

## TUBERCULOSIS

### Definition

The presence of symptoms, signs and /or radiographic findings caused by MTB complex (*M. tuberculosis* or *M. bovis*).

Disease may be pulmonary or extrapulmonary, (i.e. central nervous system (CNS), disseminated (miliary), lymph node, bone & joint) or both.

### Clinical features

- pulmonary disease is commonest. Symptoms include fever, cough, weight loss, night sweats, respiratory distress.
- extrapulmonary disease may manifest as prolonged fever, apathy, weight loss, enlarged lymph nodes (cervical, supraclavicular, axillary), headache, vomiting, increasing drowsiness, infants may stop vocalising. Swellings and loss of function may suggest bone, joint or spinal TB.
- phlyctenular conjunctivitis, erythema nodosum and pleural effusions are considered hypersensitivity reactions of TB disease.

### Diagnosis of TB disease

Diagnosis in children is usually difficult. Features suggestive of tuberculosis are:

- *recent contact* with a person (usually adult) with active tuberculosis. This constitutes one of the strongest evidence of TB in a child who has symptoms and x ray abnormalities suggestive of TB.
- *symptoms and signs suggestive of TB* are as listed above. Infants are more likely to have non specific symptoms like low-grade fever, cough, weight loss, failure to thrive, and signs like wheezing, reduced breath sounds, tachypnoea and occasionally frank respiratory distress.
- *positive Mantoux test* (>10 mm induration at 72 hours; tuberculin strength of 10 IU PPD).
- *suggestive chest X-ray*:
  - enlarged hilar lymph nodes +/- localised obstructive emphysema
  - persistent segmental collapse consolidation not responding to conventional antibiotics.
  - pleural effusion.
  - calcification in lymph nodes, this usually develops > 6 months after infection.
- *laboratory tests*  
Presence of AFB on smears of clinical specimens and positive histopathology or cytopathology on tissue specimens are highly suggestive of TB. Isolation of *M. tuberculosis* by culture from appropriate specimens is confirmatory.

### Diagnostic Work-up

- efforts should be made to collect clinical specimens for AFB smear, cytopathology or histopathology, special stains and AFB culture to assure confirmation of diagnosis and drug susceptibility.
- if the source case is known, it is important to utilize information from the source such as culture and susceptibility results to help guide therapy. the diagnostic work-up for TB disease is tailored to the organ system most likely affected (see Table 1).

**Table 1. Diagnostic workup according to organ system involved**

<b>Pulmonary TB</b>	<b>Abdominal TB</b>
- chest radiograph	- CT abdomen with contrast
- early morning gastric aspirates <sup>1</sup>	- biopsy of mass / mesenteric lymph node <sup>1</sup>
- sputum (if >12 years, able to expectorate sputum) <sup>1</sup>	
- pleural fluid <sup>1</sup> or biopsy <sup>1</sup>	<b>TB osteomyelitis</b>
	- CT/MRI of affected limb
<b>Central Nervous System (CNS) TB</b>	- biopsy of affected site <sup>1</sup>
- CSF for FEME , AFB smear and TB culture <sup>1</sup>	
- CT head with contrast	<b>Miliary / Disseminated TB</b>
	- as for pulmonary TB
<b>TB adenitis</b>	- early morning urine <sup>1</sup>
- excisional biopsy or fine needle aspirate <sup>1</sup>	- CSF <sup>1</sup>

<sup>1</sup>Note: These specimens should be sent for AFB smear and TB culture and susceptibility testing. Cytopathology or histopathology should be carried out on appropriate specimens.

In addition, all children evaluated for TB disease require a chest x-ray to rule out pulmonary

Abbreviations: AFB, acid fast bacilli; CT, computed tomography scan; CSF, cerebrospinal fluid

### Treatment of TB disease

- antimicrobial therapy for TB disease requires a multidrug treatment regimen
- drug selection is dependent on drug susceptibility seen in the area the TB is acquired, disease burden and exposure to previous TB medications.
- therapeutic choices are best made according to drug susceptibility of the organism cultured from the patient.
- for any one patient, the treatment regimen would depend on the diagnosis (pulmonary or extrapulmonary), severity and history of previous treatment. directly observed therapy is recommended for treatment of active disease.

**Table 2. Tuberculosis chemotherapy in children**

Drug		Daily dose		Intermittent dose (biweekly)		Intermittent dose (thrice weekly)	
		mg/kg/day	max dose (mg)	mg/kg/day	max (mg)	mg/kg/day	max (mg)
Streptomycin	S	15-30	1000	15	1000	15	1000
Isoniazid	H	5-10	300	15	1200	10	900
Rifampicin	R	10	600	10	600	10	600
Pyrazinamide	Z	20-40	2000	not used	not used	-	-
Ethambutol	E	15-25	2500	not used	not used	30-50	-

### Short course therapy

This consists of a 6 month regimen, and is suitable for pulmonary tuberculosis and non-severe extrapulmonary tuberculosis. It is not recommended for drug resistant TB. The short course consists of:

- **Intensive Phase (2 months)**
    - daily Isoniazid, Rifampicin and Pyrazinamide
    - a 4th drug (either Ethambutol or Streptomycin) is added if initial drug resistance is present or the burden of organisms is high.
  - **Maintenance Phase (4 months)**
    - Isoniazid and rifampicin for the remaining 4 months.
    - given daily (preferred) or biweekly or thrice weekly.

Note: WHO does not recommend a twice weekly regimen but advocates a thrice weekly regimen for intermittent dosing.
- all intermittent dose regimens must be directly supervised.

### Pulmonary TB and less severe extrapulmonary TB

- recommended regimen is short course therapy as above
- less severe extrapulmonary TB include lymph node disease, unilateral pleural effusion, skin, and bone / joint (single site) excluding spine

### Extrapulmonary TB (severe forms)

- these include meningeal, CNS and spinal TB, abdominal TB, bilateral pleural or pericardial effusion, bone and joint TB (> 1 site) and disseminated disease
- treat with intensive phase as above, but continuation phase for 7 - 10 months

### Corticosteroids

- indicated for children with TB meningitis
- may be used in children with pleural and pericardial effusion (hastens reabsorption of fluid), severe miliary disease (if hypoxic) and endobronchial disease
- give steroids only when accompanied by appropriate antituberculous therapy  
dose: prednisolone 1-2mg/kg/day for 3-4 weeks, then taper over 3-4 weeks.

### Monitoring of drug toxicity

- baseline and routine monitoring of serum transaminases and bilirubin are recommended *only if these risk factors are present*:
  - severe TB disease
  - clinical symptoms of hepatotoxicity
  - underlying hepatic disease
  - HIV infection
  - use of other hepatotoxic drugs (especially anticonvulsants)
- monitor for visual acuity and colour discrimination if Ethambutol is used

### Breast-feeding and the mother with pulmonary tuberculosis

- tuberculosis treatment in lactating mothers is safe as the amount of drug ingested by the baby is minimal. Hence if the mother is already on treatment and is non-infective, the baby can be breastfed.
- women who are receiving isoniazid and are breastfeeding should receive pyridoxine.
- if the mother is diagnosed to have active pulmonary TB and is still infective:
  - the newborn should be separated from the mother for at least two weeks while the mother is being treated
  - breast feeding is best avoided during this period, however, expressed breast milk can be given
  - the infant should be evaluated for congenital TB. If this is excluded, BCG is deferred and the baby should receive isoniazid for 3 months and then tuberculin tested.
    - if tuberculin negative and mother has been adherent to treatment and non-infectious, isoniazid can be discontinued and BCG given.
    - if tuberculin positive, the infant should be reassessed for TB disease and if disease is not present, isoniazid is continued for total of 9 months and BCG given at the end of treatment.
  - other close household contacts should be evaluated for TB.
- congenital TB is rare but should be suspected if the infant born to a tuberculous mother fails to thrive or is symptomatic.

Figure 1. Management of children with a positive history of contact with tuberculosis

