Post Primary Pul-Tuberculosis
;Clinical Features, Diagnosis & Treatment

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Extensive cavitary disease

Multiple cavities in both lungs with erosion into bronchi plus caseous pneumonitis and fibrosis throughout. One cavity in right lung contains an eroded aneurysmal blood vessel (Rasmussen) which is common cause of hemorrhage. Pleura also involved.

Section through wall of cavity. Cavity is to the left and is bordered by liquifying caseation with degenerating tubercles and collections of lymphoid cells.

Bilateral advanced fibrocavitary tuberculosis.
Post Pr. T.B : C F, Δ & Treatment

I. General Constitutional Symptoms
- Mild debility, Lassitude
- Fever
- Tiredness
- Night Sweats
- Anorexia
- Weight Loss
- Digestive disturbances
- Amenorrhea.
2. Systemic Symptoms: Respiratory System

(1) Cough : Involvement of Lungs, bronchi
(2) Expectoration [mucoid & purulent]: Lung cavity
(3) Hoarseness : Larynx
(4) Hemoptysis : Mild, Mod or massive
   (Most common cause is TB)
(5) Pain Chest : Dry pleurisy $\rightarrow$ pleuritic
   wet pleurisy $\rightarrow$ Pl. effusion
(6) Dyspnoea : Extensive involvement & fibrosis
Clinical Signs

G P E:

* Temp ↑
* Pulse ↑

Chest signs:

* Infiltration : crepitations
* Cavity : cavernous breathing (BB)
* Consolidation : dullness, BB, crepitations
* Pleural effusion / empyema
* Pneumothorax
* Hydro pneumothorax
Radiological Signs

* Infiltration
  - Thin wall
* Cavity
  - Thick wall
* Fibrosis
* Calcification
  - Lung
  - Hilar
  - Pleuro-Pul
* Pneumonia
* Pl. effusion / empyema
* Tuberculoma
* Pneumothorax
3. Extra pulmonary manifestations
1. Laryngeal
2. Intestinal
3. Peripheral Lymph adenopathy
4. Uro-genital - Endometrial Tuberculosis
   - T-O Tuberculosis
     *Infertility
     *Amenorrhea
5. Bone
6. Joints
7. Kidney
Complications of tuberculosis

1. Hemoptysis
2. Spontaneous pneumothorax
3. Tub. Laryngitis
4. Tub. Enteritis
5. Tub. endo-bronchitis & tracheitis
6. Amyloidosis
Silicotuberculosis and Rheumatoid Pneumoconiosis

Silicotuberculosis. Supraventricular tuberculosis on silicosis may be difficult or impossible to recognize radiographically.

Tuberculosis with cavitation superimposed on silicosis.

Caplan's Syndrome (Rheumatoid Pneumoconiosis)

Section through margin of Caplan's nodule. A = necrotic central area, B = clefts, C = zone of fibroblasts and inflammatory cells, D = collagen.

Caplan's nodules of various sizes in lung with silicotic nodules and coal dust deposits.

Caplan's nodules in both lungs with some evidence of diffuse fibrosis.
Sequelae

1. Open negative syndrome
   - Aspergilloma
   - Hemoptysis
   - Pneumothorax
   - TB- Reactivation

2. Bronchiectasis
3. Secondary bronchitis
4. Respiratory insufficiency
5. Cor-pulmonale
6. Amyloidosis
7. Disseminated Calcification of Lung
8. Emphysema
DIAGNOSIS OF PUL TB

Clinical features

- Resp. - cough
- - sputum
- - Blood
- spitting
- - chest pain
- - Dyspnea
- - Localized wheeze

Phy. Signs

- Gen - Wt loss
- - Fever
- - Sweating
- - Anorexia

Sympt.

- Resp.
- - cough
- - sputum
- - Blood
- spitting
- - chest pain
- - Dyspnea
- - Localized wheeze

Demonstration of AFB

- Chest - crepts
- - Dullness
- - B.B
- - wheeze
- (NAD)

- Gen - ↓
- - Weak
- - thin, 
- - pale
- - fever
- - ↑Pulse
- - clubbing

a) DS
- - Sputum
- - Larn. swab
- - Bronchial
- - Gastric lav
- - BAL
- - Pl. fluid

b) Culture
- - LJ culture
- (6-8 wk)
- - LPA (3d)
- - NAAT (3hrs)

Biopsy

- - Pleural
- - Lung
- - NAD
- - UZ patch

- - Nodular
- - Cavitation
- - Calcification
- - SPN
- - Tuberculoma
- - Hilar/Med. shadow
- - Miliary motting

X-Ray

- - Pneumonia
- - Ca. Lung
- - Lung abscess
- - Bronchiectasis
- - Asthma

Tuberculin Test (Mx.)

- - Anaemia
- - WBC
- - [wnl]
- - ESR
- - [useless]
- - ↓Na+
- &
- K+

Blood

- - +ve
- - Infect
- - useful
- (children)
- - False neg
Sputum Examination (Stained Smear)

A. Fleck of purulent sputum placed on slide and crushed with another slide; slides drawn apart to make smears

B. Slide flooded with carbol fuchsin and then heated

C. Slide rinsed with water, decolorized with acid alcohol, and rinsed again

D. Counterstained with methylene blue or malachite green for 30 seconds, rinsed again, and dried

E. Slide of sputum stained with carbol fuchsin (Ziehl-Neelsen method as above), viewed under oil immersion, showing acid-fast bacilli (M. tuberculosis) as bright red rods

F. M. tuberculosis stained with auramine O which causes acid-fast bacilli to fluoresce (x 200)

G. Auramine O stain of M. kansasii (acid-fast "atypical" mycobacteria) which are much larger than M. tuberculosis (x 200)
**Sputum Culture**

Concentration and decontamination

Equal amounts of 4% NaOH plus 0.5% N-acetyl-L-cysteine added to sputum, shaken for 1 minute and incubated at room temperature for 15 to 20 minutes. This kills most contaminants but also kills some *M. tuberculosis*.

Specimen centrifuged for 15 minutes and supernatant decanted.

Sediment diluted with 3.5 ml water or saline, neutralized with phosphate buffer (pH 6.8), then spread over plates or slants of medium.

*M. tuberculosis* on slant of Löwenstein-Jensen opaque, egg-containing medium. Colonies non-pigmented or buff colored and rough

*M. kansasii* colonies on Löwenstein-Jensen medium. Orange pigmentation appears only after exposure to light.

*M. tuberculosis* colonies on 7H-11 oleic acid agar supplemented medium which allows earlier reading. *M. tuberculosis* as well as other pathogenic mycobacteria appear in about 2 weeks and are read weekly for total of 8 weeks.

Drug susceptibility testing

For pulsed patients

**Direct**. Medium in each of 3 quadrants contains a different drug: INH is control. Diluted sediment is spread evenly over all 3 or 4 plates required as each drug is tested in 2 or 3 concentrations. INH 0.2 and 1.0, EMB 0.0, 10.0, and 15.0; RFP 0.2, 0.5, and 1.0, and SM 2.0 and 10.0 mg are most frequently tested.

**Indirect**. Organisms are first cultured and then measured aliquots of culture are spread over quadrants containing different drugs in varying concentrations as well as control.

INH = isonicotinic, EMB = ethambutol, RFP = rifampin, SM = streptomycin.

PLATE 63
Differential Diagnosis

1. Ac & Ch. inflammatory conditions of different part of respiratory system
   * URTI- pharyngitis, tonsillitis, laryngitis
   * Pneumonia
   * Infection bronchi & Bronchiole:
     * Ac. Bronchitis
     * Ch. bronchitis
     * Bronchiolitis
   * Bronchiectasis
   * Suppurative conditions of lungs (abscess etc.)
   * Fungal infection: Histoplasmosis
   * TPE

2. Ca Lung
3. Silicosis / Pneumoconiosis
4. Sarcoidosis
5. Mitral stenosis
Treatment of Tuberculosis

- **Historical aspect:**
  - Sanatorium regimens (1840)
  - Sanatorium reg. + Surgical

- **Medical treatment:**
  - C.T (1943, Walksman)
  - Collapse

- **Surgical treatment:**
  - Resection
Medical Treatment

*Aim of anti TB-CT treatment*

1. Cure
2. Prevention of Death
3. Prevention of transmission
4. Prevention of Relapse

*Effective medical treatment = proper CT*

*Failure of control of Tub problem ?→RNTCP*
## Essential Anti TB drugs

<table>
<thead>
<tr>
<th>Action</th>
<th>Potency</th>
<th>Daily dose</th>
<th>Int. Thrice/wk</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>++++</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>R Bactericidal</td>
<td>+++</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Z</td>
<td>++</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>S</td>
<td>++</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>E Bacteriostatic</td>
<td>+</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>
### Bacterial populations in a lesion

<table>
<thead>
<tr>
<th>Populations</th>
<th>Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Rapidly multiplying in the cavity wall</td>
<td>H,S</td>
</tr>
<tr>
<td>B. Intra cellular bacilli</td>
<td>Z</td>
</tr>
<tr>
<td>C. Persisters (Semi dormant, Spurts)</td>
<td>R</td>
</tr>
<tr>
<td>D. Dormant (die on their own)</td>
<td></td>
</tr>
</tbody>
</table>

**Bactericidal drugs:**

**Sterilizing drugs:**

<table>
<thead>
<tr>
<th>Bactericidal drugs:</th>
<th>HSRZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterilizing drugs</td>
<td>R&amp;Z</td>
</tr>
</tbody>
</table>
### Standard Treatment Regimens

<table>
<thead>
<tr>
<th>Cat.</th>
<th>PT (WHO, IUATLD)</th>
<th>Reg. O D</th>
<th>Intermittent (RNTCP-GOI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Rx of New Cases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Sp+ P.T</td>
<td>2 HRZE/ 4HR</td>
<td>2 E₃H₃R₃Z₃/ 4 H₃R₃</td>
</tr>
<tr>
<td></td>
<td>-Sp-ve PT</td>
<td>2 SHRZ/ 4H R</td>
<td>2 S₃H₃R₃Z₃/ 4H₃R₃</td>
</tr>
<tr>
<td></td>
<td>-Ex. Pul.TB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Re treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sp+ - Relapse</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Rx fail</td>
<td>2SHRZE/ 1HRZE/ 5 HRE</td>
<td>2S₃H₃R₃Z₃E₃/ 1H₃R₃Z₃E₃/ 5 H₃R₃E₃</td>
</tr>
<tr>
<td></td>
<td>- Default</td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Ch. Cases, who fail re-treatment → MDR-TB by Specialist</td>
<td></td>
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Role of Steroids

- **As an adjuvant**

  TBM                          Pericardial effusion
  Laryngeal TB                 Severe hypersensitivity reaction
  Renal                        Massive Pl. effusion
  Massive LAP                  Addison Disease

- **Dosages**

  TBM                          40 mg  1-4 wk, than taper
  Pericardial effusion
  Pl. effusion                 40 mg  1-4 wk, than taper

- **Monitoring of Rx in smear +ve patients**

  Sputum m /e     At 2 M,  at 4 M & at completion Rx
  (2 month after I.P)
Thank You