

EOSINOPHLIC LUNG DISEASES

A wide spectrum of infiltrative lung diseases characterized by infiltration of lung parenchyma with eosinophils and/or peripheral blood eosinophilia.

How is the diagnosis made?

Clinical and radiological features along with laboratory investigations :

- BAL and peripheral blood eosinophilia.
- BAL <2% eosinophils - normal
 - 2-25% - non specific conditions
 - >25% - IAEP
 - >40% - ICEP

Peripheral blood eosinophilia > 1000/mm³ (>1500/mm³)

Classification

Eosinophilic Lung Diseases of Undetermined Cause :

- ICES, IAES
- Churg-strauss syndrome, IHES.

Eosinophilic Lung Diseases of Determined Cause :

- TPE, Loffler's syndrome, other parasites.
- ABPA, Bronchocentric Granulomaosis, other fungi.
- Drugs/ Toxins/ Radiation.

Miscellaneous :

- Asthma, Eosinophilic bronchiis, IPF, Sarcoidosis, Lung transplantation, Prarneoplastic eosinophilic pneumonia.

ICEP

- F > M.
- 30 – 40 years.
- H/o of asthma / atopy / chronic rhinitis or sinusitis.
- Non – smokers.

Clinical Features

Mean interval between onset of symptoms and diagnosis is 4 months

- Cough (dry , later on productive).
- Dyspnoea.
- Chest pain.
- Fatigue, malaise, fever , night sweats, weight loss.
- Wheeze / Crackles.

Laboratory Investigations

CXR

- B/l non – migratory peripheral opacities.
- Photographic negative of pulmonary edema (25%).
- Ground glass to consolidation.

HRCT

- B/l peripheral alveolar opacities.
- Septal thickening/ atelectasis / small pleural effusions / mediastinal lymphadenopathy

➤ **BLOOD**

↑ TLC , ESR.

↑ Total IGE >1000 IU/ml.

↑ AEC >5500/mm³.

➤ **BAL**

>40% eosinophils.

➤ **PFT**

obstructive / restrictive.

Treatment

- Mainstay of treatment is **Corticosteroids**.
- 1 mg/kg/d for 2 weeks, then tapering over 4 – 6 weeks.
- Symptoms improve in 2 weeks and CXR clear in 2 months.
- Relapse rate is 80% after stopping of treatment.
- Relapse respond well to Corticosteroids resumption.

IAEP

- M > F.
- 30 years.
- H/o of respiratory exposure to dust, initiation of tobacco smoke

Clinical Features

- Acute onset (<7 days or 7 – 31 days).
- Cough.
- Dyspnoea.
- Chest pain , myalgia , fever.
- Tachypnoea.
- Tachycardia.
- Crackles.

Laboratory Investigations

1. **BLOOD** - Lack of pulmonary blood eosinophilia.

TLC , ESR.

IgE > 1000 IU/ml.

2. **BAL** - 25% EOSINOPHILS (25 – 50 %).

3. **PFT** – Restrictive.

Severe hypoxemia

(PaO₂/FiO₂ < 300 mmHg)/(PaO₂/FiO₂ < 200 mmHg).

CXR

- B/l alveolar and interstitial peripheral opacities.
- Ground glass and micronodular.

CECT

- B/l alveolar and interstitial opacities.
- Poorly defined nodules along bronchovascular prominence
- Septal thickening.

Treatment

- Role of corticosteroids is unconfirmed, may recover spontaneously.
- Initial bolus dose of Methyl Prednisolone 60-125 mg 6 hrly then oral Prednisolone 40 – 60 mg/d for 2 – 4 weeks , tapering over few weeks.
- Complete recovery , no relapse

Diagnostic criteria for IAEP

1. Acute onset.
2. B/l diffuse infiltrates on CXR.
3. $\text{PaO}_2 < 60$ mmHg or $\text{SpO}_2 < 90\%$ or $\text{PaO}_2/\text{FiO}_2 < 300$ mmHg.
4. BAL $> 25\%$ Eosinophils.
5. Absence of any determined cause.

Chrug - Strauss Syndrome

Eosinophilic granulomatous inflammation involving the respiratory tract and necrotizing vasculitis of medium and small sized vessels along with asthmas and peripheral blood eosinophilia.

- M > F.
- 40 – 50 years.
- H/o of asthma (severe and corticosteroid dependant) / rhinitis / relapsing paranasal sinusitis / polyps.

Clinical Features

- Cough , dyspnoea , wheezing
- Weight loss, myalgia , arthralgia
- Extra pulmonary manifestations

Cardiac – M.C. cause of death

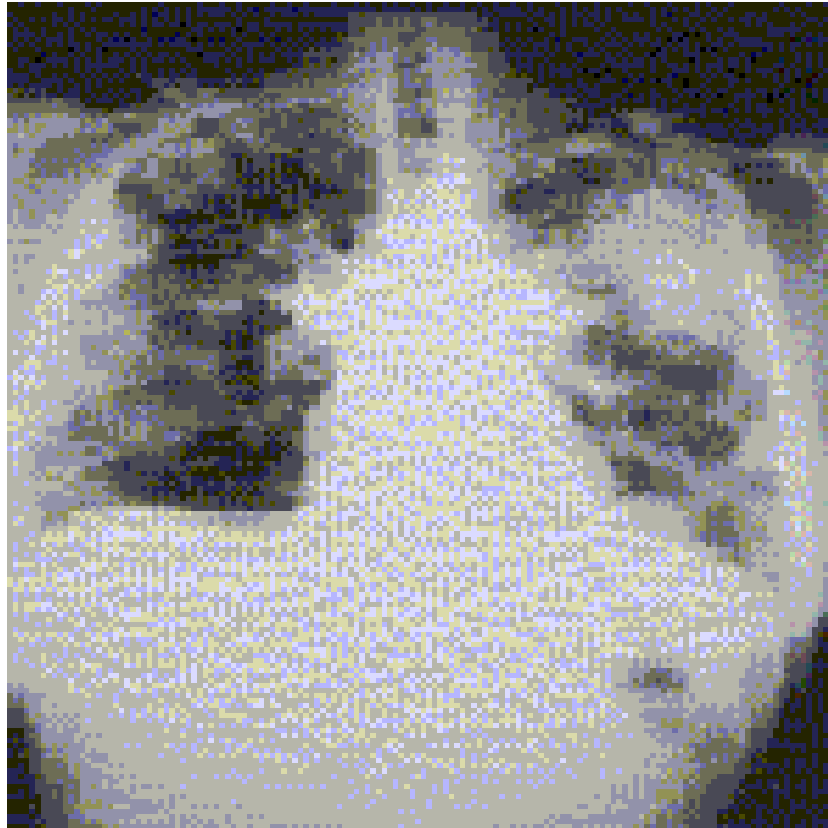
CNS , GIT , Renal , Skin

CXR

- Normal or b/l peripheral migratory and transient pulmonary infiltrates.
- B/l non- cavitating nodular opacities.

HRCT

- B/l peripheral migratory & transient pulmonary infiltrates.
- Septal thickening.
- Hilar or mediastinal lymphadenopathy.
- Bronchial wall dilation.



B/l pulmonary infiltrates



B/l ground glass opacities

Diagnostic Criteria

1. H/o Asthma.
2. PBE $> 1500 / \text{mm}^3$.
3. Systemic vasculitis > 2 extra pulmonary organs.
4. p-ANCA.
5. Skin , nerve , muscle biopsy

(*Lung biopsy is not recommended*)

Treatment

Corticosteroids

- Initial bolus dose of methyl Prednisolone - 15 mg/kg/d for 3 days.
- Than 1 mg/kg/d for several weeks with tapering over 1 year.

FIVE FACTOR SCORE (poor prognosis)

- Renal, cardiac , CNS, GIT , mild to moderate relapses

Use of following drugs is recommended

- Cyclophosphamide, Azathioprine, s.c. IFN- gamma , CyclosporineA

IHS

Heterogeneous group of disorder characterized by multiorgan eosinophilic infiltration and end organ damage without any underlying cause.

- M > F.

- 20 – 50 years.

Clinical Features

- Cough , dyspnoea , fever , malaise , fatigue.
- Extra pulmonary manifestations
 - Cardiac , CNS , Skin.

Laboratory Investigations

1. BLOOD - TLC , ESR , IgE.

AEC > 1500/mm³ for at least 6 months or death before 6 months.

LAP, Serum vit B 12 ,
Hypergammaglobinemia, ILK.

2. BAL - Mild.

3. PFT - Restrictive.

CXR

- B/l transient pulmonary infiltrates.

CECT

- B/l transient pulmonary infiltrates.
- Small nodules.

Diagnostic Criteria

1. Severe PBE ($> 1500/\text{mm}^3$) for at least 6 months or death before 6 months.
2. Absence of any other cause.
3. Multi organ dysfunction.

Treatment

1. Eosinophilia without endorgan dysfunction – **observation.**
2. With organ damage - **Prednisolone**(1 mg/kg/d) for weeks than tapering over 1 year
3. If diseases progresses - Add **Hydroxyurea** (0.5 – 1.5 g/d)
- 4 Refractory causes :
IFN alpha, Imatinib , Vincristine ,
Anti-IL5monoclonal Ab.

Tropical Pulmonary Eosinophilia

- Caused by filarial parasites - *Wuchereria Bronchofti* and *Brugia Malayi*.
- Hypersensitivity reaction to Microfilarial antigens.
- M > F.
- 25 – 40 years.

Clinical Features

- Dry cough without dyspnoea (90%).
- Dry cough with dyspnoea (45%).
- Mucopurulent sputum (40%).
- Fever, anorexia, weight loss.
- Wheeze.

Laboratory Investigations

1. **BLOOD** - TLC , ESR , IGE.

- AEC > 3000/mm³.

- Absence of microfilaria in blood and sputum.

- Specific filarial IgE , IgG.

2. **BAL** - Eosinophils.

3. **PFT** - Obstructive (when presents in < 1 month).

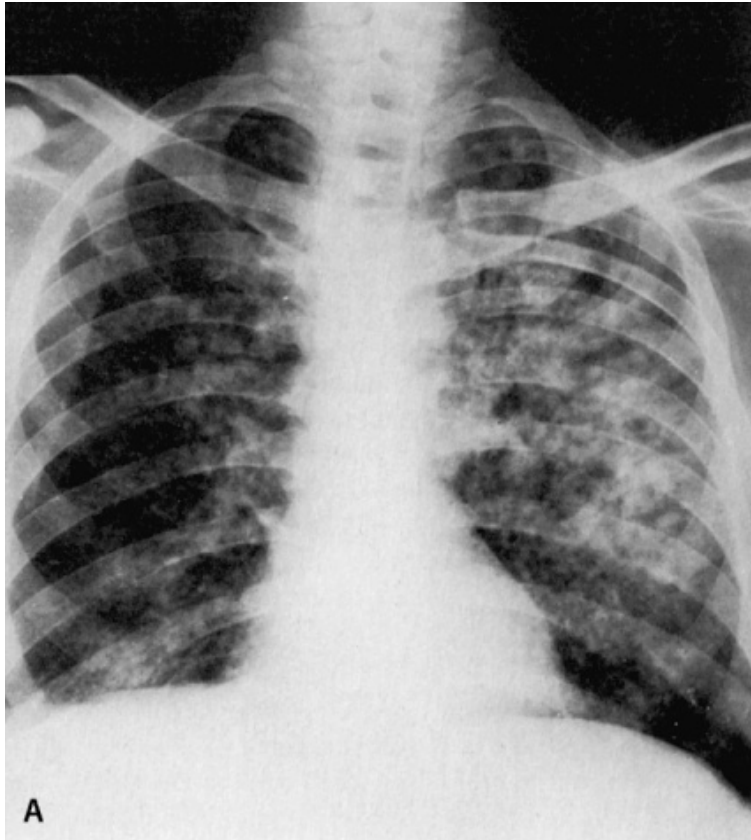
- Mixed.

CXR

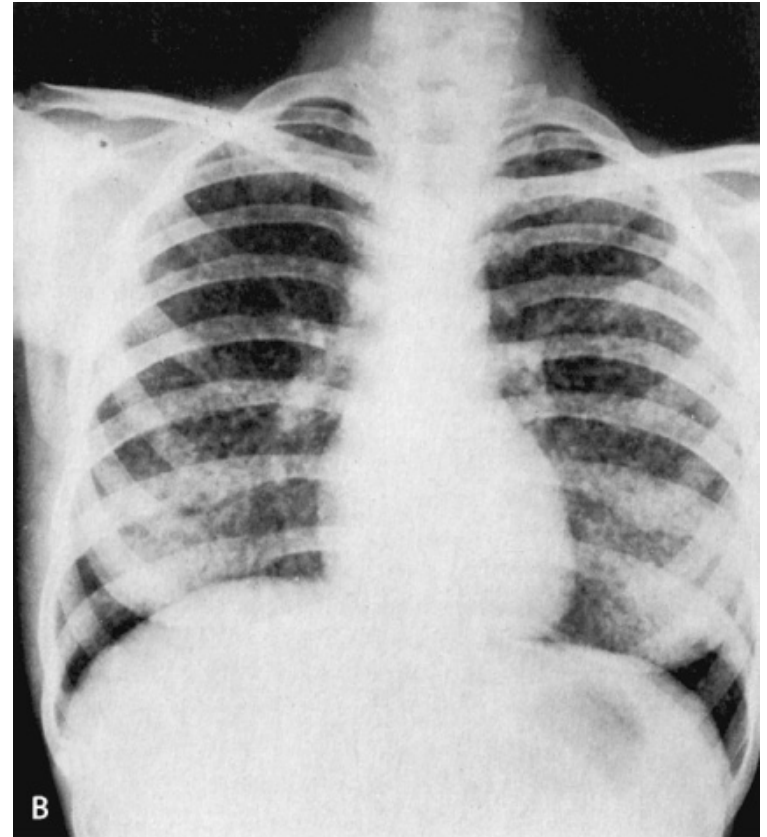
- Normal (20%).
- B/l disseminated reticulonodular opacities in MZ / LZ.
- Hilar prominence, miliary mottling.

CECT

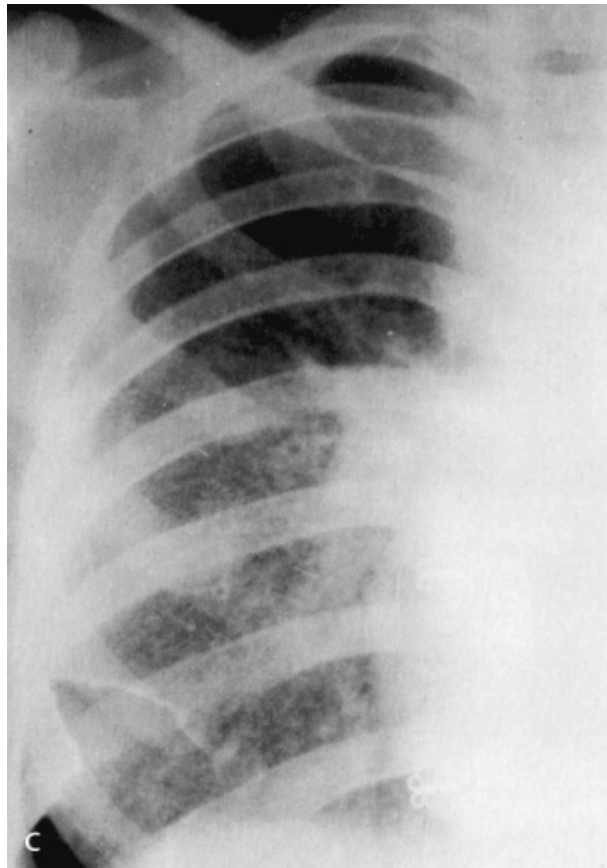
- B/l reticulonodular opacities.
- Bronchiectasis, air trapping, calcification.



B/l diffuse
bronchopneumonia



B/l diffuse miliary
nodules



Reticulonodular Pattern

Diagnosis

1. H/o residing or visit to an endemic area.
2. Eosinophilia $> 3000/\text{mm}^3$.
3. Elevated IgE.
4. Specific IgE , IgG Ab.
5. Absence of microfilaria in blood and sputum.
6. Response to DEC.

Treatment

- **Diethylcarbazine** - 6 – 12 mg/kg/day for 3 weeks.
- **Corticosteroids** and **Ivermectin** are tried in chronic variant of disease.
- If untreated , disease may resolve spontaneously or may lead to development of interstitial lung disease

Loffler's Syndrome

- Immune response to *Ascaris* larva during migration of larva through lungs.
- Other parasites and drugs are also responsible.
- No cause in 1/3 patients.
- All age groups.
- M = F.

Clinical Features

- Cough , mostly non-productive.
- Dyspnoea.
- Low grade fever.
- Anorexia, malaise, weight loss.
- Crackles.

Laboratory Investigations

- 1. BLOOD** - TLC , ESR , IgE.
- AEC > 3000 mm³.
- 2. SPUTUM** - Eosinophils, larva during pneumonic stage,
charcot - leyden crystals.
- 3. STOOL** - Ova , parasites (not seen up to 8 weeks
after onset of respiratory symptoms.
- 4. PFT** - Restrictive.

CXR

- B/L transient migratory peripheral infiltrates.
- May coalesce to form areas of consolidation.

CECT

- B/l transient migratory peripheral infiltrates.

Treatment

- Search for the etiological cause - parasites / drugs.
- Mild cases – resolve spontaneously in 1 – 2 weeks.
- Severe cases – **Corticosteroids** 1 mg/kg/day.
- To prevent late GIT symptoms :
 - **Albendazole** 400 mg single oral dose.
 - **Mebendazole** 500 mg single oral dose.
- Follow up after 3 months is needed.

ABPA

- Immune response of the bronchi and lung parenchyma in response to Ag of *Aspergillus* colonizing the airways.
- M = F.
- 30 – 40 years (any age may be affected).
- H/o of asthma / atopy.
- Family occurrence of ABPA is a rarity.

Clinical Features

- Cough with sputum.
- Dyspnoea.
- Fever , lethargy , malaise.
- Expectoration of golden brown plugs.
- Wheeze / Crackles.
- Signs of clubbing , cyanosis , cor-pulmonale , RF.

Major Criteria

1. H/o asthma.
2. Immediate skin reaction to Ag (type 1).
3. AEC > 2000/mm³.
4. IgE > 1000 IU/ ml.
5. Serum precipitins against *Aspergillus fumigatus*.
6. Specific IgE and IgG against *Aspergillus fumigatus*.
7. Transient pulmonary infiltrates on CXR.
8. Central bronchiectasis with normal tapering of distal bronchi.

Minor Criteria

1. Delayed skin reaction to Ag (type 3).
2. Brownish plugs in sputum.
3. Sputum culture positive for *Aspergillus fumigatus*.

Minimum Essential Criteria

1. H/o asthma.
2. Immediate skin reaction to *Aspergillus fumigatus*.
3. IgE.
4. Central bronchiectasis.
5. Specific IgE and IgG against *Aspergillus fumigatus*.

STAGING

1. Acute.
2. Remission.
3. Exacerbation.
4. Steroid dependant.
5. Fibrotic lung disease.

Laboratory Investigations

1. **BLOOD**
 - TLC, ESR, IgE.
 - AEC > 1000/mm³.
 - Serum precipitins against A.F.
2. **SPUTUM**
 - Eosinophils.
 - Positive culture for A.F.
3. **SKIN TESTS** - Positive immediate test.
4. **PFT** - Restrictive / obstructive / mixed.

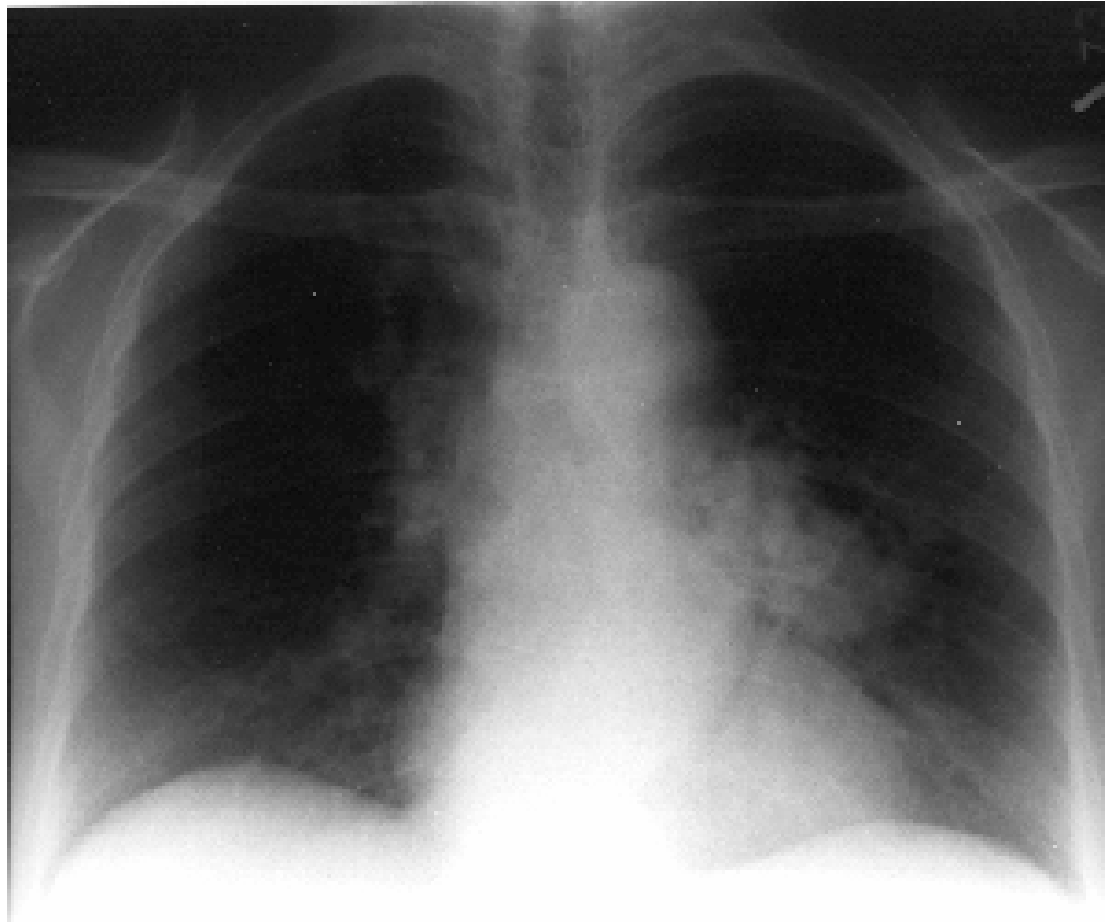
CXR - *TRANSIENT CHANGES*

- Fleeting shadows, Tram-line shadows.
- Tooth-paste and Gloved finger shadows.
- Lobar/segmental collapse, consolidation.

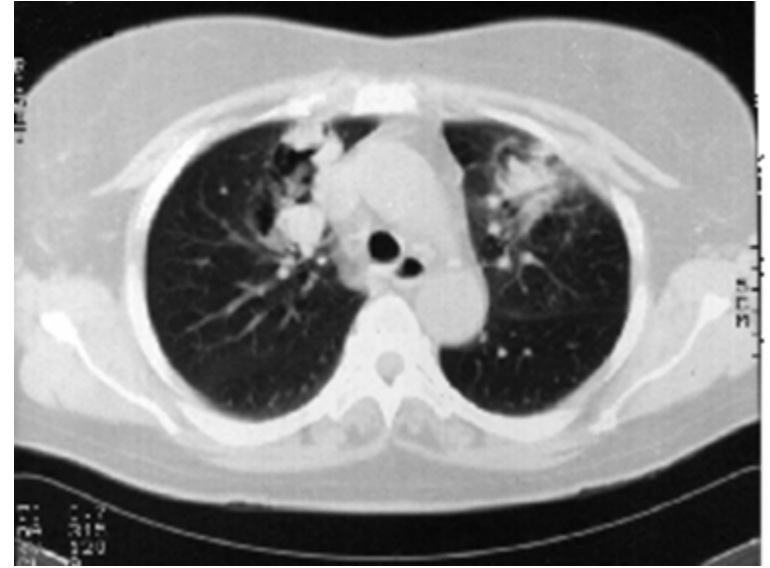
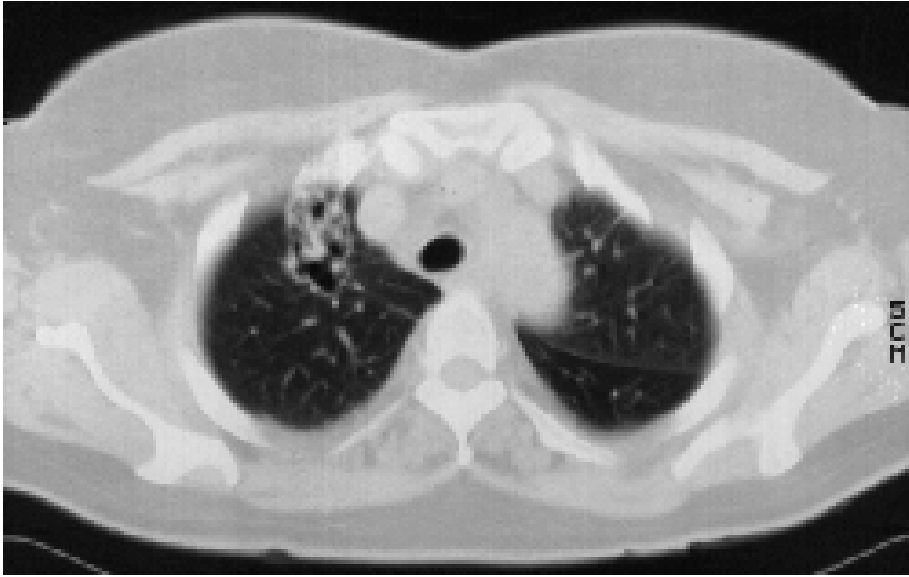
PERMANENT CHANGES

- Central bronchiectasis .
- Parallel line shadows, Ring shadows.
- Fibrosis, honeycombing, cavities.

CECT- Central bronchiectasis.



Large lobulated perihilar shadows.



Lobulated masses contained in the cystic cavities extending to the central hilum.

Treatment

Corticosteroids

Acute / Exacerbation - 0.5 mg/kg/day for 2 weeks, then 0.5 mg/kg alternate day for 2-3 months with gradual tapering.

Steroid dependant - 10 – 40 mg alternate day.

Fibrotic - low dose daily or alternate day.

Itraconazole

Reduces dose of CS , decrease rate of exacerbations but long term effect is not known.

Drugs / Radiation

- Develop progressively.
- Cough, dyspnoea, fever, cutaneous rashes (drugs).
- B/L pulmonary infiltrates in CXR.
- AEC > 1000/mm³ ; BAL > 40%.
- Resolution of infiltrates after stopping of drug , steroid hasten recovery in severely ill.
- Corticosteroids are mainstay if treatment in radiation induced disease.

All the best..