffuse infiltrative lung disorders (RIPID): a four-year report. Sarcoidosis Vasc Diffuse Lung Dis. 2005;22 Suppl 1:S4–8
4. Dhooria S, Agarwal R, Sehgal IS, Prasad KT, Garg M, Bal A, *et al...* (2018) Spectrum of interstitial lung diseases at a tertiary center in a developing country: A study of 803 subjects. PLoS ONE 13(2): e0191938. https://doi.org/10.1371/ journal.pone.0191938
5. Hutchinson J, Fogarty A, Hubbard R, McKeever T. Global incidence and mortality of idiopathic pulmonary fibrosis: A systematic review. Eur Respir J. 2015;46:795–806.
6. Raghu G, Chen SY, Hou Q, Yeh WS, Collard HR. Incidence and prevalence of idiopathic pulmonary fibrosis in US adults 18–64 years old. Eur Respir J. 2016;48:179–86.
7. Raghu G, Chen SY, Yeh WS, Maroni B, Li Q, Lee YC, *et al...* Idiopathic pulmonary fibrosis in US Medicare beneficiaries aged 65 years and older: Incidence, prevalence, and survival, 2001-2011. Lancet Respir Med. 2014;2:566–72.
8. Grenier P, Valeyre D, Cluzel P, Brauner MW, Lenoir S, Chastang C. Chronic diffuse interstitial lung disease: diagnostic value of chest radiography and highresolution CT. Radiology 1991;179:12332.
9. Mathieson JR, Mayo JR, Staples CA, Muller NL. Chronic diffuse infiltrative lung disease:comparison of diagnostic accuracy of CT and chest radiography. Radiology 1989;171:1116.
10. Reynolds HY. Diagnostic and management strategies for diffuse interstitial lung disease. Chest 1998;113:192 202.
11. Stein MG, Mayo J, Muller N, Aberle DR, Webb WR, Gamsu G. Pulmonary lymphangitic spread of carcinoma:appearance on CT scans. Radiology 1987;162: 3715.
12. Murray KA, Gamsu G, Webb WR, Salmon CJ, Egger MJ. High-resolution computed tomography sampling for detection of asbestos-related lung disease. Acad Radiol 1995;2:1115.
13. Travis WD, Costabel U, Hansell DM, *et al...* An official American Thoracic Society/European Respiratory Society statement: Update of the international multidisciplinary classification of the idiopathic interstitial pneumonias. Am J Respir Crit Care Med. 2013;188(6):733-748.
14. Lynch DA, Travis WD, Muller NL, *et al...* Idiopathic interstitial pneumonias: CT features. Radiology. 2005;236(1):10-21
15. Kazerooni EA. High-resolution CT of the lungs. AJR Am J Roentgenol. 2001;177(3):501-519.
16. Prosch H, Schaefer-Prokop CM, Eisenhuber E, Kienzl D, Herold CJ. CT protocols in interstitial lung diseases--a survey among members of the European Society of Thoracic Imaging and a review of the literature. Eur Radiol. 2013;23(6):1553-1563.
17. B. Sundaram, B. H. Gross, E. Oh, N. Müller, J. D. Myles and E. A. Kazerooni (2008) Reader Accuracy and Confidence in Diagnosing Diffuse Lung Disease on High-Resolution Computed Tomography of the Lungs: Impact of Sampling Frequency, Acta Radiologica, 49:8, 870-875.

Source of Support: None Declared
Conflict of Interest: None Declared