"ROLE OF HIGH RESOLUTION COMPUTED TOMOGRAPHY IN EVALUATION OF PULMONARY DISEASES"

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ABSTRACT

With the incidence of pulmonary disease on marked rise, it can difficult to attribute to specific cause, clinically. Pulmonary diseases are significant public health problems. The prevalence of pulmonary diseases 80% Range between 40 patients of the imaging modalities can help elicit the subtle sings to establish the diagnosis. The goal is to HRCT at early stage so that complete clinical finding can be achieved. HRCT is a useful tool in the diagnosis and management as it can differentiate active from inactive pulmonary diseases with greater sensitivity. This study concludes that HRCT is a powerful and reliable investigation in the diagnosis of pulmonary diseases. Our study illustrates the potential role of HRCT in early detection of pulmonary involvement as a non-invasive, alternative modality for diagnosis and differentiation of active inflammatory process from fibrosis. Pulmonary diseases can be difficult to a specific cause, both clinically and radio graphically. Pulmonary diseases in the setting of a normal-appearing radiography and a nonspecific history and clinical findings can be a difficult dilemma. The precise diagnosis of pulmonary diseases can be elusive, since the signs and symptoms are frequently similar for the different diagnosis and conventional roentgenograms are non-specific for the diagnosis purpose. HRCT using thin sections has become the established method for evaluating defuse lung disease. When the CT findings are analyzed in the context of the clinical history, physical findings, pulmonary function test and laboratory data, characteristics HRCT findings may allow a confident diagnosis in conditions such as asbestosis, silicosis and idiopathic pulmonary fibrosis. In some cases such as allergic alveolitis, HRCT findings may preclude the need for lung biopsy, it can be used as a guide in selecting the best site for a biopsy. HRCT is more sensitive than chest radiography for detecting emphysema and it has replaced bronchi graph as the definitive method for detecting bronchiectasis. Multi slice CT is the most effective way to image patient after blunt chest trauma, which is second only to cans injury as a cause of post trauma death.

INTRODUCTION

A myriad of injuries may result ,including pulmonary contusion or laceration, pneumothorax, hemothorax, trachea-bronchial laceration diaphragmatic injury and the chest wall and the spinal injuries although the chest radiograph in useful in detecting a potentially life threatening conditions, chest radiography is simply not sensitive enough to reliably identify or quantify the extent of most thoracic injuries screening CT studies of the lungs to detect nodules has recently become popular ,but this remains a highly controversial indication. This is primarily due to the high false positive rate cause benign nodules such as granulomas and lymph nodes and current and lack of adequate studies to confirm decrease mortality rate from earlier tumor detection. HRCT chest scanning can begins superiorly from the level of clavicles and extends to the posterior CP angles. Scans are typically obtained in full inspiration during a single breath hold therefore misregistration are no longer a problem when the posterior lung base is the region of primary concern, prone scans may be helpful to increase aeration to these areas. Lateral deceits scan are helpful in rare instance in distinguishing between complex pleural and pulmonary pathological conditions, such as differentiating emphysema from a large lung abscess

1. Evaluation of imaging spectrum of pulmonary disease on High resolution Computed Tomography (HRCT).

2. To assess the cause of Lung disease using HRCT.

3. To assess the severity of pulmonary disease and exclude complications using HRCT.

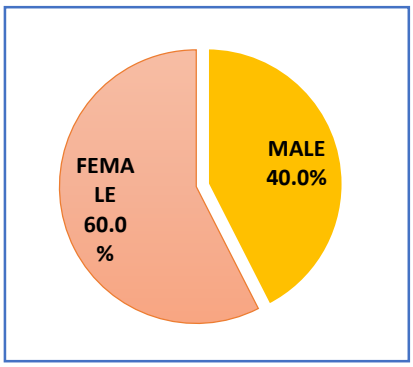
MATERIAL AND METHODS

DESIGN: Evaluation of High Resolution computed tomography in pulmonary diseases. **PARTICIPANTS:** The source of data for this study are patients referred to Department of Radio diagnosis, Imaging and interventional radiology from OPD/IPD of C.S.S. Hospital, under the age is of N.S.C.B Subharti Medical College Meerut. **INCLUSION CRITERIA:**-All the patients with clinically suspected pulmonary diseases. **EXCLUSION CRITERIA:**- Pregnancy, All other lesions mimicking pulmonary disease. Patient who did not give consent. All operated cases. Uncooperative patients. **METHOD OF COLLECTION OF DATA**: -After obtaining clinical history relevant clinical examination will be done. Patient will be subjected to imaging modality, after an informed consent for confirmation of diagnosis. CT examinations will be done on Phillips Ingenuity Core 128 slice CT. Imaging and Diagnosis of pulmonary disease will be made as per departmental protocols.

RESULTS

After HRCT procedure out the inclusion criteria, a total 40 patients of both sex and different age group, were included in the present prospective study. An informed consent was obtained from all the patients before they were subjected for evaluation. Out of 40 patients included in this study, 16/40 (40.0%) patients males and 24/40 (60.0%) patients females. Maximum number of HRCT patients were in the age group of 41-70 years (70.0%).

GRAPH 1: Distribution of patients on males and females.



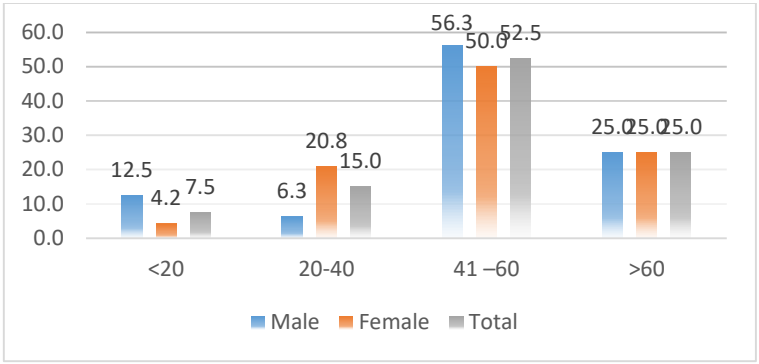


Table no.1: Age and Sex wise distribution.

AGE GROUPS	MALE		FEMALE		TOTAL	
	FREQ	%	FREQ	%	FREQ	%
<20	2	12.5	1	4.2	3	7.5
20-40	1	6.3	5	20.8	6	15.0
41 –60	9	56.3	12	50.0	21	52.5
>60	4	25.0	6	25.0	10	25.0
TOTAL	**16**	100.0	**24**	100.0	**40**	100.0

χ^2 value = 2.32 ρ - value equals 0.508 (NS)

The χ^2 value 2.32 and the ρ value equals 0.508 is considered to be not statistically significant.

Maximum number of patients were presented with cough with sputum (100.0%), and SOB (70.0%), Chest pain (80.0%), (45.0%) patients were presented with smoking.

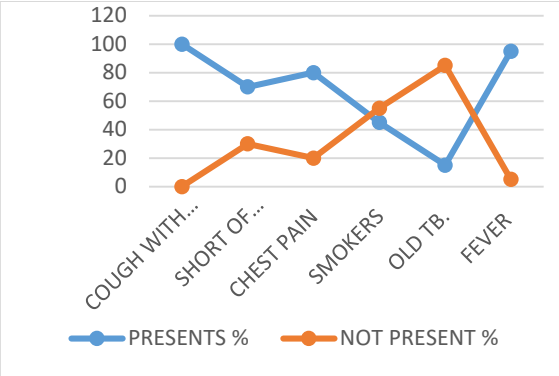
Table no.2: Distribution of patients on the basis of clinical history.

CLINICAL HISTORY	PRESENTS		NOT PRESENT	
	FRE.	%	FRE.	%
COUGH WITH SPUTUM	40	100.0	0	0.0
SHORT OF BREATHNESS (SOB)	28	70.0	12	30.0
CHEST PAIN	32	80.0	8	20.0
SMOKERS	18	45.0	22	55.0
OLD TB.	6	15.0	34	85.0
FEVER	38	95.0	2	5.00

χ^2 value = 95.49 ρ value equals < 0.001 (sig.)

The χ^2 value 95.49 and the ρ value equals < 0.001 is considered to be statistically significant.

GRAPH 2: Distribution of patients on the basis of clinical history.



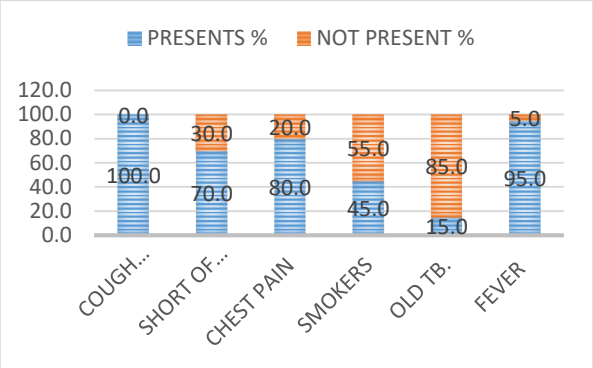


Table no.3: Distribution of patients on clinical findings.

CLINICAL FINDING	MALE		FEMALE		TOTAL	
	FRE.	%	FRE.	%	FRE.	%
PLEURAL EFFUSION	10	25.0	4	10	14	35
EMPHYSEMA	6	15.0	6	15	12	30
TUBERCULOSIS	1	2.5	5	12.5	6	15
BRONCHIETASIS	5	12.5	2	5	7	17.5

χ^2- value = 12.03; ρ - value equals 0.099 (NS)

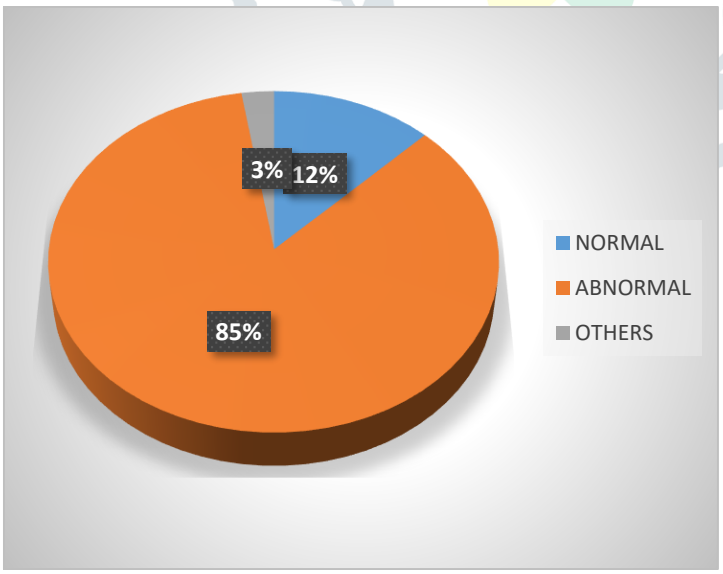
The χ^2 value 12.03 and the ρ value equals 0.099 is considered to be not statistically significant

Distribution of patients on clinical findings.

In five (12.5%) patients the study ware normal. And the 35 (87.5%) patients were abnormal, pulmonary disease causes, (TB, ILD, COPD, P.E. lymph node etc.) constitute (87.5%) 35 patients the most common HRCT diagnosis in patients presenting with pulmonary diseases.

In five (12.5%) patients the study ware normal. And the 34 (85.0%) patients were abnormal, and others 1 (2.5%) pulmonary diseases causes.

GRAPH 3: Distribution of patients on basis of clinical findings of normal and abnormal.



The etiological spectrum varies in the different age groups. This study comprised of 14 cases of pleural effusion (35.0%), and 10 (25.0%) males and 4 (10.0%) females.

The etiological spectrum varies in the different age groups. This study comprised of 13 cases of lymph nodes (32.5%), and 10 (25.0%) males and 3 (7.5%) females.
The etiological spectrum varies in the different age groups. This study comprised of 2 cases of COPD (5.0%), and 1 (2.5%) males and 1 (2.5%) females.

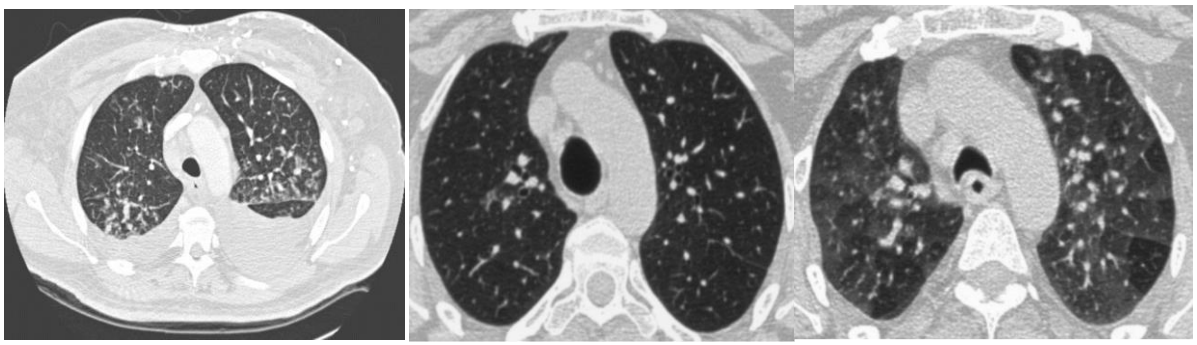
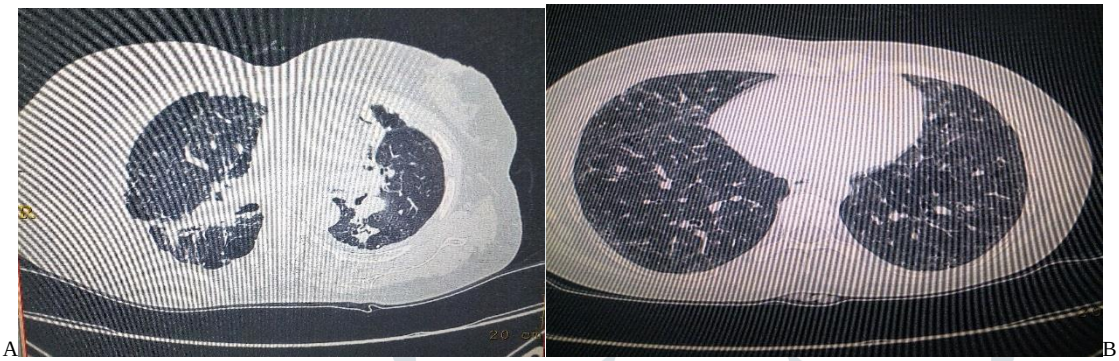


Fig.no.1 Patient being evaluated for suspected pleural effusion, Expiratory



A B

Fig. no.2 Active TB images, A. TB nodes and lymph nodes, B. patient being evaluated for suspected interstitial lung disease.

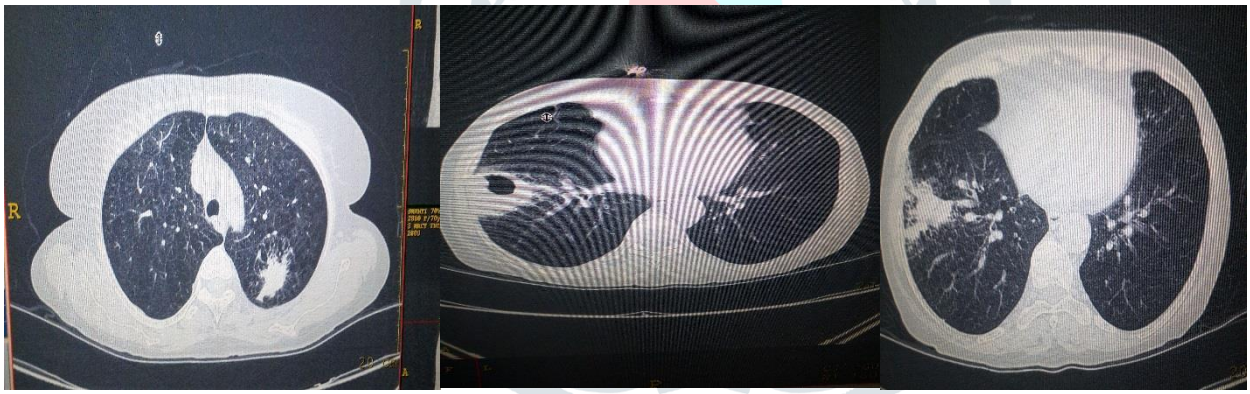
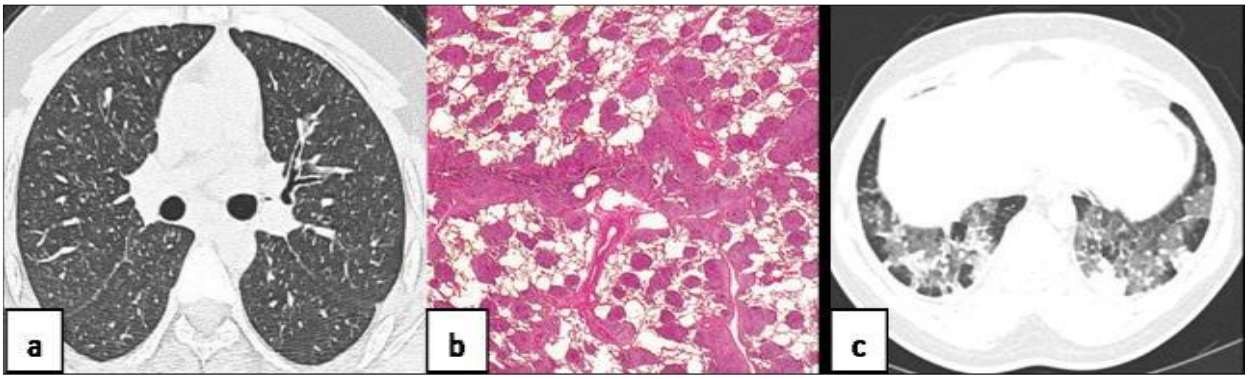


Fig.no 3. Patient being evaluated for suspected B/L emphysema and lymph nodes.



Predominantly nodular findings (a) HRCT image of a patient with sarcoidosis shows small well-defined centrilobular nodules with perilymphatic distribution and symmetrical lymph node enlargement (b) HPE shows extensive pleural and interlobular segments.

DISCUSSION

Pulmonary diseases can be difficult to diagnose because of a specific cause, both clinically and radio-graphically. Pulmonary diseases on normal-appearing radiography and a nonspecific history and clinical findings can be a difficult dilemma. The precise diagnosis of pulmonary diseases can be elusive, since the signs and symptoms are frequently similar for the different diagnosis and conventional roentgenograms are non-specific for the diagnosis purpose.

Clinical profile the etiological spectrum varies in the different age groups. In five (12.5%) patients the study were normal, 34 (85.0%) patients were abnormal, and others 1 (2.5%) was evaluated with pulmonary disease. This study comprised of 14 cases of pleural effusion (35.0%), and 13 cases of lymph node (32.5%), 12 of emphysema (30.0%), 7 of bronchiectasis (17.5%), 7 case of ILD (17.5%), 6 cases of TB (15.0%), 2 cases of COPD or mass lesion / tumor (5.0%).Under 20 years of age three cases of HRCT were seen. Under 30year's four cases and under 40 years only two cases were seen. Under 50 years of age seven cases were seen, and the maximum cases under 60 years and under 70 years of HRCT were seen. Under 80 years of age two cases of HRCT were seen.

CONCLUSION

With the incidence of pulmonary disease on marked rise, it can be difficult to attribute to specific cause, clinically. Pulmonary diseases are significant public health problems. The prevalence of pulmonary diseases ranging 80% between 40 patients of the imaging modalities can help elicit the subtle findings to establish the diagnosis. The goal is to have HRCT done at early stage so that complete clinical finding can be achieved. HRCT is a useful tool in the diagnosis and management as it can differentiate active from inactive pulmonary diseases with greater sensitivity. This study concludes that HRCT is a powerful and reliable investigation in the diagnosis of pulmonary diseases. Our study illustrates the potential role of HRCT in early detection of pulmonary involvement as a non-invasive, alternative modality for diagnosis and differentiation of active inflammatory process from fibrosis. We conclude that there are many abnormalities on the high resolution computed tomography of patients with persistent asthma. Changes suggestive of bronchiectasis, namely bronchial dilatation, frequently resolve spontaneously. Therefore, the diagnosis of bronchiectasis by high resolution computed tomography in asthmatic patients must be made with caution, since bronchial dilatation can be reversible or can represent false dilatation. Non-smoking chronic asthmatic subjects in this study has no evidence of centrilobular or panacinar emphysema. In case of Tuberculosis, HRCT findings of ill-defined nodules, consolidation, tree-in-bud appearance and cavitation's are best indicators of active disease.

BIBLIOGRAPHY

1. Euclid Seeram, "Computed Tomography" Physical Principals, Clinical Applications, and Quality Control Third Edition; Copyright 2009 http://en.wikipedia.org/wiki/Computed_tomography#History
2. 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.
3. Computed Tomography- Euclid Seeram (IIIth – edition) page no- 442-425

Mayo JR et al: Pulmonary Embolism: prospective comparison of Spiral CT with Ventilation –Perfusion Scientigraphy, radiology 205: 447-452, 1997

4. Muller NC; Differential Diagnosis of chronic diffuse infiltrative lung disease on high- Resolution Computed Tomography semin roentgenol 26:132-142,1991
5. Munk PL et al: Pulmonary lymphangitic Carcinometosis :CT & Pathologic findings Radiology 166:705-709,1988
6. Sensen SJ et al: lung nodule enhancement at CT: protective findings, Radiology 201:447-455, 1996.
7. Muhm JR et al: Comparison of whole lung tomography and computed tomography for detecting pulmonary nodules, AJR Am F Roentgenol 131: 981 – 984, 1978.
8. Zerhouni EA et al: CT of the pulmonary nodule: a cooperative study, Radiology 160:319-327, 1986.

Mayo JR the high –resolution computed tomography technique, semin Roentgenol 26:104-109, 1991.

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