Pulmonary Tuberculosis – Dr Serene Wong

How common is pTB? 00:15

- TB is endemic in Singapore and southeast
- 39 cases per 100 000 of population in 2018

When should we be suspecting pTB? 00:42

- Patients with pTB can be asymptomatic
- CXR findings: Cavitary lesions, upper lobe infiltrates, unilateral effusion
- If unsure about findings (equivocal cases like reported scarring/granulomas), compare against old X-rays
- Symptoms: Chronic cough > 3 weeks, hemoptysis

Which patients should be isolated? 1:55

- Practice differs from hospital to hospital
- Ideally, suspect all patients who are considered suspects – however in practice, we usually end up risk stratifying
- Isolation policy in hospitals take into account possible risk to other admitted patients who might be immunocompromised
- Patients with unilateral effusion should generally be isolated: 20% of patients with TB pleuritis of concomitant pulmonary TB

pTB testing? 5:19

- Gold standard: TB culture – but takes from 2-8 weeks depending on burden on AFB
- Surrogate measures
    - AFB smear (resulted in ~ 24 hours): Direct visualization of acid-fast bacilli
    - TB molecular (resulted in ~ 24 hours): Always has to be interpreted in the presence of a AFB smear
        - § Interpretation
            - Smear negative + TB molecular positive: TB
            - Smear negative + TB molecular negative: Could mean a poor sample
            - Smear positive + TB molecular negative: NTM
        - § rpoB gene mutation
            - If detected, suggest rifampicin resistance – assume upfront that this is MDR TB and proceed with second line treatment (fluoroquinolone and aminoglycoside)
- Resistance Terminology
    - Multi Drug Resistant (MDR) TB: Resistance to rifampicin and isoniazid
    - Extensively Drug Resistant (XDR) TB: MDR + resistance to fluoroquinolone and aminoglycoside; if resistant to either, then termed pre-XDR TB
- Number of samples of AFB
    - 1 sample yield: 65%
    - 2 sample yield: 95%
    - 3 sample yield: 97%
- 2 days in a row vs pooling of samples
    - Best time to do sputum induction: Early morning sputum samples
    - 2 samples: 2 mornings in a row
    - Alternatively, 1 in morning and 1 in afternoon – then pool to send off
- If patients are unable to expectorate sputum
    - Sputum induction
    - 2 x early morning gastric aspirate
    - Bronchoalveolar lavage

Role for TB Quantiferon? 14:26

- Mantoux testing or TB quantiferon not used for diagnosis of active TB – only for latent TB
- If sputum negative but still suspicious of TB, then do gastric aspirate of BAL
- Latent TB: Infected with TB bacteria but do not have clinical manifestations or signs of TB
- Only look for latent TB if we intend to treat it: E.g. immunosuppression, long term travel into a non-endemic country

Baseline tests prior to treatment? 19:10

- Liver panel, renal panel
- HIV and DM screen
- Ishihara chart

Treatment 19:53

- Dosing of (Isoniazid/Rifampicin/Ethambutol/Pyrazinamide) HREZ: 5/10/15/20 or 5/10/20/25 if young patient with high AFB burden

Table 2 Dosages of first-line anti-tuberculosis drugs[110, 111]

Drug	Available preparations	Dosing for adults (i.e. persons age ≥15 years	Dosing for children (i.e. persons age <15 years
Isoniazid	100 mg, 300 mg	5 mg/kg daily, maximum 300 mg/day 15 mg/kg, max 900 mg 3x/wk	10-15 mg/kg daily max 300 mg/day 20 mg/kg max 900 mg 3x/ week
Rifampicin	150 mg, 300 mg	10 mg/kg, max 600 mg daily or 3x/week	10-20 mg/kg daily max 600 mg daily 20 mg/kg max 600 mg 3x/ week
Ethambutol	100 mg, 400 mg	15-20mg /kg daily for 1st 2 months then 15 mg/kg daily. Maximum 1600 mg/day	15-25 mg/kg max 1600 mg daily
Pyrazinamide	500 mg	25 mg/kg daily, maximum 2g/ day	25-35 mg/kg max 2g daily
Streptomycin i/m	1 g vial	15mg/kg daily, maximum 1g/d in persons ≤ 59 years of age 10 mg/kg daily, maximum 0.75 g/day in persons > 59 years of age	15-20 mg/kg max 1g daily

- Counseling of Treatment
  - Side Effects
    - § Hepatoxicity (Isoniazid, rifampicin and pyrazinamide – ethambutol is not hepatotoxic): Look for jaundice and abdominal pain
      - Stop if 3X UL of normal with symptoms or 5X UL of normal without symptoms
    - § Peripheral Neuropathy
  - Pyridoxine
    - § Usually 10mg OM
    - § If at risk for peripheral neuropathy (DM, HIV, ethanol ingestion, pregnancy), 25mg OM instead
- Treatment Duration
  - HREZ 2 months > Trace cultures, if sensitive > RH for another 4 months
  - Prolonged duration:
    - § TB meningitis or TB osteomyelitis
    - § If pyrazinamide is dropped: RHE 2 months followed by RH 7 months

Indications for Other regimens? 25:40

- If rifampicin resistance based on TB PCR testing
- Drug allergies
- Hepatotoxicity

Post-Treatment Monitoring? 26:40

- Outpatient
  - Reviewed at 2-week mark: Only if at risk for hepatotoxicity (CLD/ethanol ingestion) or if symptoms, then will LFTs be repeated
  - Colour vision is checked on each follow-up
  - Repeat of smear depends how heavily positive the initial smear was
  - Culture repeated at the end of 2 months
- Inpatient
  - Initial side effects: Rashes, anaphylaxis, nausea/vomiting, liver dysfunction
  - Indications to keep patients inpatient:
    - § Severe nausea/vomiting
    - § Re-challenging in instance of development of side effects

Deisolating patients? 29:10

- Institution dependent
- Smear positive patients ideally should remain in isolation
- For outpatients, home isolate for 14 days

Clinical significance of different TB manifestations 30:02

- Pulmonary TB: Public health isolation
- Miliary TB:
  - Suggests haematogenous spread
  - Sputum not expected to be positive
  - Less respiratory, more hemodynamic compromise – may present in shock
- TB pleuritis
  - Diagnosis: Exudative lymphocytic effusion with a high ADA
  - Pleural biopsy gold standard (blind or thoracoscopy) – Unless sputum returns positive

Post Discharge 33:58

- Compliance to medications is of paramount importance
- Will need to refer to TBCU in order to refer to DOT (direct observe therapy)
- Outreach DOT for those with mobility issues
- Journey of a patient
  - Discharged with 2 weeks' worth of medications
  - Follow up with TBCU in 1-2 week
  - Immediate referral to DOT the next day – Daily or 3x/week
  - Regular interval follow up sessions with TBCU

Counseling Families 36:14

- TBCU will contact family for contact tracing
- Advise patients not to interact with new family members
- Can continue interacting with family in same household

Incidental Asymptomatic Granulomas and Apical Scarring? 37:22

- Granuloma: Approach as per incidental pulmonary nodule

- Apical scarring: Consider screening for TB

Take Home Points 39:36

- High index of suspicion
- 2x AFB, 2x cultures, 1x TB molecular
- Contraindications to sputum induction: Bronchospasm, unstable, active hemoptysis