TUBERCULOSIS

Dr. Y. Tilakaratna

Worldwide increased prevalence

Increased incidence of HIV

Decline in control

Development of drug resistance

TRANSMISSION

- ***M. tuberculosis***
- **Inhalation of droplets coughed by sputum positive people (Humans are the only reservoir)**
- **Susceptible to UV light therefore day time transmission is rare**
- **Over crowded poorly ventilated housing there is a increased risk**

(Ctd…..)

- **M.avium intracellulare**

  -Found in soil and water.

  -Causes disease in immuno suppressed patients.

- **M.bovis – Pathogen found in cattle. Transmission by ingesting raw milk or animal contact**

PEOPLE AT GREATEST RISK

1. **Children, adolescents, young adults**
2. **Contacts – smear +ve pulmonary disease**
3. **Immunocompromised**
4. **Health workers**
5. **People living in overcrowded conditions**

PATHOLOGY OF TUBERCULOSIS

Majority

Inhalation → **Lung alveoli** → **Primary complex (Ghons focus)**

(Sub pleural)

+

Lymphatics

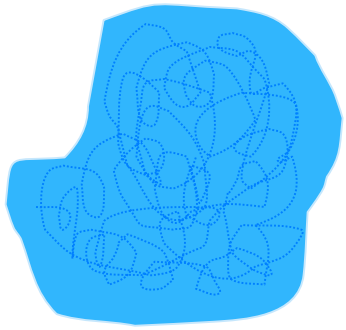
+

Lymph nodes

Primary TB

- **Form of disease developed in previously unexposed and thereby desensitized people (children and also in elderly people with reduced immunity)**

PRIMARY TB-PATHOGENESIS



BACILLI WITHIN MACROPHAGES (ESCAPE KILLING)

Lymphocytes aggregate

Epytheloid cells

Giant cells

Granuloma

After 3-8 weeks, development of cell-mediated immunity

- **GRANULOMA WITH CENTRAL CASEATION SURROUNDING FIBROSIS(KILLS MAJORITY OF BACTERIA, BUT FEW CAN REMAIN DORMANT)**

Outcome of primary TB

Most cases heal spontaneously 90%

Ctd……

Enlargement of LN collapse,
Bronchiectasis

Primary complex

(Ghons focus)

10%

Local spread
Pneumonia/Pleural effusion

Haematogenous spread
(Large number of bacilli)

Milliary TB

TB meningitis

Dissemination of small number of bacilli in blood causes tuberculosis in organs like:

- **Vertebral column**
- **Joint**
- **Lymph nodes**
- **Kidney**
- **Intestine, peritonium, pleura**
- **Testes and Fallopian tubes**
- **Meninges**

POST PRIMARY TB (secondary, adult type)

after many years of primary infection

Reactivation

Reinfection → **Lungs**

post primary TB

POST PRIMARY TUBERCULOSIS

Because of delayed hypersensitivity response

↓

Exaggerated tissue response (caseation & fibrosis)

↓

Disease (lung apices-high O2 concentration)

OUTCOME OF POST-PRIMARY TB

1.Majority of patients

Fibrocaseous TB ± cavitation (open TB)

2. Less commonly

Caseous pneumonia

Extension to pleura (pleural effusion empyma)

Bronchopleural fistula

Dissemination into blood (miliary TB)

CLINICAL FEATURES

- **Primary TB symptomless usually occurs in childhood**

- **There may be fever, malaise, cough erythema nodosum or small pleural effusions.**
- **Develop CMI type 4hypersensitivity reaction (tuberculin test positive)**
- **Rarely can present with bronchopneumonia, localized bronchial obstruction**

CLINICAL FEATURES

Pulmonary - Post Primary

Symptoms

Specific

- **Cough**
- **Haemoptysis chest pain**

Non specific

- **Low grade fever long standing evening**
- **Loss of appetite**
- **Night sweats**
- **Loss of weight**

(Ctd…..)

SIGNS OF FIBROCASEOUS TB

No abnormality

Loss of weight-fever (no clubbing)

Few crepitations – apices commonly

Signs of cavitation/fibrosis

(Ctd….)

Rarely- Unresolving pneumonia

Pleural effusions

Bronchopleural fistula

DIFFERENTIAL DIAGNOSIS

- COPD
- Lung cancer
- Lung abscess
- bronchiectasis
- Pneumonia - atypical

COMPLICATIONS OF PULMONARY TB

- Bronchiectasis
- Aspergilloma
- Massive haemoptysis
- Larengeal TB, intestinal TB
- Amyloidosis

INVESTIGATIONS

(Radiology)

Chest X ray

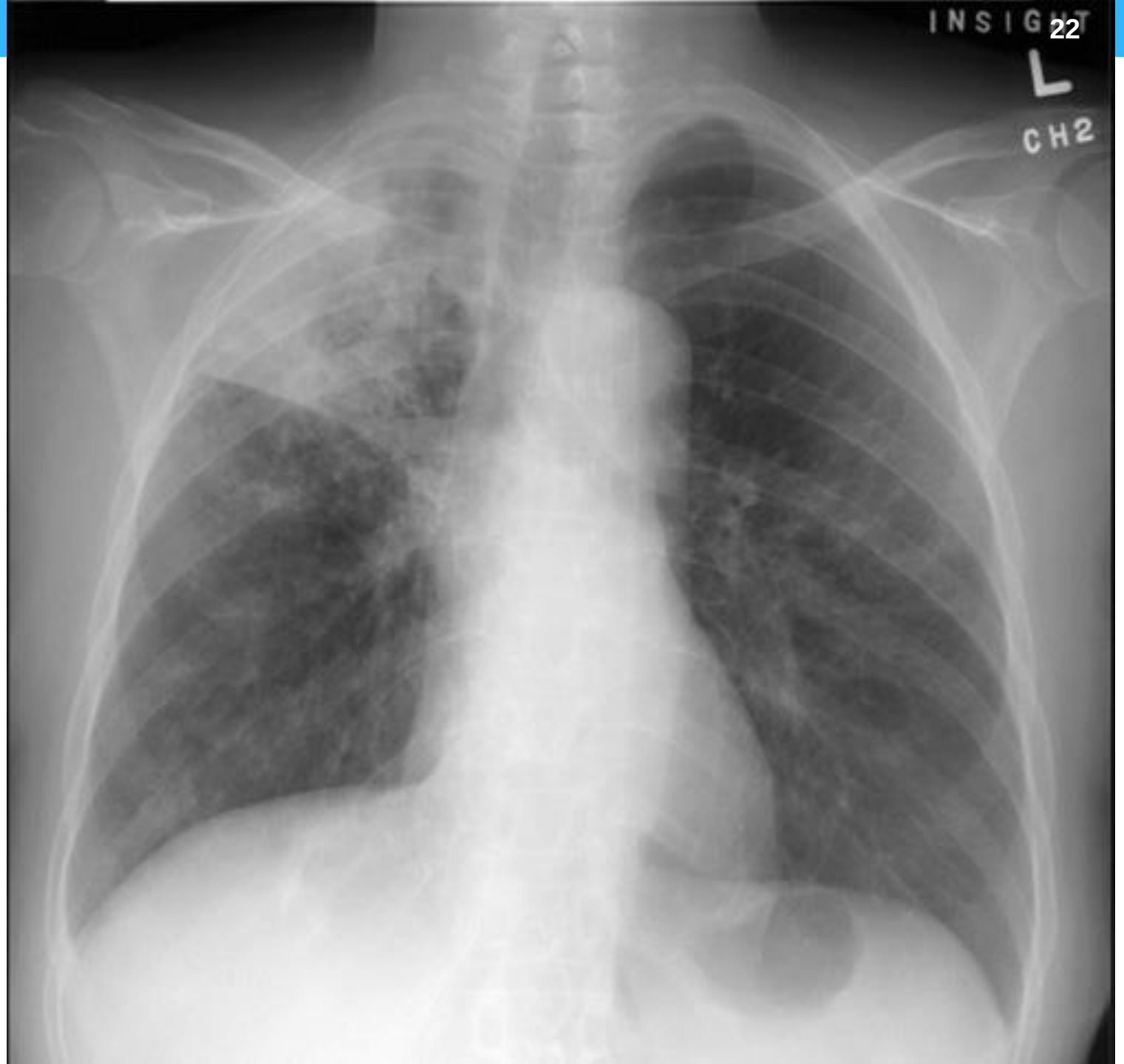
Non specific but very useful (suspicious x ray should never be treated without sputum examination)

Certain features - strongly suggestive

Upper zone - patchy nodular shadow unilateral bilateral

Cavitation / fibrosis may be seen

(CT chest-Rarely)


INSIGHT
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INVESTIGATIONS
(Microbiological)

- **Microscopic examination for AFB** – sputum

  Specific, less sensitive, can be repeated

- (Other samples - trans tracheal aspiration , broncho alveolar lavage)

Ctd…..

Culture for mycobacterium tuberculosis

Takes 4-8 weeks; done in special cases (relapses, failure of treatment-drug resistance)

Polymerase chain reaction (PCR)

(for mycobacterium DNA)

Used in extra pulmonary TB

Highly sensitive and specific but expensive.

Immunological Investigations

Manteaux test

Manteaux test is a test for infection in human and not necessarily a disease

Ctd…..

Tuberculin skin test

- **Technique**
- **Assessment**
- **Interpretation**

- **POSITIVE-(active TB, PREVIOUS TB, after BCG vaccination);**

  ≥10mm swelling with induration

- **NEGATIVE - Doesn't exclude active TB**
- **Repeatedly negative - may rule out TB**
- **Negative →positive – TB is likely**

Ctd…….

Interferon Gamma Release Assay (QuntiFERON)

- Whole Blood test
- Do not help to differentiate latent TB from disease

Histological diagnosis

Not commonly practiced to diagnose pulmonary TB. CT guided lung biopsy, trans bronchial lung biopsy are less commonly done for diagnosis of pulmonary TB.

CASEATING GRANULOMA is diagnostic.

(differentiate from other non granulomatous conditions)

OTHER FORMS

Disseminated tuberculosis “Miliary”

Organ TB

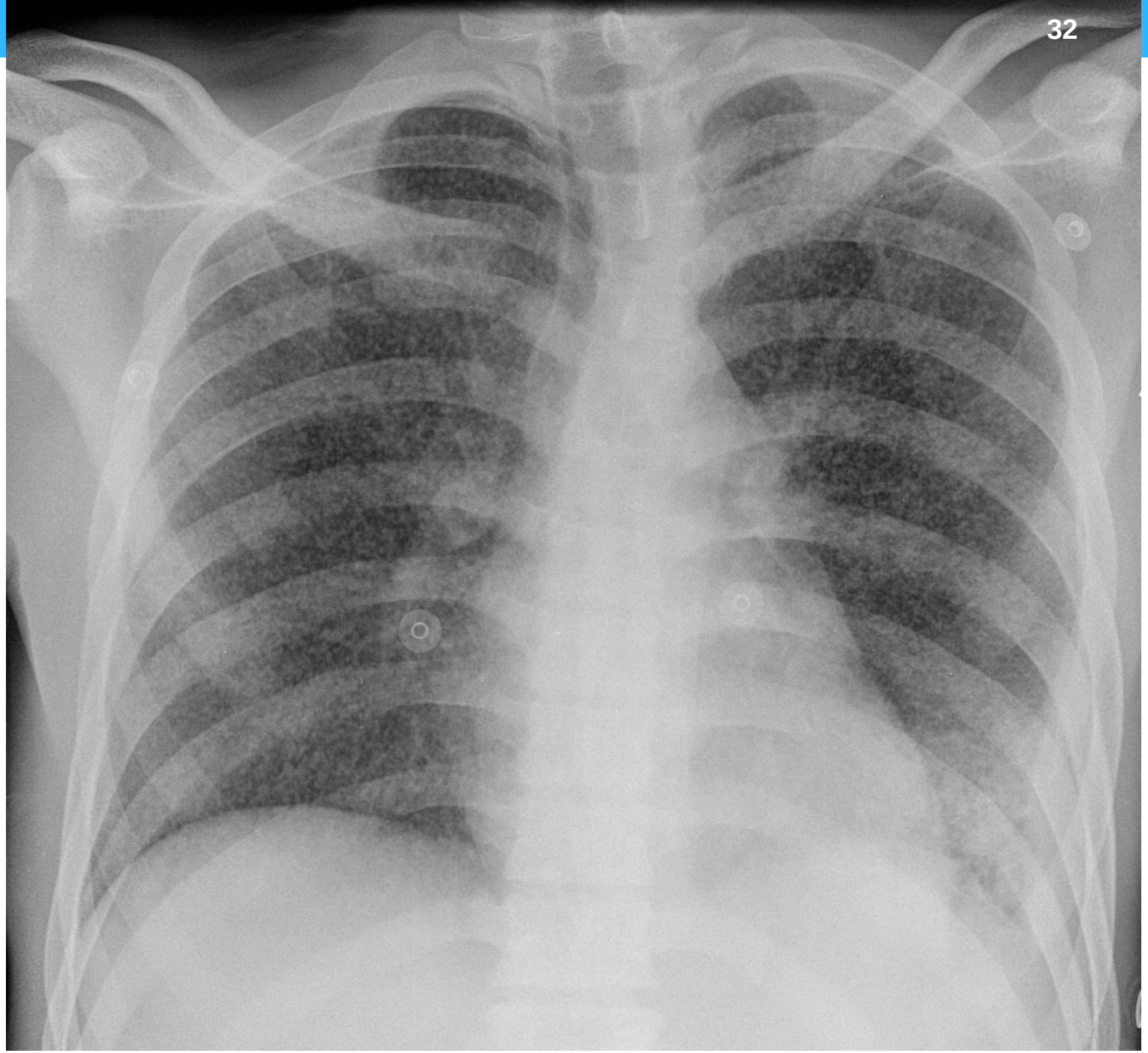
- **Renal**
- **Spine**
- **Meninges**
- **Intestinal**
- **Peritoneal / pleral**
- **Lymph node**
- **joint**

Milliary TB

- **Result of acute diffuse dissemination of TB bacilli via blood stream.**
- **Fatal without treatment.**
- **Presentation**
  - **PUO rarely as meningitis**
  - **Hepatosplenomegaly (later)**
  - **Choroid tubercles in the fundus**

Investigations - Milliary TB

- **CXR – Normal or milliary mottling**
- **CT – Shows lung parenchymal changes**
- **Manteaux test – Positive (may be negative)**
- **Biopsy & culture – Marrow / liver**



TB lymphadenitis
(Mycobacterium tuberculosis + atypical mycobacteria)

- **Commonest extra pulmonary site.**
- **Cervical and mediastinal lymph nodes commonly involved.**

Painless, matted

When caseation and liquefaction occurs - Fluctuant collar stud abscess

Mild - constitutional symptoms

Manteaux – strongly positive

Principles of Treatment

1. **Kill multiplying bacteria -**

   INAH + Isoniazide

2. **Treat persisters(in the macrophages)–**

   Rifampicin+pyrazinamide

3. **Prevent drug resistance and relapses Ethambutol**

Drugs

1st LINE

bactericidal

- **INAH**
- **Rifampicin**
- **Pyrazinamide**
- **Streptomycin**

Bacteriostatic

- **Ethambutol**

2nd line

Drugs which can be added

- **Amikacin**
- **Kanamycin**
- **Ciprofloxacin**
- **Ofloxacin**
- **Ethionamide**
- **Prothianamide**
- **Clofazamine**
- **Thiacetazone**
- **Cycloserine**
- **Pas**

Treatment

COMBINED Rx

- **INTENSIVE - INAH ,Rifampicin , Ethambutol , Pyrazinamide (two months)**

- **CONSOLIDATION - INAH , Rifampicin (four months)**

Treatment – Drug – Anti TB

- **It has changed the disabling – fatal disease to 100% cure**
- **Formerly protracted, now has effectively**

  -short course regimen
- **Understanding of mode of action has overcome the problem of drug resistance** ↓
- **Needs good compliance – long term Rx**
- **Should be aware of side effects**
- **Combined therapy is helpful as it prevent taking a single drug which lead to drug resistance**

- **Length of Rx – Bone TB – 9/12**

  Meningeal – 12/12

- **Pregnancy –**

  Never to be stopped or postponed

  Avoid streptomycin

- **Corticosteroids – improve outcome in patients with pericarditis meningitis or in sever infection with persistent fever**

- **Pyridoxine 10 mg daily may be added when deficiency is a likely possibility**

Monitor the treatment

- **Clinical**
- **CXR – takes time**
- **Microbiologically- smear AFB**

Ctd……

- During the initial phase there is rapid killing of tubercul bacili –non infectious within 2 weeks
- Improvements of symptoms
- Smear negative in 2 months

DOT – Drug Rx
Directly observed therapy

- **Patients are actually being watched by the health personnel while they swallow tablets.**

- **Improve compliance**
- **Reduce MDR outbreaks**
- **Reduced failures in treatment**

RELAPSERS OR INCOMPLETE Rx

- **INAH**
- **Pyrazinamide**
- **Rifampicine**
- **Ethambulol**
- **Streptomycin**

- **Start all 5 , change when sensitivity results are available**

PROBLEMS

- **Poor compliance**
- **Drug resistance**
- **Side effects**

CONTROL

1.Socio economic development

2. Health education

3. BCG vaccination of new born

4. Chemoprophylaxis – eg. HIV infection

5. Chemotherapy

6. Contact screening – prophylactic Rx when necessary

Thank you