

CLINICAL STUDY OF CHEST LESIONS BY MULTI DETECTOR COMPUTED TOMOGRAPHY OF THE CHEST***Dr. Pragma Ghosh M. D.**

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Article Received on 11/06/2018

Article Revised on 02/07/2018

Article Accepted on 23/07/2018

ABSTRACT

Present study is based upon patients with chest lesions (26 with pulmonary Koch's & 44 with other chest pathologies) including ILD, Pneumonic consolidation, CA lung, mediastinal masses, trauma, hydatid cyst, bronchogenic cyst, TPE, ARDS & cold abscess chest wall. Slight male dominance was noted. Main clinical presentation was coughing, breathlessness, sputum production, chest pain, few presented with hemoptysis & dysphagia. All lesions presented with a variety of features on computed tomography described in detail in text. HRCT / CECT of Pulmonary Koch's revealed centrilobular nodules, "tree in bud appearance" fibrotic strands, bronchiectasis, consolidation – segmental collapse etc. ILD patients revealed architectural distortion, ground glass appearance reticular and nodular shadowing. Secondaries revealed multiple nodules of varying sizes in lung parenchyma. Literature supported our observations in majority of cases. Blood & sputum examination / histopathology / FNAC & pleural fluid cytology confirmed the diagnosis in all cases.

KEYWORDS: Chest, HRCT, CECT, Koch's, pulmonary, pleural, mediastinum, ILD, pneumonic.**INTRODUCTION**

CT Chest (whether HRCT or contrast enhanced CT) is a very useful diagnostic tool for imaging of chest. CT provides a three dimensional image of structures of the chest including lungs, pleura, heart, mediastinum, esophagus and provides all information not provided by other diagnostic tools & missed on a conventional chest X-ray.

CT chest can either be an HRCT Scan (High resolution computed tomography) or CECT (Contrast enhanced computed tomography). HRCT does not involve IV contrast and is predominantly used to assess the lung parenchyma. CECT improves characterization of pathological lesions & delineates vascular anatomy.

MATERIAL AND METHODS

The present study was undertaken in the department of Radio-diagnosis, Heritage Institute of Medical Science, Varanasi between the period of July 2017 to June 2018. Patients with suspected chest pathologies were referred from OPD & IPD of different departments especially Chest & TB.

All together 70 patients with different chest pathologies were investigated. Short history was taken & tomography done on Philips MX-16 Slice CT Machine.

HRCT or CECT was done as per patient requirement. CT findings were interpreted and correlated together with clinical findings followed by confirmation on blood, sputum tests & histopathology where ever possible. Finally data was tabulated, analysed & conclusions drawn.

Indications for CT Chest

1. In ICU to diagnose ARDS, ILD small pneumothorax etc.
2. To evaluate loculated pleural effusions, empyema etc.
3. Gold standard investigation for diagnosis of pulmonary embolism.
4. Mandatory in major trauma.
5. For primary lung CA / staging of metastatic disease.
6. Mediastinal pathology – tumors, aortic aneurysm etc.
7. Evaluation of a solitary pulmonary nodule on X-Ray.
8. Cardiac and pericardial pathology – tumors, coronary artery disease, pericardiac effusion.

OBSERVATIONS

Present study consists of 70 cases of various chest pathologies.

Sex and Age incidence are presented in table1.

Pulmonary Koch's (26 cases)			Other chest pathologies (44 Cases)		
Age	No. of Cases		Age	Total No. of Case	
	Male	Female		Male	Female
0 – 10 Yrs.	x	x	0 – 10 Yrs.	1	x
11 – 20 Yrs.	2	x	11 – 20 Yrs.	3	1
21 – 30 Yrs.	2	1	21 – 30 Yrs.	2	2
31 – 40 Yrs.	1	2	31 – 40 Yrs.	4	2
41 – 50 Yrs.	6	3	41 – 50 Yrs.	6	6
51 – 60 Yrs.	3	2	51 – 60 Yrs.	8	2
61 – 70 Yrs.	2	1	61 – 70 Yrs.	3	2
71 – 80 Yrs.	x	1	71 – 80 Yrs.	1	1
	16	10		28	16

Majority of chest lesions (Pulmonary Koch's & other chest lesions) showed male dominance & commonest in

5th & 6th decades of life. Most of the cases complained of coughing, breathlessness & sputum production.

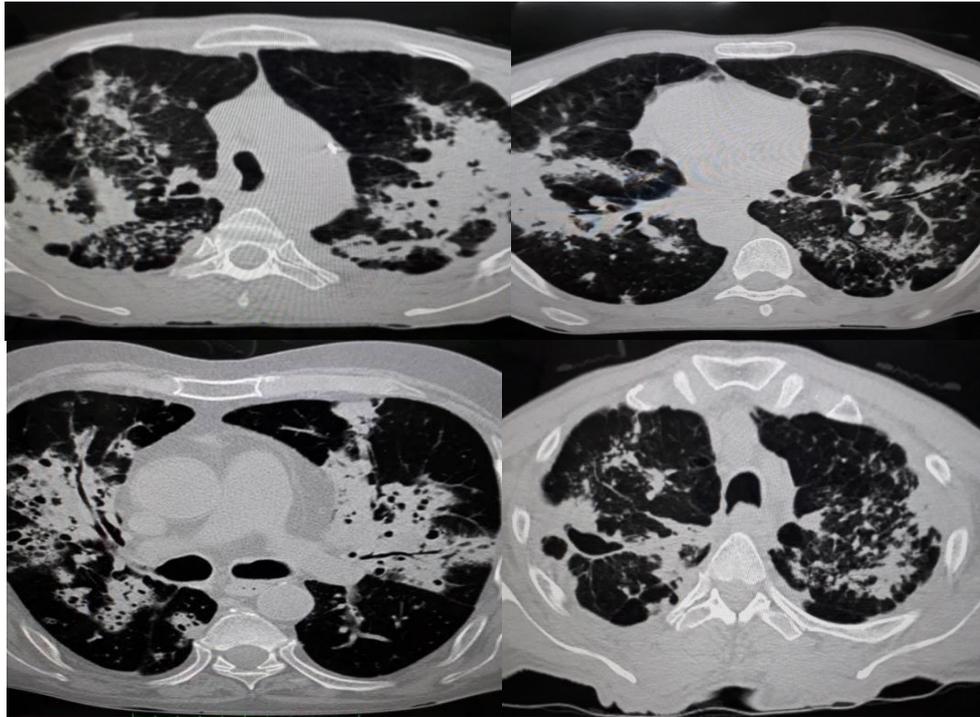
Table 2: Reveals no. of various types of chest pathologies on CT chest. Majority were confirmed on blood and sputum examinations & histopathology.

Chest Pathologies	No. of cases
Pulmonary Koch's	26
Active Pulmonary Koch's	18
Inactive tuberculosis	08
ILD	14
Nonspecific interstitial pneumonitis	05
Idiopathic pulmonary fibrosis	06
Collagen vascular disease	03
Pneumonic consolidations	08
CA lung	08
Primary	04
Secondaries	4+1 (associated with primary CA lung)
Mediastinal Mass	05
Trauma	03
Hydatid cyst	01
Bronchogenic cyst	01
TPE	02
ARDS	01
Cold abscess chest wall	01
Total	70

Pulmonary Koch's was the major chest pathology (26 cases) on HRCT Scan. Active tuberculosis showed centrilobular lesions (08 cases) multiple nodules 5-8 mm diameter in peribronchial distribution (10 cases), consolidation – segmental collapse, (08 cases) “tree in bud appearance” (5 cases) in majority of cases. Associated precarinal & mediastinal lymphadenopathy associated with 20 cases.

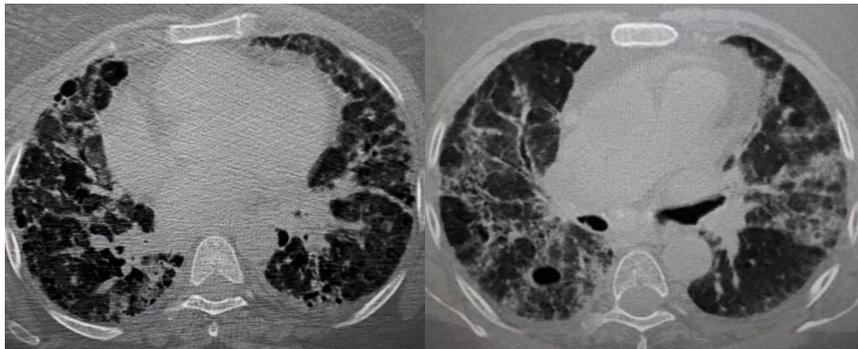
Pleural effusion was associated with 10 cases. Cavitation noticed in 7 cases. There were 3 patients of military T.B. showing multiple nodules of varying sizes in lung fields. Other findings were bronchial wall thickening, ground glass appearance & septal wall thickening. Inactive tuberculosis revealed fibrotic lesions, destruction of bronchovascular structures, calcified granulomas, emphysema, pleural thickening & bronchiectasis in all 8

patients. Pleural plaque seen in 4 patients. Diagnosis was confirmed on sputum examination.



14 cases of ILD were recorded in our study. 10 cases showed ground glass opacities, honeycombing, interseptal thickening, reticular shadows. 08 cases

showed bronchiectatic changes, 04 cases showed mosaic crazy-paving pattern of alveolar consolidation.



08 patients with pneumonic consolidations were seen. There were 05 cases of nonsegmental consolidation and 03 cases of segmental consolidation. CT showed areas of

increased pulmonary parenchymal attenuation with air-bronchogram. Pleural effusion was associated in 06 cases.

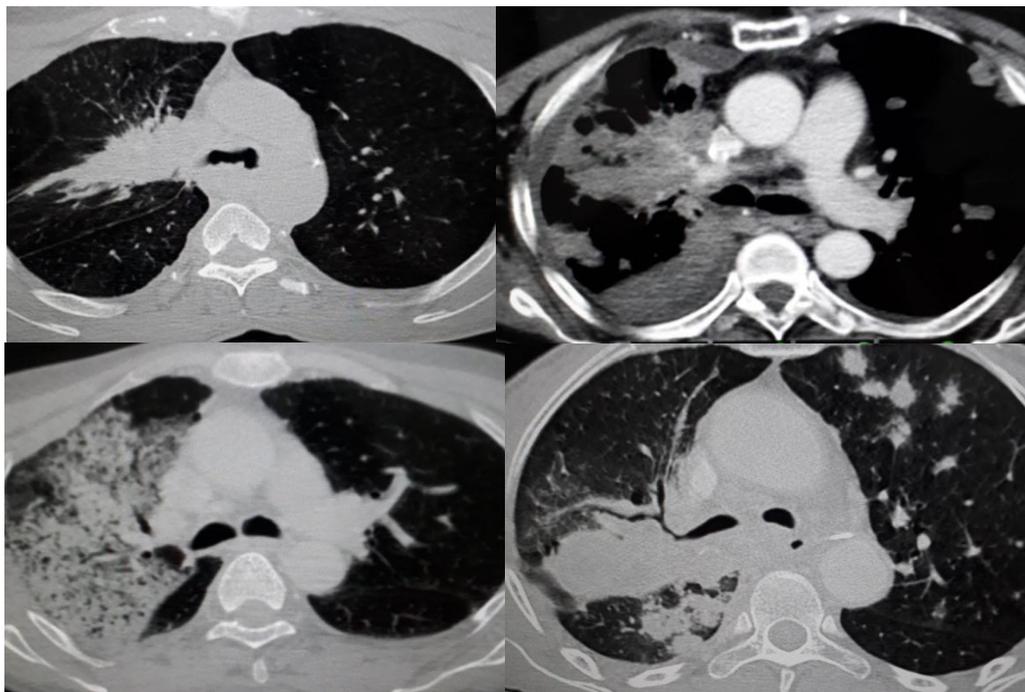


08 cases of CA lung seen, 04 primary & 05 secondaries. (01 associated with primary CA lung, 02 with primary CA breast, 01 with primary colo-rectal CA & 01 with

CA bladder). Primary lung carcinomas were 03 Bronchogenic CA (03 Squamous cell CA), 01 Bronchio-alveolar CA. Secondaries presented with multiple

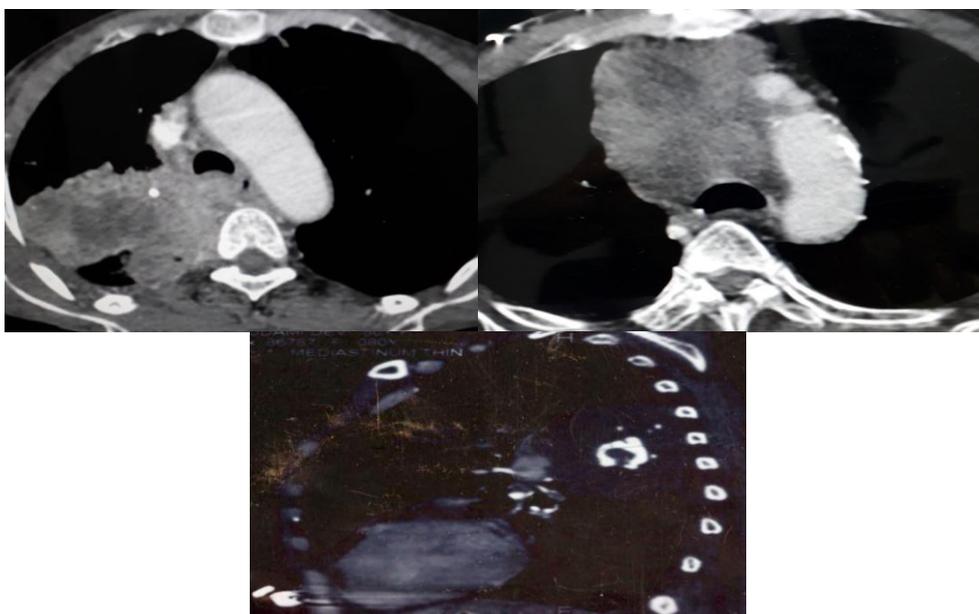
nodules of varying sizes in lung parenchyma. 03 cases of Bronchogenic CA seen 02 presented as right parahilar solid masses with spiculated margins encasing the right main bronchus 01 presented as a left parahilar solid

mass. Bronchio-alveolar CA revealed ground glass opacities with mosaic pattern in RUL & right parahilar region with pseudo cavitation & nodular opacities, consolidation & bilateral pleural effusion.



05 cases of mediastinal masses were encountered (01 in antero-superior mediastinum with extension in middle mediastinum, 02 in posterior mediastinum & 02 middle mediastinal masses). Antero-superior mediastinal mass presented as lobulated heterogeneous solid mass with necrotic areas in antero-superior mediastinum (proved to be germ cell tumor). Posterior mediastinal masses presented as a solid homogeneous mass with contrast

enhancement, central & peripheral calcifications (proved to be sympathetic ganglion tumors) 02 cases of CA esophagus seen (middle mediastinal masses) stage III tumors characterised by soft tissue mass in upper thoracic esophagus, wall thickening, direct local extension into adjacent structures and paravertebral region with pleural effusion. Diagnosis was proved on biopsy.



03 cases of trauma were recorded, All presented with consolidation, lung contusion & laceration, hemothorax

and fracture ribs. 01 presented with vertebral fracture and soft tissue emphysema.



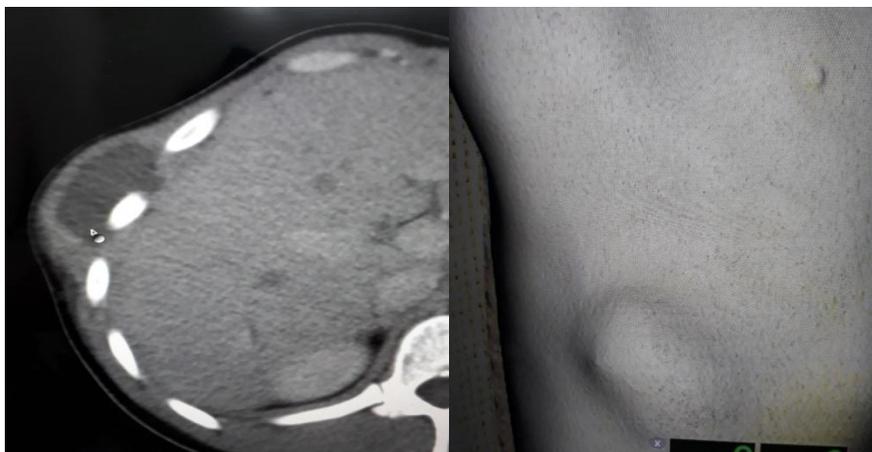
01 case of ruptured hydatid cyst seen in RLL showing spherical mass with air-fluid level (meniscus sign positive) consolidation adjacent to cyst with collapsed

membranes seen with right pleural effusion. Confirmation made on Casoni's test.

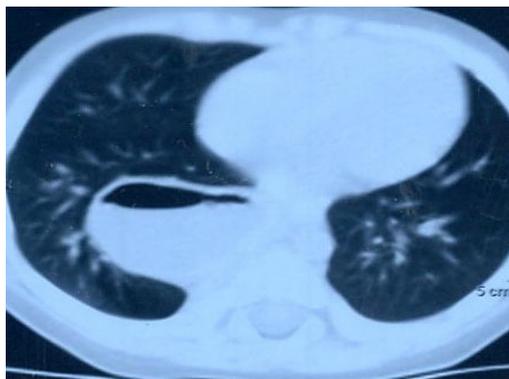


01 case of cold abscess (tubercular) found in right lateral chest wall (7th – 9th intercostal spaces) showing a

hypodense lesion with rim enhancement. FNAC clinched the diagnosis.



01 case of Bronchogenic cyst encountered presenting as a fluid density intrapulmonary ovoid mass with air-fluid level.

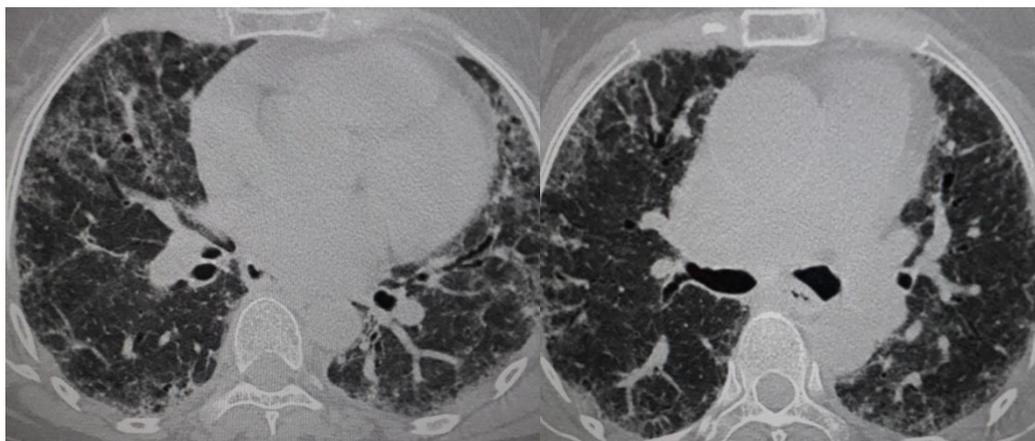


02 cases of TPE recorded showing small pulmonary opacities, bronchial wall thickening and bronchiectatic

changes. Diagnosis confirmed by increased absolute eosinophilic count $> 3000 / \mu\text{l}$.



01 case of ARDS registered. Presented with ground glass opacities, consolidation, architectural distortion, multiple subpleural cysts and bilateral pleural effusion.



DISCUSSION

Pulmonary Koch's

Chest TB is a widespread problem in India where it is one of the leading causes of mortality. Chest involvement is commonly pulmonary, followed by lymphnodal & pleural disease. HRCT is an important tool in the detection of radiographically occult disease, D/D of parenchymal lesions, evaluating mediastinal lymphnodes, disease activity & complications.

Active Tuberculosis can be classified into

1. Primary TB – Initial infection with consolidation, adenopathy & pleural effusion.
2. Secondary TB – Which commonly is post primary, less often reactivation of TB Usually located in apical segment & upper lobes with cavitation.
3. Endobronchial spread shows typical “tree in bud appearance”.
4. Miliary TB – Shows 2-3 mm randomly distributed nodules.

Most common finding with active tuberculosis are centrilobular lesions, macro nodules (5-8 mm in diameter) & “tree in bud appearance”, consolidation (lobular or lobar), bronchial wall thickening, cavitation, pleural thickening & lymphnodes.

Inactive tuberculosis shows fibrotic lesions, distortion of bronchovascular structures, emphysematous changes, bronchiectasis & atelectatic segments, pleural plaques & granuloma formation.

Interstitial Lung Disease (ILD)

Diffuse ILD encompasses a variety of disorders characterised by cellular infiltration in a periacinar location. Precipitants are smoking, dusts, gases, drugs, infections, underlying systemic disease, granulomatous disease, neoplasm, vasculitis, interstitial, autoimmune & collagen disease. If no cause detected than nonspecific interstitial pneumonitis & idiopathic pulmonary fibrosis are considered. Collagen vascular disease shows multiple pulmonary nodules (between 0.5-5 cm), fine reticular opacities. Nonspecific interstitial pneumonitis can be subacute or chronic. Subacute IP present with ill-defined centrilobular nodules of ground glass opacity (80%) & air trapping. Chronic IP shows mosaic pattern with secondary nodules, septal and intralobular reticular thickening indicating fibrosis. Most common findings in idiopathic pulmonary fibrosis are symmetrical fine reticular attenuation with linear opacities, septal thickening, traction bronchiectasis, ground glass opacity & honeycombing.

Pneumonic Consolidation

Consolidation appears on HRCT as a homogeneous increase in pulmonary parenchymal attenuation with air-bronchogram formation. Consolidation may be segmental (bronchopneumonia), nonsegmental (lobar pneumonia) & interstitial (as already discussed in ILD) depending on distributions pattern of air space opacification. Etiologically air space consolidation may be due to infectious, noninfectious or inflammatory diseases.

CA Lung

May be primary or secondary Primary CA lung may be Bronchogenic CA including SCC (30-35%), Adeno CA, Small cell, large cell CA or Bronchio- alveolar CA. SCC has a central location, presents with obstructive consolidation & atelectasis, has inverse sign of golden & usually associated with smoking. Adeno CA usually presents with peripheral nodule and seen in upper lobes in 69% cases. Bronchio-alveolar CA are typically solitary, well circumscribed “fried egg appearance” focal areas of ground glass opacities with or without consolidation. Secondaries usually occur from breasts, contralateral lung, GI tract, liver, bone etc. On HRCT metastasis presents as well circumscribed rounded lesions of soft tissue attenuation.

Mediastinal Mass

Mediastinal masses are classified as superior (above the thoracic plane) & inferior mediastinal masses (below the thoracic plane). Inferior mediastinal masses may be anterior, middle or posterior. Anterior mediastinal masses include teratoma, thymus, thyroid & lymphoma etc. Middle mediastinal masses include CA esophagus, lymphnodes, duplication cysts or aortic arch anomalies. Posterior mediastinal masses include neurogenic tumors, lymphnodes and sympathetic ganglia.

Germ cell tumors arise from mediastinal remnants of germs cell migration. Teratomas are the most common GCT. Finding of a fat fluid level within mass on CT is diagnostic of teratoma. Teratomas have a uni or multilocular cystic component. Seminomas present as large lobulated masses of homogeneous attenuation.

Neurogenic tumors account for 20% of all adult & 35% of pediatrics posterior mediastinal tumors. Intratumoral calcification seen with bone destruction, occur in paravertebral location. Schwannomas & Neurfibromas present appear as sharply marginated spherical masses. Sympathetic ganglia tumors appear as heterogeneous masses with punctuate calcifications.

CA esophagus is a middle mediastinal mass. CECT reveals intraluminal soft tissue polypoidal mass, focal wall thickening, local extension or distant metastasis.

Trauma

Chest trauma may be blunt or penetrating Blunt trauma accounts for 90% of thoracic injures. Penetrating trauma is caused by gunshot wounds and stabbing & causes an opening in inner thorax. Blunt injures are mainly caused by motor vehicle crashes (63-78%). CT reveals a spectrum of abnormalities like pneumothorax, collapsed lung, hemothorax, pulmonary contusions, laceration, aspiration pneumonia, fracture vertebrae & fracture ribs. Contusions appear as nonsegmental areas of ground glass or nodular opacities.

Hydatid Cyst

In humans, echinococcus granulosus is responsible for the most common type of hydatid disease. After the liver, lungs are the most common site for hydatid disease. Lower lobes are the most common location in lungs (60%).

30% of cases have > 1 cyst, bilateral in 20% cases. Uncomplicated cysts appear as well circumscribed fluid attenuation lesions with homogeneous contents and hyperdense walls. If cyst ruptures, bronchial erosion can cause appearance of crescent of air between pericyst and endocyst (crescent sign). Other signs on CT are signet ring sign, cumbo sign & water lily sign.

Bronchogenic Cyst

Bronchogenic cysts are congenital malformations of the bronchial tree.

They can occur in mediastinum or are intrapulmonary. Commonest site is middle mediastinum. On CT they appear as well circumscribed, spherical or ovoid masses of variable attenuation. 50% are of fluid density. Significant proportions are of soft tissue density.

Tropical Pulmonary Eosinophilia

TPE is an unusual hypersensitivity response to filarial antigens of *W. bancrofti* & *B. malayi*. Blood AEC (Absolute eosinophilic count is diagnostic > 3000/ μ l).

HRCT chest demonstrates pulmonary opacities in simple pulmonary eosinophilia. Loeffler's syndrome shows a classical "reverse bat wing" appearance. Acute eosinophilic pneumonia demonstrates reticulo-nodular opacities and bronchiectasis.

Acute Respiratory Distress Syndrome (ARDS)

ARDS is a sudden life threatening lung failure as a result of increased permeability together with injury to respiratory epithelium. Pulmonary ARDS shows patchy distribution of lung disease, complete distortion more basal with subpleural cysts. Extrapulmonary ARDS shows ground glass opacities, consolidation and symmetrical abnormalities.

Cold Abscess (Tubercular) Chest wall

Tubercular infection of the thoracic cage is rare. Chest wall TB can occur over rib cage, sternum or sternoclavicular joints. HRCT reveals superficial hypodense areas, bony destruction or sclerosis of articular surface. Diagnosis is confirmed on FNAC.

SUMMARY AND CONCLUSION

This study is based upon 70 patients with various chest pathologies. Majority were of Pulmonary Koch's (26 cases) which included 18 cases with active & 08 cases with inactive pulmonary T.B. Rest 44 cases included ILD (14 cases), pneumonic consolidation (08 cases), CA lung (08 cases), mediastinal masses (05 cases), hydatid cyst (01 case), trauma (03 cases), Bronchogenic cyst (01 case), TPE (02 cases), ARDS (01 case), cold abscess chest wall (01 case). CT made presumptive diagnosis in all cases which were proved on biopsy, sputum & blood examinations or post surgery.

Different parenchymal, pleural & mediastinal lesions were found on HRCT / CECT examination. Hence, it is concluded that CT chest is an excellent tool for diagnosis of these pathologies & final diagnosis is based on sputum & blood examination & histopathology.

ACKNOWLEDGEMENT

My heartfelt thanks go to Mr. Bhupendra Bahadur Prajapati who meticulously typed out this work.

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