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Standard Treatment Workflow (STW) for the Management of

PAEDIATRIC TUBERCULAR MENINGITIS

ICD-10-A17.0

WHEN TO SUSPECT?

- Fever with one or more of the following
  - › Headache
  - › Vomiting
  - › Seizures
  - › Irritability/Lethargy/ Drowsiness
  - › Loss of function e.g. recent onset deviation of eyes/mouth and/or weakness of arm/leg and/or altered mentation
  - › Malaise, Anorexia, Weight loss
- Symptoms are usually of 5 to 7 days duration with insidious onset, particularly with history of exposure to infectious TB in past 2 years

EXAMINATION

- Assessment of sensorium*
- Full/bulging anterior fontanelle
- Meningeal irritation- Neck stiffness, Kernig's sign & Brudzinski's sign
- Examine eye, if feasible for papillodema/ choroid tubercles/ optic atrophy
- Cranial nerves
- Motor system including power, reflexes & plantar responses
- Peripheral lymph nodes
- Chest examination for signs of pulmonary involvement

Use any standardized scale including Glasgow Coma scale/ AVPU scale

INVESTIGATIONS

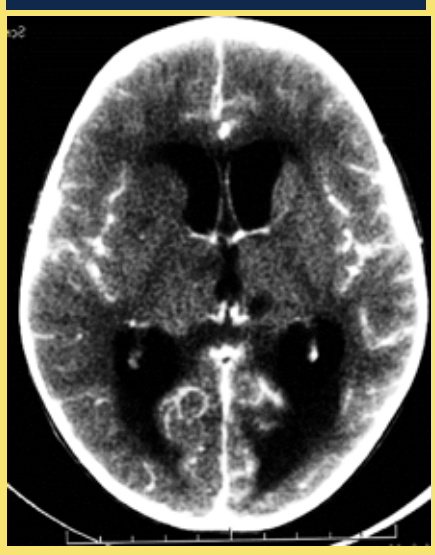
Essential
- CBC
- CSF examination
  - › Cell count and differential
  - › Sugar (with simultaneous blood sugar)
  - › Protein
  - › NAAT*
  - › MGIT culture
  - › Bacterial culture
- HIV
- Contrast enhanced CT scan of head
- CXR
- Gastric lavage/ Induced sputum in patients where CXR is abnormal and CSF NAAT is negative

ICMR/NTEP approved NAAT test, use 3-5 ml CSF if possible

Desirable
- MRI brain with contrast when CECT head is not contributory

Optional
- CSF cryptococcal antigen
- Contrast CT chest/abdomen to look for extracranial sites of infection

NEUROIMAGING IN TB



CECT showing
- Hydrocephalus (ventricular dilatation)
- Thick basal exudates
- Tuberculoma

DIAGNOSTIC ALGORITHM

SUSPECTED TBM?

- Immediate investigations
- CBC, HIV
- CECT head
- CSF: Cell count including differential, CSF sugar (with blood sugar), protein, NAAT, bacterial culture
- CXR

AFB seen/CSF NAAT +ve (Microbiologically confirmed TBM)

Criterion 1
≥3 of the following
- ≥5 days of symptoms
- TLC < 15,000/ cumm
- CSF WBC 10-500/ cumm
- CSF sugar < 50% of blood sugar
- CSF lymphocytes >50%
- Neuroimaging finding of (one or more) :
  - › Basal exudates
  - › Hydrocephalus
  - › Infarct
  - › Tuberculoma

Criterion 2- 2 or more risk factors for TBM
- HIV infection
- Severe acute malnutrition
- Recent contact with infectious TB

Criterion 3
- Evidence of TB elsewhere

2 or more criteria met → **Yes** → **Start treatment**

No

Continue investigations & management for partially treated bacterial meningitis
IF NOT BETTER
- Repeat LP after 48-72 hours
- Expand search for TB elsewhere
- Consider MRI contrast if not done earlier

Re-review criterion 1, 2 & 3 and see if ≥ 2 criterion fulfilled → **Yes**

No

- Does patient have falling CSF glucose/dropping sensorium?
- Have new focal deficit?

→ **Yes**

No → **Continue evaluation**

TREATMENT

- Treatment should be started & follow-up to be done as per NTEP guidelines
- **Anti TB drug regimen**
  - › 2 HRZE and 10 HRE **(in appropriate doses)**
  - › Pyridoxine 10 mg/day
- **Corticosteroids**
  - › Prednisolone 2 mg/kg/day for 4 weeks & then taper over 4 weeks*
  - › Slower taper needed in some patients

Equivalent dose of another steroid formulation may be used either injectable/oral

- **Other supportive therapy**
  - › Care of unconscious child
  - › Nasogastric feeding, if indicated
  - › Anti edema measures (mannitol/ hypertonic saline/glycerol/ acetazolamide)
  - › Anticonvulsants, if seizures
- **Surgical therapy, if indicated**
  - › External ventricular drain
  - › VP shunt

- **Cases should be managed at least at a district hospital**
- **Early referral to Medical College/ higher centre to be considered if**
  - › Unresponsive child/rapid deterioration indicating need for intensive care
  - › No diagnosis after initial evaluation
  - › Surgical treatment needed
  - › MDR TB meningitis
  - › No improvement/deterioration after 2-4 weeks of treatment
- **Need for ICU care**

ABBREVIATIONS

AFB: Acid-fast Bacillus
CBC: Complete Blood Count
CECT: Contrast Enhanced Computed Tomography
CSF: Cerebro-spinal Fluid
CT: Computed Tomography
CXR: Chest X-ray
HIV: Human Immunodeficiency Virus
HRZE: Isoniazid; Rifampicin; Pyrazinamide; Ethambutol
ICU: Intensive Care Unit
LP: Lumbar Puncture
MDR: Multi-drug Resistant
MGIT: Mycobacteria Growth Indicator Tube
MRI: Magnetic Resonance Imaging
NAAT: Nucleic Acid Amplification Test
NTEP: National TB Elimination Programme
TB: Tuberculosis
TBM: Tubercular Meningitis
TLC: Total Leucocyte Count
VP: Ventriculo-peritoneal
WBC: White Blood Cells

REFERENCES

1. National TB Elimination Programme, Central TB Division. Training Modules for Programme Managers & Medical Officers. Ministry of Health & Family Welfare, Government of India https://tbcindia.gov.in/index1.php?lang=1&level=1&sublinkid=5465&lid=3540 Last access on 05 March, 2022.
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