|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
PubMed (National Library of Medicine ID: 101738825)
Index Copernicus Value 2018: 75.71
Original Research Article
Volume 3, Issue 8; August: 2019; Page No. 132-136

EARLY DIAGNOSIS OF INTERSTITIAL LUNG DISEASE WITHOUT OPEN LUNG BIOPSY

Dr. Mohammed Hidayath Hussain[1], Dr. Mohana Vamsy[2], Dr. Indivar Kiran[3], Dr. P. Satya Dattatreya[4], Dr. Vindhya Vasini[4], Dr. S.S.Nirni[4]

[1] Associate Professor Department of Pulmonology, Shadan Institute of Medical Sciences
[2] Chief Surgical Oncologist, [3] Medical Director, [4] Medical Oncologist
[2,3,4]Omega Hospital

Article Info: Received 20 June 2019; Accepted 30 July. 2019
DOI: https://doi.org/10.32553/ijmbs.v3i8.487
Address for Correspondence: Dr. Wadhvaniya Noordin, Canadian Specialist Hospital Dubai.
Conflict of interest: No conflict of interest.

Abstract

Background:

Objective : The primary objective of this study was to diagnose interstitial lung disease in patients with thorough clinical history, physical exam, chest radiograph, high resolution CT scan, pulmonary function tests (without open lung biopsy) for early diagnosis of disease and to reduce the progression of disease.

Design: This was a Cross sectional study, patients of ILD were selected and studied during the period from November 2017 - December2018)

Setting: Department of Pulmonary Medicine, Shadan Institute of Medical Sciences

Duration: One year (patients of ILD were selected and studied during the period from November 2017 - December2018)

Participants: 69 Patients with ILD attending department of Pulmonary Medicine, Shadan Institute of Medical Sciences. Hyderabad, Telangana.

Methods: Patients with ILD were included in the study. Radiologic, spirometric evaluation was done and the results are statistically analyzed.

Results: Most common form ILD observed was IPF (37.2%) and collagen vascular disease (5.1%). Majority of cases belonged to the age groups 41-50yrs (26%) and 51 -60 yrs (26%). Most of the cases were males (63.7%) and dyspnoea (100%) on exertion and cough (97%) were the most common presenting features. In reference to radiological abnormalities most common pattern observed is honey combing (45.8%) and ground glass (15.2%) & reticular in (13.5%) of patients. 63.6% of cases of IPF and 33 % of RA-ILD showed honey combing features. Associated features like shaggy cardiac borders, elevated domes of diaphragm and lymphadenopathy, pleural reaction were observed in 42.4% of patients. The Zonal distribution of the disease on chest X-ray showed that (6.8%) of patients involve mid and lower zones. Only lower zones were involved in 23.7 % subjects and mid-zone in 1.7%. Involvement of all zones was observed in 64.4 % of cases. Spiro metric function was observed in subjects. Restrictive defect was observed in 81.3 % of patients and mixed defect was observed in 18.6 % patients.

Conclusion: HRCT is significantly superior to chest radiography in identifying and determining the correct diagnosis of ILD. A confident clinical diagnosis of IPF can be reliably made in the presence of characteristic HRCT and clinical findings. However small subset of young patients who are progressing the disease with rapid deterioration may require invasive tests like trans bronchial lung biopsy to rule out infective process or malignancy

Keywords: Interstitial Lung Disease, Diagnosis, Clinical Methods.

Introduction:

The interstitial lung diseases are a clinically challenging and diverse group of over 150 disorders characterized by varying degrees of fibrosis and inflammation of the lung parenchyma or interstitium. The interstitial lung diseases represent many features in common such as similarities of symptoms, comparable appearance of chest imaging studies consistent alterations in pulmonary physiology and typical histological features. However ILD are difficult to classify because approximately 150 known diseases are characterized by interstitial involvement, either as a primary disease or as a part of multi organ process as may occur in collagen vascular diseases one useful approach is to separate ILD into two groups, those with known or unknown causes, for each ILD there may be an acute phase followed by a phase of chronicity with acute exacerbation. Among ILD of known cause, the largest group includes diseases due to Inhalation of inorganic dusts, organic dusts and various irritant and noxious gases. The number of ILD of unknown cause is also very large. The major ones are Idiopathic Pulmonary Fibrosis, Sarcoidosis, ILD associated with collagen vascular diseases.

When a clinician is confronted with a patient with possible ILD, in addition to a detailed medical history , physical examination and routine lab tests, a rationale approach to a diagnostic evaluation includes noninvasive diagnostic techniques such as pulmonary function tests including exercise stress test and chest imaging. Invasive diagnostic procedures such as bronchoalveolar lavage, transbronchial lung biopsy and open lung biopsy are taken up when a specific cause of ILD remains unclear. Pulmonary function tests are an important means for establishing the presence of ILD. They are also useful for the clinical monitoring of the disease course and to assess the efficacy of treatment. It is observed that a fraction of biopsy proven cases of ILD have normal plain chest films. Hence characteristic pulmonary function and exercise test abnormalities can suggest ILD and provide justification for lung biopsy. Exercise test is the most sensitive diagnostic test for ILD since in some patients with biopsy proven ILD the physiological responses to exercise are distinctly abnormal, even though base line pulmonary functions including DLCO and arterial blood gases, chest radiograph and HRCT scan are all normal. Exercise response of ILD patients include a progressive widening of A-a O2, elevated physiological dead space, marked reduction in overall exercise tolerance and low oxygen pulse.. Plain radiograph of the chest remains the cornerstone of the basic imaging in ILD's though in early stages the chest films can be normal. In addition, it is a good means of monitoring progression of disease and response to treatment. It can also provide diagnostic points to possible etiologies.

CT and HRCT scans are more sensitive and can detect abnormalities better than chest radiography. Preliminary studies suggest that when HRCT pattern is combined with clinical and radiological findings, it can have a diagnostic utility. It can also detect areas of nonfibrotic active disease and relatively unaffected areas to guide the site selection for biopsy. Bronchoalveolar lavage is of diagnostic value when the specimen contains infectious agent or neoplastic cell and altered CD 4: CD8 are detected. Open lung biopsy and thoracoscopic guided lung biopsy merit consideration as final diagnostic step in selected patients. Since the exact etiology and pathogenesis of most ILD are unclear, the treatment options are non specific the therapy is aimed at reducing the inflammation so that the fibrosis can be halted and the rate of progression can be slowed down. The clinical response is variable. Prognosis is excellent in some ILD like hypersensitivity pneumonitis when the noxious stimulus is removed .In chronic fibrotic disorders, generally the prognosis is poor. Almost half of the patients of IPF, experience subjective improvement with corticosteroid therapy and other immunosuppressive agents, but only 20 to 25% demonstrate objective improvement. The PaO2 at rest and during exercise testing is superior to traditional PFT, to monitor physiologic response to therapy. Supplemental oxygen should be given to all patients with resting hypoxemia, as well those with oxy-hemoglobin desaturation with exertion. Heart and lung or single lung transplantation for highly selected patients with end stage pulmonary fibrosis is available. Relentless progression of the disease with eventual respiratory insufficiency is inevitable and the five years survival rate is above 50% .It is to be hoped that, in future major advances will be made in understanding the pathogenesis of the disorder so that novel therapeutic strategies may be invented.

MATERIALS AND METHODS

Place of Study: Shadan Institute of Medical Sciences.
Type of Study: This was a Cross Sectional study.
Sample Collection: Sample Size: 69
Sampling Methods: Consecutive patients.
Inclusion Criteria:

1. Chest symptoms – cough, shortness of breath with or without wheeze with enquiry of rashes arthralgia.
2. Radiological appearance of reticular, nodular, reticulo-nodular or honey combing patterns.

Exclusion Criteria: 1-Tuberculosis, 2- Lung fibrosis, 3-Firbothorax
Statistical Methods: The results are statistically analyzed using appropriate statistical software.

OBSERVATIONS AND RESULTS

Majority of cases belonged to the age groups 41-50yrs (26%) and 51 -60 yrs (26%) and most of the cases were males (63.7%).

SYMPTOMATOLOGY

Table 1: Symptomatology

Symptoms	*Number*	*Percentage*
Cough	*67*	*97.1*
Dyspnoea on Exertion	*69*	*100*
Arthritis & Arthralgia	*3*	*4.3*
Skin Rashes & Lesions	*1*	*1.4*
Dysphagia	*1*	*1.4*

From the above table it is evident that dyspnoea (100%) on exertion and cough (97%) were the most common presenting features of Interstitial Lung Disease (ILD).

ETIOLOGY WISE RADIOLOGICAL DISTRIBUTION IN ILD

Table 2: Etiology Wise Radiological Distribution in ILD

Diseases	Upper zone		Mid Zone		Lower zone		Mid & Lower zone		All zones	
	N	%	n	%	n	%	n	%	n	%
IPF	-		1	4.5	4	18.2	2	9	15	68.2
RA	-		-		-		-		3	100
Scleroderma	-		-		1	100	-			
Miliary Metastasis	-		-		-		-		1	100
PCP	-		-				-		1	100
Occupation & Environmental	-		-		6	35.3	-		11	64.7
Interstitial Pneumonia	1	25	-		-		1	25	2	50
Lymphangitis Carcinomatosis	-		-		--		--		1	100

As shown in table 2 in the present study, the most common cause of ILD is IPF accounting for 37.2% of cases followed by 28.8%, occupation & environmental induced diseases.

RADIOLOGICAL PROFILE IN ILD

Table 3: Radiological Profile in ILD

Pattern	Number	%
Nodular	2	3.4
Reticular	8	13.5
Reticulo nodular	7	11.9
Honey combing	28	47.5
Ground Glass	9	15.3
Shaggy cardiac borders	0	0
Elevated domes of Diaphragm	2	3.4
Lymphadenopathy	3	5.1
Pleural reaction	6	10.2
Cardiomegaly	14	23.7
Disc atelectasis	0	0
Superimposed Pneumonia	0	0
Normal Chest X-ray	0	0

In current study the characteristic radiographic appearances observed are the Honey combing (47.5%), Reticulation (13.5%) and Reticulo-nodular (11.8%) patterns. Associated features like shaggy cardiac borders, elevated domes of diaphragm, lymphadenopathy were seen in 32.2% cases. 9.9 % cases of IPF and 0% RA-ILD showed reticulo-nodular features. Honey combing which indicates fibrotic end stage of ILD was seen in 63.6% of IPF and 0 % scleroderma.16.9% of cases showed ground glass appearance.

CHEST X-RAY – ZONAL DISTRIBUTION OF THE DISEASES

Table 4: Chest X-Ray – Zonal Distribution Of The Diseases

Zone	Number	%
Upper Zone only	1	1.7
Middle Zone only	1	1.7
Lower Zone only	15	25.4
Middle & Lower Zone	4	6.8
All Zones	38	64.4

9.9% of IPF showed mid and lower zone involvement and involvement of all zones seen in 68.1 % of cases of IPF. Of the 4 cases of CVD-ILD, 3 cases showed all zone involvement and one case scleroderma showed lower zone involvement.

TYPES OF ILD OBSERVED

Table 5: Types of ILD Observed

Disease	**Number**	**Percentage**
IPF	22	37.2
Scleroderma	1	1.7
Rheumatoid Arthritis	3	5.1
Miliary metastasis	1	1.7
Pneumocysis Carinii	1	1.7
Pneumonia		
Occupation and	17	28.8
environment induced		
Interstitial pneumonia	4	6.8
Others (traction	9	15.3
bronchiectasis etc)		

Predominate disease observed of all the ILD was IPF (37.2%) followed by occupation and environment induced (28.8%) variant.

DISCUSSION

Interstitial lung diseases are heterogeneous group of diseases involving lung interstitium. They have features in common like similarities of symptoms, comparable radiographic appearances, consistent alterations in the pulmonary physiology and typical histological features.

These are the cases studied during the period from (November 2017 - December2018) in the Department of Pulmonary Medicine at Shadan Institute of Medical Sciences

Hyderabad, Telangana. The study group included various etiological forms of interstitial lung diseases such as IPF, ILD due to CVD, military metastasis, PCP

and pneumoconiosis etc. In addition to clinical profile, the chief aim was to study the HRCT chest scan appearances. In the present study of the total 69 patients take 59 were proved to be ILD by HRCT scan

In a study of patients conducted Lim G et al (Korea) the most common cause of ILD was IPF which was followed by CVD – PF and hypersensitivity pneumonia. In present study also the most common cause is IPF accounting for 37.2% of cases followed by 28.8%, occupation &environmental induced diseases. In the references to the study by Lim GI et al the sex ratio was equal in males & females in IPF, CVD – PF. But the female incidence was greater in sarcoidosis and male incidence in pneumoconiosis. In the present study the males account for majority (54.5%) in IPF. In CVD also males accounted for 100% of cases. Over all, males accounted for majority of the cases in ILD with 62.7 % in the current study. In CVD – PF, the most common cause is Rheumatoid arthritis in Lim GI et al study, in this study also RA are most common causes in CVD – PF. Glazen 'C' study of patients on radiographic appearances in ILD described the characteristic radiographic appearances of ILD – the ground glass effect, consolidation, cysts – honey combing pulmonary modules and interstitial thickening. They also included the advantage of HRCT in ILD.

In current study the characteristic radiographic appearances observed are the Honey combing (47.5%) Reticulation (13.5%) Reticulonodular (11.8%). Associated features like shaggy cardiac borders, elevated domes of diaphragm, lymphadenopathy were seen in 32.2% cases. 9.9 % cases of IPF and 0% RA-ILD showed reticulo- nodular features. Honey combing which indicates fibrotic end stage of ILD was seen in 63.6% of IPF and 0 % scleroderma.16.9% of cases showed ground glass appearance. 9.9% of IPF showed mid and lower zone involvement and involvement of all zones seen in 68.1 % of cases of IPF. Of the 4 cases of CVD-ILD, 3 cases showed all zone involvement and one case scleroderma showed lower zone involvement. HRCT chest was done in all cases. HRCT is more sensitive than chest roentgenogram in ILD. HRCT showed changes like reticulo-nodular pattern, traction bronchiectasis, and honey combing. Pulmonary function was studied in all patients 76.8 % has restrictive defect, 23.1% of cases had mixed defect. There is no isolated obstructive defect. Detailed history taking is required to identify respiratory risk factors both past and present.

In addition and to the general teaching hospital we have also taken few cases from a tertiary oncology centre, Omega Hospital which is a premier oncology institute in Hyderabad. We have taken few lung cancer patients who have been smokers

The association between lung cancer (LC) and interstitial lung disease (ILD) can be explained by the shared risk factors like smoking and physiopathology of fibro genesis and cancer genesis. The relative LC risk is shown to be 3 to 7 times higher in ILD, with LC occurrence estimated at 10–15 % in ILD, with 15-20% of ILD patients likely to die from LC. ILD incidence upon LC diagnosis varied from 3–10%. Primary radiological findings consist of lesions which are basically peripheral, mostly in the inferior pulmonary lobes. Inverted proportion trend of adenocarcinomas and squamous-cell carcinomas, with EGFR mutations very rarely found. ILD with associated LC shows bad to grim prognosis, with surgery associated with increased morbidity-mortality, particularly due to acute exacerbation (AE) of ILD. Limited resection reduced this risk, whilst increasing that of cancer mortality. Studies on radiotherapy that can induce AE-ILD are scarce. Chemotherapy was associated with similar response rates to those in LC patients without ILD, yet worse survival. This difference may be accounted for by ILD patients' poorer health and higher risk of drug-induced pneumonitis. Further studies are warranted to better understand cancer physiopathology within the fibrotic areas, along with the therapeutic strategies required

The first literature reviews on the association between lung cancer (LC) and interstitial lung disease (ILD) date back to over 10 years. Primarily focused on epidemiology (23, 24), these reviews reported increased LC risk in ILD. Published in 2017, the last review focused on LC associated with idiopathic pulmonary fibrosis (IPF) (25).

CONCLUSION

HRCT is significantly superior to chest radiography in identifying and determining the correct diagnosis of ILD. The combined information from clinical, laboratory and HRCT findings allows a correct diagnosis to be made in the majority of patients with ILD. In the appropriate clinical setting appearances on the HRCT scan may be sufficiently characteristic to preclude the need for BAL or lung biopsy and histo-pathological examination. Surgical lung biopsy when required should be performed before the initiation of treatment. However some select patients below

50yrs of age, with diffuse shadows, fever, weight loss, and with rapid deterioration may require a Trans Bronchial lung biopsy to rule out malignancy or infective process multiple multi lobe lung biopsies are technically easier by VATS procedure than open lung biopsy. VATS is also associated in the less postoperative pain than open lung biopsy. A confident clinical diagnosis of IPF can be reliably made in the presence of characteristic HRCT and clinical findings.

Acknowledgment

The authors thank all the patients for their kind co-operation, Dr.Jagannatham The Dean, for his kind permission and Mohammed Sarib Rasool Khan, managing director Shadan Institute of Medical Sciences also Dr. Ch Mohana Vamsy Chief Surgical Oncologist Omega Hospital, Dr.W.Indivar Kiran Medical Director Omega Hospital and the team of medical oncologists Dr.P.Satya Dattatreya, Dr.S.S.Nirni and Dr.Vindhya Vasini for giving the permission to conduct the study

REFERENCES

1. Fishman's pulmonary diseases and disorders. Fourth edition volume 1 page no: 1038-1178.
2. Crofton and Douglas respiratory diseases 5th edition volume 2 page no: 877-891, 1002-1072.
3. Text book of Diagnosis of the Chest by Fraser and Pare's fourth edition volume III page no : 1421-1621.
4. Cecil Text book of Medicine volume – 1 page no : 396-402.
5. Seminars in Respiratory and critical care medicine on interstitial lung diseases part II, volume 15, by Ganesh Raghu M.D., Guest editor.
6. Text book of medical physiology by Guyton, 10th edition page no : 456-460.
7. Text book of Principles by of internal medicine by Harrisons II volume page no : 1460-1670.
8. New England Journal of Medicine Gross and humming hake 345 (7) : 517.
9. Coultas DB, Zum walt RE, Black WC, Sobonya RE. The epidemiology of Interstitial lung diseases AM J Respiratory critical care medicine 150 : 967-972, 1994.
10. Pathophysiology of activity limitations in patients with Interstitial lung diseases chest 109:1566-1576, 1996.
11. Correlation of Chest roentgenogram with pulmonary function and bronchoalveolar lavage in interstitial lung diseases by Nugent – Kn, Peterson Mu, Jokes H chest 96; 1224-1227, 1989.
12. Padley SPG, Hansell DM, flower CDR, Jenning P. comparative accuracy of HRCT and chest radiograph in the diagnosis chronic diffuse ILD clinical radiology 44 : 222-226, 1991.
13. Raghu G. Cain K, Hammer S. Winter bauer R improved forced vital capacity, DLCo and resting P (A-a) O2 measurements at one year predict longterm survival in idiopathic pulmonary fibrosis AM. Rev. Respiratory Diseases 143:A 57. 1991.
14. Raghu G : Interstitial lung diseases : A diagnostic approach, Are CT scan and lung biopsy indicated in every patient. AM J. respiratory critical care medicine 15:909-914, 1995.
15. Grenier P, chevret S Beigelman C etal : chronic diffuse interstitial lung diseases. Determination of diagnostic value of clinical data, chestradiography and CT with Bayesian Analysis, Radiology 191 : 383-390, 1994.
16. Oxygen improves maximal exercise performance in ILD by Harris – Eze AO, Sridhar G, Clemens RE etal.
17. Robertson HT clinical application of pulmonary function and exercise tests in the management of patients with ILD seminar in Respiratory critical medicine 15:1-9, 1994.
18. Terrif BA, Kwan Sy, Chan – yung MM, Muller NL fibrosing alveolitis, chest radiography and CT as predictors of clinical and functional impairment at follow up in 26 patients. Radiograph 184 : 445-449, 1992.
19. Walters LC, King TE, Schwarz MI etal, a clinical radiographic, and physiologic scoring system for the for the longitudinal assessment of patients with IPF Am revised respiratory diseases 133:97-103, 1986.
20. An analysis of sub maximal exercise response in patients with sarcoidosis and fibrosing alveolitis by spiro SG, Dowdeswell IRG, Clark TGH, Brj Dischest 1981; 75:169-80.
21. Younes M. Interpretation of clinical exercise testing in respiratory diseases clinical chest medicine 1984:5:189-206.
22. Austrian R, Mc clement JH, Renzethi AD etal clinical and physiological features of some types of pulmonary diseases with impairment of alveolar capillary diffuses Am I med 1951;11:667-85.
23. Raghu G, Nyberg F, Morgan G. The epidemiology of interstitial lung disease and its association with lung cancer. Br J Cancer 2004;91 Suppl 2:S3-10. 10.1038/sj.bjc.6602061
24. Ma Y, Seneviratne CK, Koss M. Idiopathic pulmonary fibrosis and malignancy. Curr Opin Pulm Med 2001;7:278-82. 10.1097/00063198-200109000-00005
25. Karampitsakos T, Tzilas V, Tringidou R, et al. Lung cancer in patients with idiopathic pulmonary fibrosis. Pulm Pharmacol Ther 2017;45:1-10. 10.1016/ j.pupt.2017.03.016