

Training Module On Extrapulmonary Tuberculosis

STANDARD TREATMENT WORKFLOW

Standard Treatment Workflow (STW) for the Management of ADULT PERIPHERAL LYMPHADENOPATHY ICD-10-A18.2

WHEN TO SUSPECT?



WHEN TO SUSPECT?

- Swelling (>1 cm) in neck, armpit or groin (>2 cm) +/- redness, fluctuation, sinus discharge
- May or may not be associated with fever, weight loss, night sweats or cough
- History of similar swelling in the past / past history of tuberculosis
- History of contact with a patient with a diagnosis of TB

DIAGNOSTIC ALGORITHM

Lymphnode enlargement > 1cm ± systemic symptoms*

PERIPHERAL (ACCESSIBLE)

FNAC / LN aspirate

Send for NAAT#

+ve

Treat as LN TB

-ve

LN biopsy (refer if indicated)

LN tissue for
• NAAT
• Cultures[§]/ LPA

*Tender LN, fluctuation, pain, fever, weight loss, night sweats
#Xpert/TrueNat/ ICMR or CTD approved test
§MGIT/LJ

ABDOMINAL/MEDIASTINAL (INACCESSIBLE)

Sputum / induced sputum

Send for NAAT#

+ve

Treat as LN TB

-ve

Refer for FNAB

Tissue for
• NAAT
• Cultures/ LPA

Treatment : As per NTEP Guidelines

ASSESS RESPONSE TO THERAPY AT 3-4 MONTHS

- **Resolution:** Decrease in size of LN with settling of systemic symptoms
- **Delayed response -Paradoxical reaction:** Increase in size of LN or new signs of inflammation (up to 3 months of starting treatment) OR appearance of new LN at same/other site
- May require tissue cultures, if not done, to rule out treatment failure/resistance
- Therapeutic drug monitoring to ensure adequate drug levels
- **If cultures reveal susceptible TB it is likely due to paradoxical worsening:** May require anti-inflammatory agents (inaccessible)/ surgical removal (accessible)

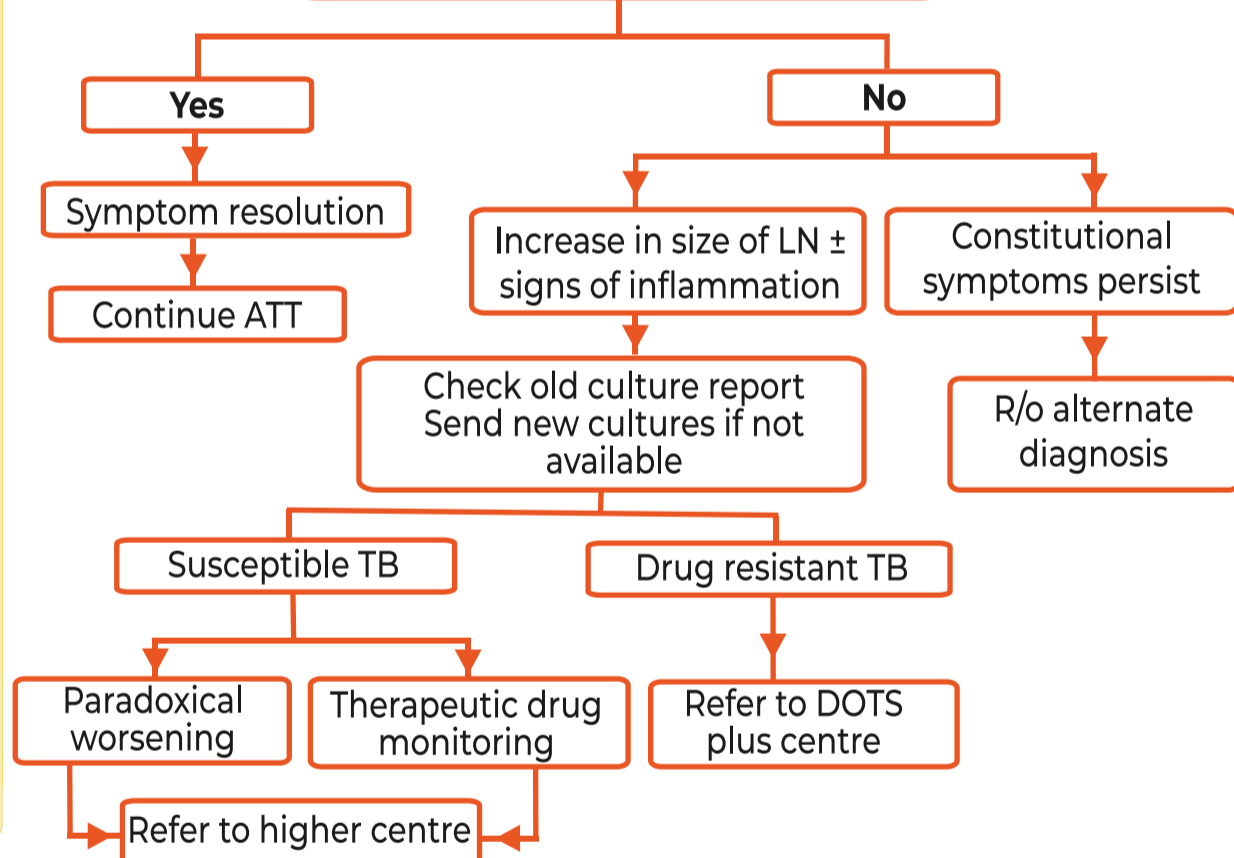
COMPLICATIONS

- Abscess formation
- Rupture may lead to sinus formation

REFER TO HIGHER CENTRE IF

- Non responders
- Needs treatment for Drug Resistance
- Large Nodal Mass/Abscess requiring surgical intervention

Response to therapy at 3 months



BCG LYMPHADENITIS

- Age is usually < 2 years
- Axillary and/or supraclavicular LN on same side as BCG vaccination (usually given on left)
- No systemic symptoms in immunocompetent children
- **Treatment:**
 - Wait & watch if small
 - If large & suppurative, repeated aspiration or rarely incision & drainage is required

NAAT/AFB smear positivity can not differentiate between BCG & MTB

ABBREVIATION

ATT: Anti Tubercular Treatment	FNAB: Fine Needle Aspiration Biopsy	LPA: Line Probe Assay	NTEP: National TB Elimination Programme
BCG: Bacille Calmette Guerin	FNAC: Fine Needle Aspiration Cytology	MGIT: Mycobacterial Growth Indicator Tube	PCR: Polymerase Chain Reaction
CTD: Central TB Division	LJ: Lowenstein Jensen	MTB: Mycobacterium Tuberculosis	TB: Tuberculosis
DOT: Directly Observed Treatment Short-course	LN: Lymph Node	NAAT: Nucleic Acid Amplification Test	

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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 accessed on 11 March, 2022.
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Standard Treatment Workflow (STW) for the Management of ADULT PLEURAL TUBERCULOSIS ICD-10-A15.6

WHEN TO SUSPECT?



- ### HISTORY
- Fever
 - Pleuritic chest pain
 - Cough
 - Breathlessness
 - Anorexia
 - Weight loss
 - History of TB contact

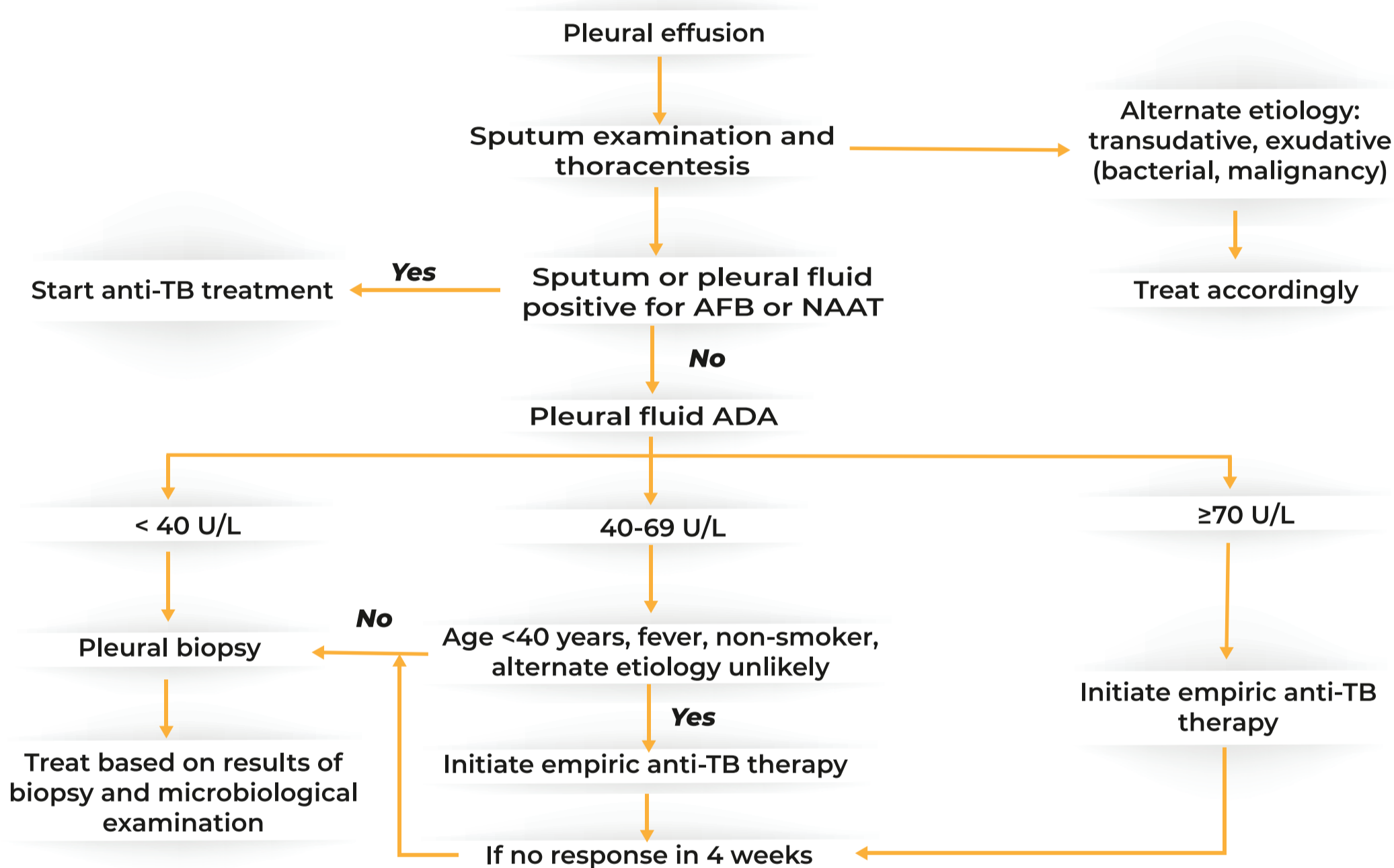
- ### EXAMINATION
- Dullness to percussion
 - Decreased/absent breath sound

INVESTIGATIONS

- ### ESSENTIAL
- CXR (to confirm pleural effusion)
 - Sputum for AFB/NAAT
 - Refer immediately for pleural tap
 - Thoracentesis (ultrasound-assisted)
 - Pleural fluid analysis :
 - › Cell count (total and differential)
 - › Protein
 - › Glucose
 - › Gram stain
 - › Bacterial cultures
 - › Stain for acid-fast bacilli
 - › Adenosine deaminase (ADA)
 - › NAAT
 - › Cytology evaluation

- ### DESIRABLE
- CT chest (before pleural biopsy)
 - Pleural biopsy (image-guided/thoracoscopic) (If diagnosis is uncertain)
 - Histopathology
 - MGIT

DIAGNOSTIC



MANAGEMENT

TREATMENT AND RESPONSE

- As per NTEP
- Therapeutic pleural tap can be done under ultrasound assistance if the effusion is large, and the patient is breathless

WHEN TO REFER?

- Facility for ultrasound assistance is not available
- Diagnosis is not established after thoracentesis and facilities for pleural biopsy is not available
- Drug-resistant TB is detected: according to NTEP
- Worsening pleural effusion on follow up

FOLLOW UP

- Most patients who respond to treatment will have improvement in their general condition by 2 weeks, and significant improvement in pleural effusion by 4-8 weeks
- Disappearance of constitutional symptoms with decrease in pleural effusion suggests responsiveness to treatment
- Increase in pleural effusion can suggest
 - › Paradoxical reaction or
 - › Drug-resistant TB or
 - › Alternative etiology
- A follow up CXR at 4-8 weeks after starting ATT is useful to assess progress

ABBREVIATIONS

ADA: Adenosine Deaminase
AFB: Acid-fast Bacilli
ATT: Anti Tubercular Treatment

CT: Computed Tomography
CXR: Chest Radiograph
MGIT: Mycobacterial Growth Indicator Tube

NAAT: Nucleic Acid Amplification Test
NTEP: National Tuberculosis Elimination Programme
TB: Tuberculosis

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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 11 March, 2022.
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Standard Treatment Workflow (STW) for the Management of PERICARDIAL TUBERCULOSIS

ICD-10-A18.84

WHEN TO SUSPECT

SYMPTOMS

- Cough, fever, breathlessness or pleuritic chest pain
- May be associated with weight loss, night sweats or difficulty lying down
- Past history or a history of contact with a patient with a diagnosis of tuberculosis
- Examination reveals tachycardia, increased jugular venous pressure, hepatomegaly, ascites, & peripheral edema
- A pericardial friction rub and distant heart sounds present on cardiovascular examination
- If clinical picture +/- heart US suggest pericarditis or pericardial effusion refer for echo-cardiogram

COMPLICATIONS

Constrictive pericarditis: Clinical signs for recognition include

- Kussmaul's sign (lack of an inspiratory decline in jugular venous pressure)
- Elevated & distended jugular veins with a prominent Y descent (second inward deflection of internal jugular pulse due to diastolic inflow of blood into the right ventricle)
- Pericardial knock (rare)

Cardiac tamponade: Clinical signs include

- Sinus tachycardia
- Hypotension with a narrow pulse pressure
- Elevated JVP jugular venous pressure
- Muffled heart sounds
- Pulsus paradoxus (a decrease in systolic blood pressure by >10 mmHg on inspiration)
- Ascites

Other complications:

- Myopericarditis: Abnormal ejection fraction with evidence of myocarditis and pericarditis (elevated cardiac enzymes & ST elevation on ECG)
- Effusive constrictive pericarditis: Mixed clinical picture. Main clue is elevated JVP clinically & right atrial pressure on ECHO in spite of removal of pericardial fluid

Essential tests:

- Chest X-ray
- ECG
- Echocardiogram

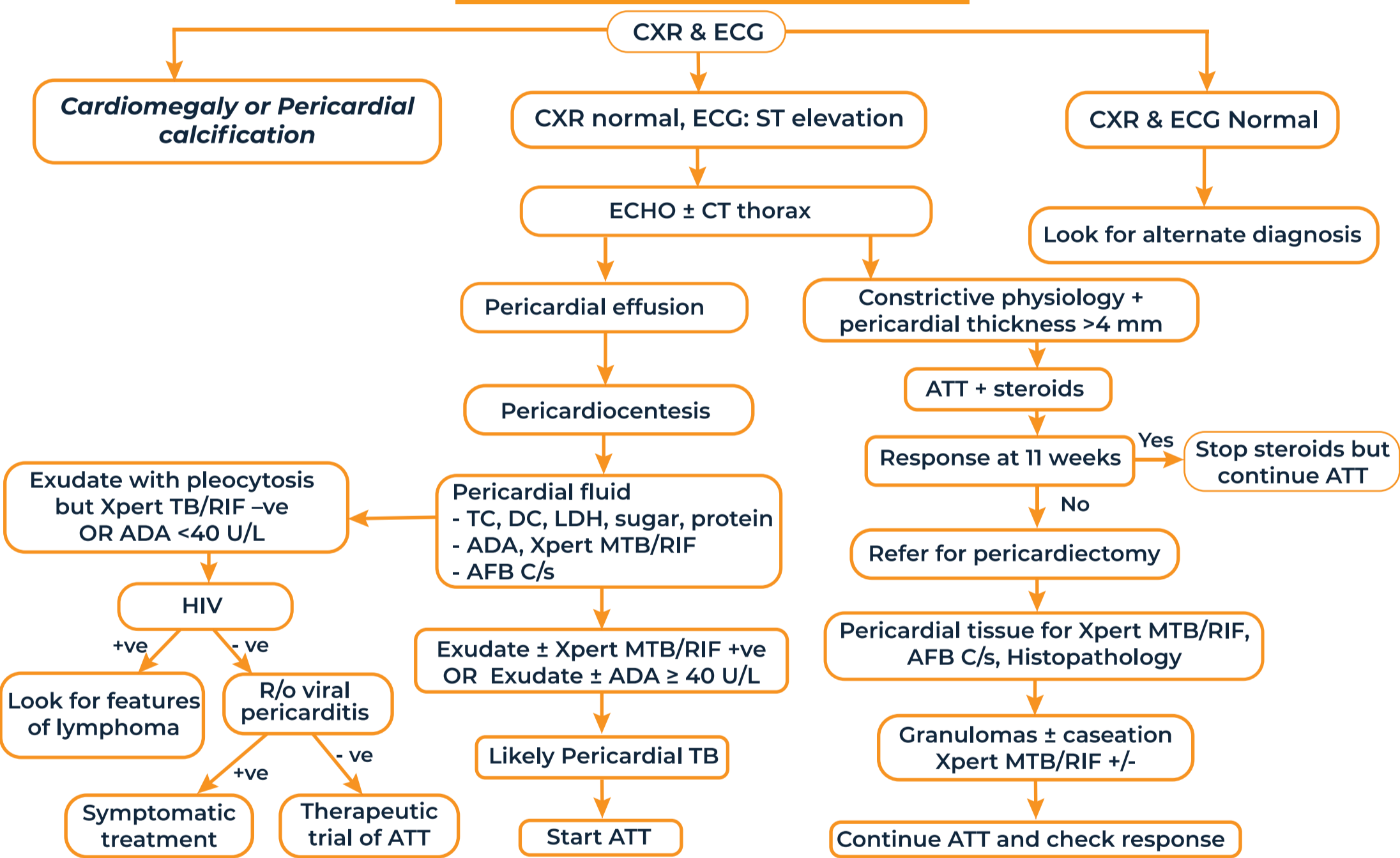
INVESTIGATION

Desirable:

- Cardiac enzymes
- CT/MRI of Thorax
- Pericardiocentesis
- Pericardial biopsy

DIAGNOSIS

SUSPICION OF PERICARDIAL TUBERCULOSIS



MANAGEMENT

TREATMENT

- Antitubercular therapy is advised as per NTEP
- Steroids are recommended in large pericardial effusions, prominent pleocytosis & pericardial fluid with high inflammatory markers or early constriction
- Give Prednisolone 60 mg/day for 4 weeks, 30 mg/day for 4 weeks, 15 mg/day for 2 weeks & 5 mg/day for 1 week
- Total duration of systemic steroids is 11 weeks depending on the regimen may be used

NON RESPONSE TO STEROIDS & ATT

- Should prompt a referral to a specialist center for confirmation of diagnosis
- Non response of cardiac symptoms to anti-tuberculous therapy cardiac surgical evaluation may be required
- Should prompt an evaluation for alternative causes of effusio-constrictive pericarditis
- Common alternate diagnosis include viral infections, Systemic lupus erythematosus, primary effusion lymphomas or pericardial malignancies

ABBREVIATION

ADA: Adenosine Deaminase
ATT: Antituberculous Therapy

CXR: Chest X-ray
ECG: Electrocardiogram
ECHO: Echocardiogram

JVP: Jugular Venous Pressure
NTEP: National Tuberculosis Elimination Programme
TB: Tuberculosis

REFERENCES

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Standard Treatment Workflow (STW) for the Management of ADULT TUBERCULAR MENINGITIS

ICD-10-17.0

SUSPECT TBM WITH FOLLOWING CLINICAL FEATURES

- Fever (Duration of 5 days or more[†])
- Headache
- Vomiting
- Altered sensorium
- Cranial nerve palsy
- Hemiparesis/any limb weakness
- Seizures
- Neck pain and stiffness

ALWAYS ENQUIRE FOR ASSOCIATED FEATURES

- Constitutional symptoms
- Active TB elsewhere
- Past history of TB & ATT
- Contact with TB patient
- HIV seropositivity
- Low socio-economic status
- High endemic area

[#]This is to increase sensitivity for diagnosis of TBM. The duration could be variable from days to weeks to months.
[†]Clinical judgement & evaluation of other conditions is also required as fever can be associated with headache in other medical conditions. Delaying work up for meningitis is not recommended.

IF TBM SUSPECTED

Refer to a centre where facility of evaluation (at least Lumbar puncture & CT scan) is available.

EVALUATION AT CENTRE OF CARE

CLINICAL HISTORY & EXAMINATION

- Symptoms type & duration, onset & progression
- Headache, altered sensorium, focal deficits
- Neck rigidity, Kernig's sign
- Cranial nerve palsy
- Fundus examination - papilledema

LABORATORY EVALUATION

- CBC, ESR, CRP
- LFT, RFT, Electrolytes
- Blood sugar
- HIV
- Chest X Ray- PA view
- USG whole abdomen
- Mantoux (optional)

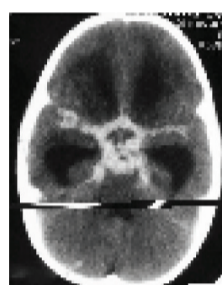
IMAGING

- NCCT/CECT head- Preferred as initial investigation
- MRI brain (and spine if indicated) in selective cases

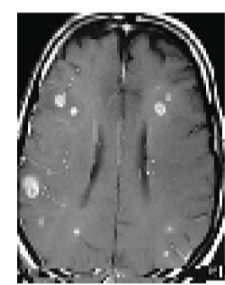
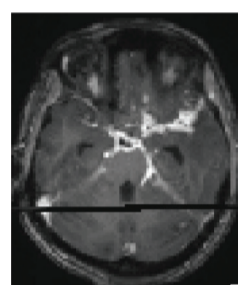
CSF

- Mandatory- Should be sent for essential analysis (Box 1)
- Prudent to perform CT head prior to CSF in presence of papilledema & /or focal deficits

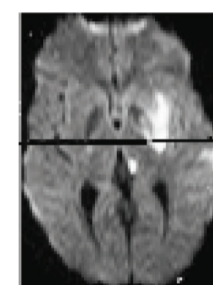
COMMON NEUROIMAGING FINDINGS IN TBM



Basal exudates and Hydrocephalus



Tuberculomas



Infarction



Arachnoiditis



Pott's spine

CSF EVALUATION*

01

ESSENTIAL

- Cell count & type
- Protein
- Sugar (& Corresponding blood sugar)
- GenXpert / TrueNat
- Grams stain
- Bacterial culture
- AFB stain
- AFB culture/sensitivity
- India Ink**
- Cryptococcal antigen**

*CSF samples should be sent to the lab as soon as possible for examination of cells, protein, sugar and cytology.

**Cryptococcal meningitis should be excluded wherever possible as it is a close differential diagnosis of TBM.

†In ideal settings, it may be prudent to exclude a diagnosis of carcinomatous meningitis.

‡Especially in patients with HIV.

02

DESIRABLE

- Fungal smear & culture
- Cytopathology[#]

03

OPTIONAL

- Wet mount
- VDRL
- Toxoplasma PCR[†]
- Viral PCR

If some tests are not available at site, store sample in sterile container, keep in refrigerator & transport in icebox to other facility

CSF FINDINGS IN TBM AND OTHER MENINGITIS

MENINGITIS TYPE	CELL COUNT	PREDOMINANT CELL TYPE	PROTEIN	SUGAR	SPECIFIC TESTS FOR CONFIRMATION
Tubercular	Usually <500	Lymphocytic Neutrophilic in some acute cases	High	Low	AFB smear and culture *Xpert / TrueNat
Pyogenic	In thousands	Neutrophilic	Moderately High	Very low	Gram stain, culture
Fungal	Variable	Lymphocytic	High	Low	India Ink, Fungal Culture, Cryptococcal antigen
Viral	50-500	Lymphocytic	Normal to marginally high	Normal	PCR for specific virus

*A negative Xpert / TrueNat result does not rule out TBM. The decision to give ATT should be based on clinical features and CSF profile.

MANAGEMENT

ANTI-TUBERCULAR TREATMENT

- Intensive Phase: 2 months of RHZE or RHZS
- Continuation phase: 3 drugs: RHZ for at least 10 months^{*}

STEROIDS

- Preferably Dexamethasone 0.4 mg/kg/day intravenously in 3-4 divided doses during hospital stay
- If not feasible, give oral Dexamethasone 0.4 mg/kg/day in divided doses or oral Prednisolone 1 mg/kg/day in a single morning dose
- Discharge on oral steroids on tapering doses for a total duration of 8-12 weeks

*treatment duration may be increased in some cases as per the clinician decision

FOLLOW UP

- Regular follow up is essential every month for at least first 3 months & can be increased thereafter till treatment is stopped
- Monitor liver function tests & any other features of drug toxicity
- Observe for clinical improvement or any deterioration
- Closely observe for development of any complications

SUSPECT COMMON COMPLICATIONS

- Hydrocephalus and raised ICP:** Worsening of headache with vomitings and/or altered sensorium
- Optico-chiasmatic arachnoiditis:** Complaints of vision loss in one or both eyes with or without headache
- Myelitis and or arachnoiditis:** Development of paraparesis or quadriparesis with/without sensory disturbances, bladder involvement
- Epidural abscess/Pott's spine:** Complaints of back pain and/or weakness in one/ both lower limbs/ bladder/ bowel disturbances
- Tuberculoma:** Seizures, new onset focal deficits, worsening headache
- Seizures:** Consider tuberculoma/electrolyte or metabolic imbalance/ cerebral infarction
- Cerebral infarction and stroke:** Sudden onset weakness of one half of body, new onset confusion, altered mental status, seizures
- Hyponatremia, SIADH:** Persistent or worsening mental status

ABBREVIATIONS

ATT: Antitubercular therapy
 CBC: Complete Blood Count
 CECT: Contrast Enhanced CT
 CRP: C Reactive Protein
 CSF: Cerebrospinal Fluid

E: Ethambutol
 ESR: erythrocyte sedimentation rate
 H: Isoniazid
 ICP: Intracranial pressure
 LFT: Liver function tests

MRI: Magnetic resonance imaging
 NCCT: Non-contrast CT
 NTEP: National TB Elimination Programme
 PCR: Polymerase Chain Reaction
 R: Rifampicin

RFT: Renal function tests
 S: Streptomycin
 SIADH: Syndrome of inappropriate antidiuretic hormone
 TBM: Tubercular meningitis
 Z: Pyrazinamide

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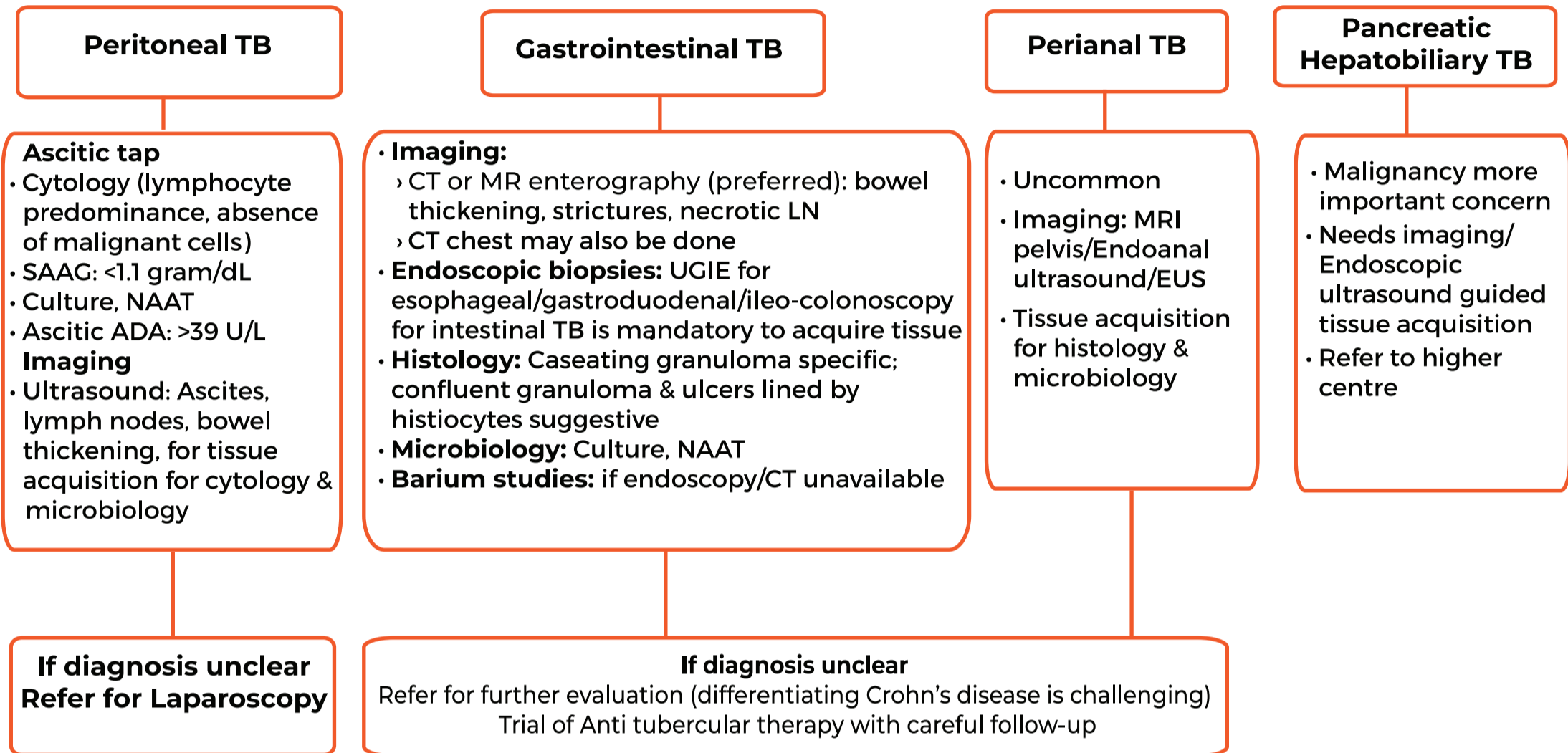
Standard Treatment Workflow (STW) for the Management of ADULT ABDOMINAL TUBERCULOSIS ICD-10-A18.3

WHEN TO SUSPECT

Any organs in abdominal cavity, including gut lumen & peritoneum may be affected

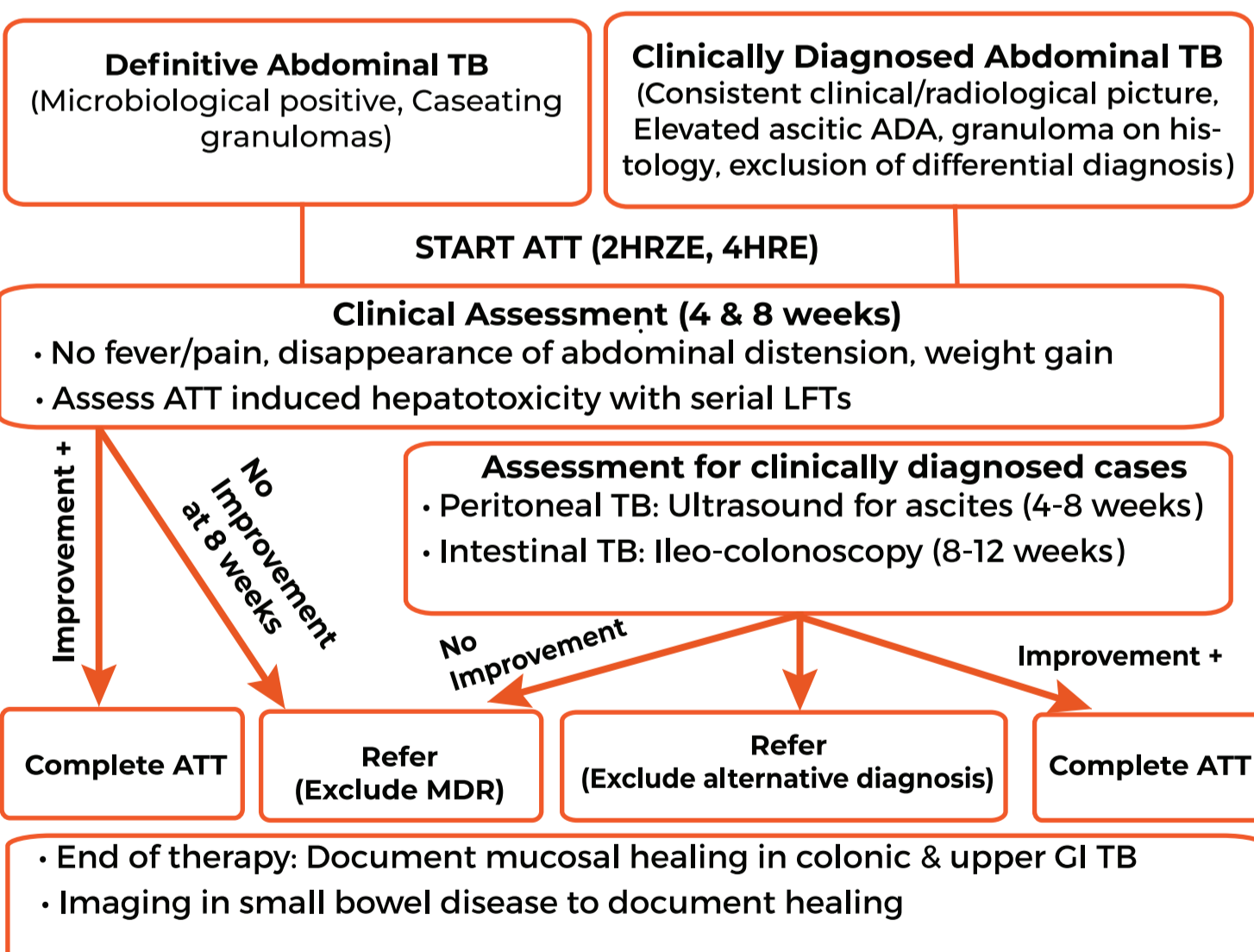
PERITONEAL	INTESTINAL	ESOPHAGEAL	GASTRO-DUODENAL	PERIANAL	PANCREATIC	HEPATO-BILIARY
<ul style="list-style-type: none"> Abdominal distension Pain abdomen Fever 	<ul style="list-style-type: none"> Recurrent intestinal colic Partial/ incomplete intestinal obstruction Chronic diarrhoea Weight loss Palpable mass abdomen Lower gastrointestinal bleeding 	<ul style="list-style-type: none"> Dysphagia Odynophagia Hematemesis Constitutional symptoms 	<ul style="list-style-type: none"> Gastric outlet obstruction Gastrointestinal bleed 	<ul style="list-style-type: none"> Simple/ Complex peri-anal fistula Persistent discharge Fistulae which recur after multiple surgeries 	<ul style="list-style-type: none"> Abdominal pain Obstructive jaundice Dilated pancreatic or bile duct with (peri)-pancreatic mass or cyst Constitutional symptoms 	<ul style="list-style-type: none"> FUO Hepatomegaly Jaundice Elevated ALP SOL Hepatic abscess

EVALUATION FOR SUSPECTED ABDOMINAL TUBERCULOSIS



HIV & blood sugar test should be done in all suspected patients as per NTEP guidelines

FOLLOW UP



TREATMENT:

- Start treatment & follow-up as per NTEP guidelines
- 1st line treatment for adults & children with abdominal TB: 2HRZE/RHRE
- Extend duration of treatment in cases of inadequate response
- Refer for surgical management for complications [intestinal obstruction (due to strictures), perforation]. Consider endoscopic dilatation for treatment for accessible strictures
- Refer for biliary drainage in case of Jaundice due to biliary obstruction (hepatobiliary obstruction/pancreatic TB)

ABBREVIATIONS

ADA: Adenosine Deaminase	FUO: Fever of Unknown Origin	MR: Magnetic Resonance	Rif: Rifampicin
ALP: Alkaline phosphatase	GI: Gastro-intestinal	Mtb: Mycobacterium Tuberculosis	SOL: Space occupying Lesion
ATT: Anti-Tubercular treatment	HRZE: Isoniazid; Rifampicin; Pyrazinamide; Ethambutol	NAAT: Nucleic Acid Amplification Test	SAAG: Serum Ascites Albumin Gradient
CT: Computed Tomography	LFT: Liver function tests	NTEP: National TB Elimination Programme	UGIE: Upper gastrointestinal endoscopy
EUS: Endoscopic ultrasound	MDR: Multi-drug resistance		

REFERENCES

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Standard Treatment Workflow (STW) for the Management of ADULT MUSCULOSKELETAL TUBERCULOSIS

ICD-10-A18.0

WHEN TO SUSPECT?



SPINE TUBERCULOSIS

- Persistent localized pain in spine region >6 weeks, night pains
- Local tenderness/cold abscess
- Recent onset deformity in the back
- Recent neurological deficit (better to refer*)
- Persistent heaviness around the waist/Girdle pain
- Fever, cough, weight loss & night pains
- History of close contact with TB

OTHER JOINTS/BONES

- Persistent localized pain & swelling >6 weeks
- Mono-articular joint involvement
- Discharging sinus (+/-)
- Fluctuant swelling with or without inflammation
- Painful restriction of involved joint movements
- Wasting around the area
- Fever, cough, weight loss & night pains
- History of close contact with TB

DIAGNOSTIC ALGORITHM

Presumptive TB

ESR, CRP, LFT, KFT, HIV

Imaging : X-rays spine & chest, (MRI, if feasible)

Features s/o TB

In case of psoas abscess or soft tissue abscess: USG guided biopsy, bone/joint biopsy (open or percutaneous)

Biopsy facilities not available: Refer
Lesion not accessible for biopsy : Refer*

Send samples for: Gram staining & Culture sensitivity, AFB staining, HPE, NAAT, Solid & liquid mycobacterium culture, LPA if feasible

MTB +ve

Start ATT

MTB -ve

Refer to higher centre



Paravertebral shadow

Obliterated disc space & bone loss in X-rays

T₁WI and T₂WI images bone edema with VB destruction

T₂WI septate pre/para vertebral abscess in MRI

Findings S/o TB

• X-ray findings(spine):

- › Regional Osteopenia
- › Decreased/obliterated disc space
- › Vertebral erosions +/- reduced vertebral height
- › Paravertebral shadow

• MRI findings (Spine):

- › Contiguous VB involvement with relatively preserved disc
- › Pre & paravertebral septate collection (Abscess)
- › Epidural encroachment +/- intraosseous abscess

• X-ray & MRI Finding (extraspinal):

- › Regional osteoporosis with bone destruction on X-rays
- › Inflammation of bone(T1WI & T2WI) +/- abscess on MRI

TREATMENT

Treatment should be started & follow-up should be conducted as per NTEP guidelines
The following algorithm provides additional guidance for follow-up

TB +ve on any test

NAAT sensitive to Rifampicin: Start 4 drug first line ATT

GeneXpert resistant to Rifampicin: refer*/culture for TB and sensitivity to other drugs

TB -ve on all tests

Index of suspicion high ESR, CRP raised: Refer*

Index of suspicion low CRP normal: Reassurance

- Clinical symptoms improvement
- CRP decreasing continue for standard 12 months regime
- Intensive 4 drug regime (not more than 4 months)
- Stop ATT after 12 months if all three parameters clinical, Lab(ESR, CRP) & radiological return to normal
- In case of spine decision to stop ATT to be taken by evaluating healed status on contrast MRI
- Mildly elevated ESR, CRP (non specific tests) can be ignored
- Follow up every month with CRP, LFT during intensive phase
- Follow up every 3 months during continuation phase with CRP/LFT
- On treatment worsening of symptoms
 - › Early (<3 months): Paradoxical
 - › Late (>4 months): ?drug resistance
- Any aberrance in course such as appearance of neural deficit: Refer*

Clinical symptoms not improving
ESR, CRP increasing: Refer*
?Suspected drug resistance

*Refer to higher centre where advanced diagnostic, & therapeutic facilities including surgical procedures are available.

ABBREVIATIONS

AFB: Acid-fast Bacillus
ATT: Anti-Tubercular Treatment
CRP: C-Reactive Protein
ESR: Erythrocyte Sedimentation Rate

HIV: Human Immunodeficiency Virus
HPE: Histopathological examination
KFT: Kidney Function Tests
LFT: Liver Function Tests
LPA: Line Probe Assay

MRI: Magnetic Resonance Imaging
NTEP: National TB Elimination Programme
TB: Tuberculosis
USG: Ultrasonography
VB: Vertebral body
WNL: Within Normal Limits

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Standard Treatment Workflow (STW) for the Management of CUTANEOUS TUBERCULOSIS

ICD-A18.4

ETIOLOGY

- M.tuberculosis
- M.bovis
- BCG (rarely)

WHEN TO SUSPECT

- Presence of ulcer or discharging sinus over lymph node, bone & joints
- Persistent asymptomatic reddish/reddish brown lesion of >6 months duration which may show scarring
- Persistent warty or verrucous lesion of >6 months duration

OTHER FEATURES

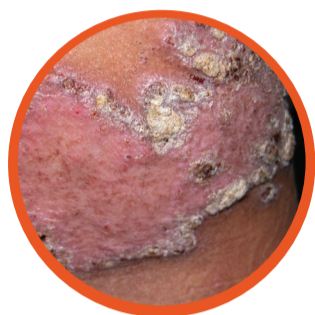
- Extracutaneous involvement
- Lymph node & lungs involvement
- Other organ systems involvement (bones, GIT & CNS)

TYPES OF CLINICAL DISEASE

- Primary Inoculation tuberculosis
- Tuberculosis verrucosa cutis
- Lupus vulgaris
- Scrofuloderma
- Acute miliary tuberculosis
- Orificial tuberculosis Metastatic tuberculosis
- Abscess (tuberculousgumma)
- Normal primary complex-like reaction
- Postvaccination
- lupus vulgaris Perforating regional adenitis
- Lichen scrofulosorum and
- Papulonecrotictuberculid
- Facultative tuberculids
- Nodular vasculitis and Erythema nodosum



Lupus Vulgaris



Lupus Vulgaris



Scrofuloderma



Scrofuloderma



Verrucous TB



Verrucous TB

INVESTIGATION

SCREENING FOR SYSTEMIC INVOLVEMENT

- Examination:
 - › Lymph node to be examined (FNAC)
 - › Other organ system can be done if indicated
- Essential:
 - › Chest X-ray
 - › FNAC from the indurated part of lesion
- Desirable:
 - › Histopathology
 - › Culture from biopsy sample (Not swab)

INVESTIGATIONS

- Histopathology: Granulomas with epithelioid histiocytes & Langerhans - type giant cells
- FNAC: If indicated
- IGRA /NAAT/PCR: Not recommended for diagnosis

CASE DEFINITION

A) Confirmed case:

- › M.tuberculosis complex identified by either culture or PCR or histology shows typical morphology
- › Full course of ATT which led to complete clearance of lesions

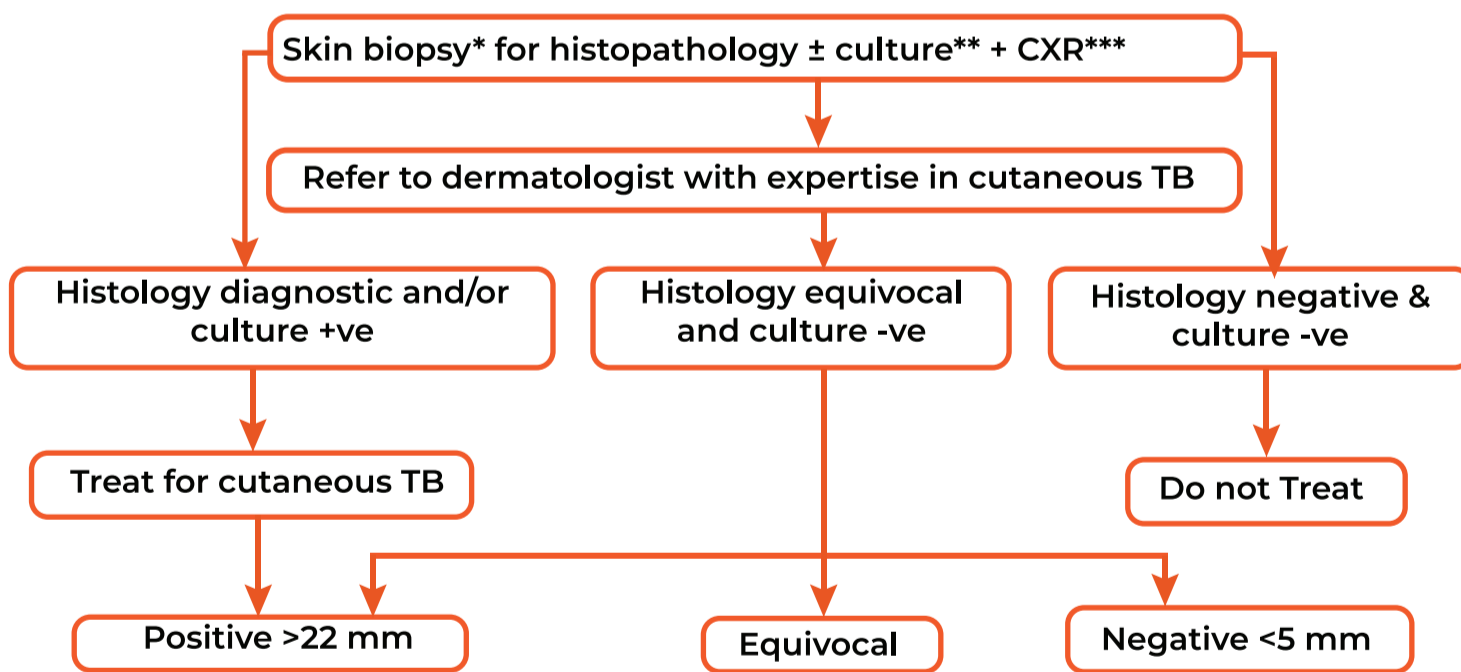
B) Probable case:

- › Typical skin lesion with no positive features/investigation as mentioned above (A)

DIAGNOSTIC ALGORITHM

Suspected TB case based on presence of clinical signs

- Ulcers/discharging sinuses over sites of LN, bones & joints
- Persistent, asymptomatic raised reddish/reddish brown lesion of >6 months' which may show scarring at one end
- Persistent, warty skin lesion of >6 months'



• Strong clinical suspicion
› Start ATT

*FNAC can be done if facilities for skin biopsy are not available
**PCR may also be done if facilities are available but cannot be recommended as a routine due to the low level of evidence regarding its usefulness in diagnosis of cutaneous tuberculosis
***if CXR shows signs suggestive of respiratory TB, treat accordingly

MANAGEMENT

TREATMENT

- As in Pulmonary TB. Extend if needed
- DR -TB to be kept in mind
- No role of steroids oral or topical in management of CT

FOLLOW UP

- 1st follow-up after 4-6 weeks; majority improves; to look for ADRs
- If no response after 8 weeks
- No response- alternate diagnosis/DR-TB; refer to higher centre

ABBREVIATION

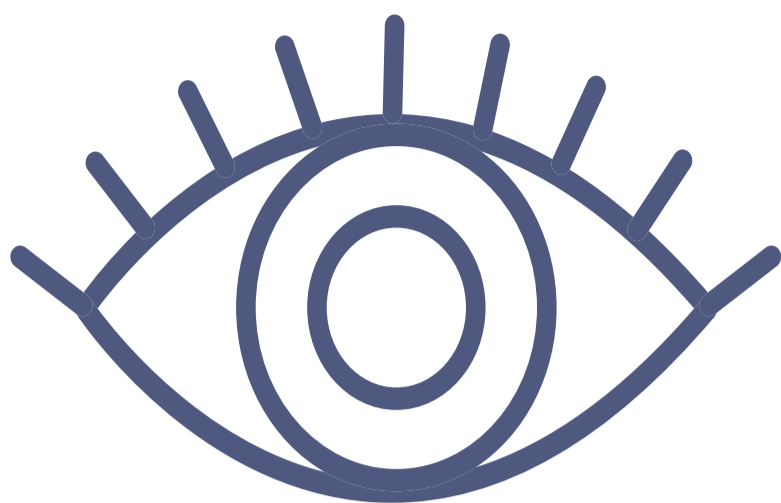
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|---|--|--|
| ATT: Anti-Tubercular treatment | DR-TB: Drug resistant Tuberculosis | NAAT: Nucleic acid amplification test |
| BCC: Bacille Calmette Guerin vaccine | FNAC: Fine needle aspiration cytology | NTEP: National TB Elimination Programme |
| CNS: Central Nervous System | GIT: Gastro-intestinal tract | NTM: Non-Tuberculous Mycobacterium |
| CT: Cutaneous Tuberculosis | IGRA: Interferon Gamma Release assay | PCR: Polymerase chain reaction test |
| CXR: Chest X-ray | LN: Lymph node | TB: Tuberculosis |

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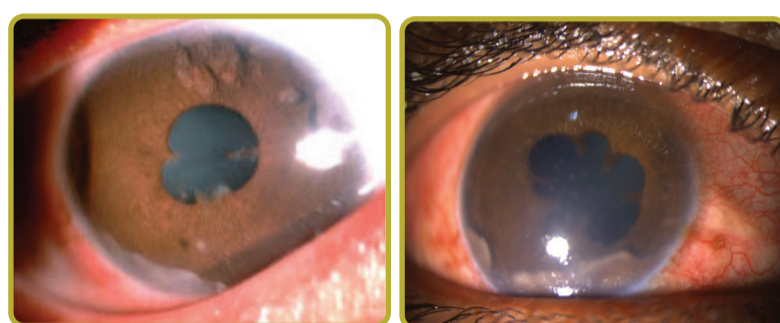
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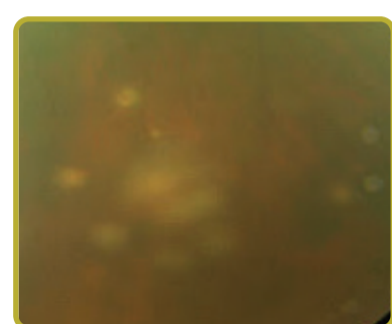
Standard Treatment Workflow (STW) for the Management of INTRAOCULAR TUBERCULOSIS ICD-10-A18.3



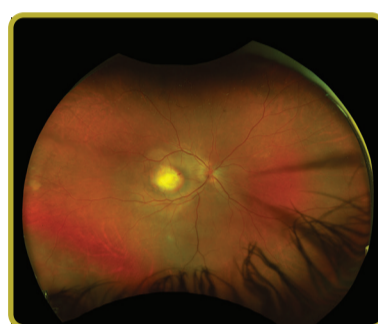
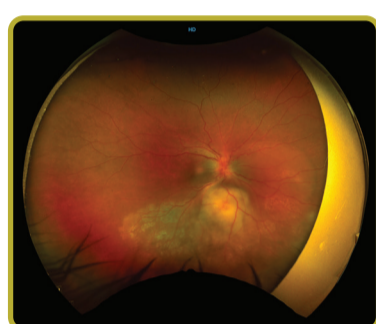
Granulomatous anterior uveitis



Intermeditate uveitis



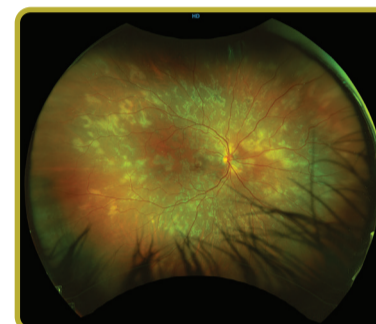
Panuveitis/Posterior uveitis



Retinal vasculitis



Choroiditis



When to suspect

Ocular Symptoms

- Blurred vision
- Redness
- Photophobia
- Pain in the eye
- Floaters
- Flashes of lights

Refer to Ophthalmologist for detailed examination

Eye Care facility should have:

Mandatory: Slit lamp, ophthalmoscope (direct or indirect), intraocular pressure assessment device
Preferred: Fundus camera, Fundus fluorescein angiogram (FFA), Optical Coherence Tomography (OCT)

Examination of the eyes

Clinical signs

- Assess visual acuity
- Anterior chamber cells, Keratic precipitates, Synechiae, Irregular pupil, RAPD
- Complicated cataract, high or very low intraocular pressure
- Vitritis, Pars plana exudates, Retinal vasculitis, Retinitis, Choroiditis, Optic nerve head swelling

INVESTIGATIONS

Essential:
CXR for healed/
active
pulmonary TB

Desirable:
Mantoux Test
(standardised
tuberculin
units): 10 mm
induration
considered positive

Optional:
CT Chest (if
available) for
healed/active
pulmonary TB

Imaging of eye: Ascertaining diagnosis, extent of disease & follow up, teleconsultation

**Retinal
photographs
using fundus
camera**

**Optical
coherence
tomography
scans (if
available)**

**Fluorescein
angiograms
(if available)**

Investigations to rule out other causes of clinical presentation

MANAGEMENT

TREATMENT

- ATT : 2 months of RHEZ + 7 months of RH depending on clinical response & side effects to treatment
- Add pyridoxine 10 mg/day
- **Corticosteroids** : Topical steroids eye drops for severe/anterior chamber inflammation
- For treatment in children refer to paediatrician
- Systemic corticosteroids for severe inflammation in consultation with Uveitis expert

REFERRAL TO HIGHER CENTRE

- Not confident to treat
- Vision threatening
- Non-response to treatment
- Side effects due to treatment
- Atypical reaction

MONITORING AND FOLLOW UP

- Frequency of follow up: 1-2 weeks in 1st month followed by monthly for 3 months & then 3 monthly
- Eye: Clinical grading of inflammation using fundus photographs & OCT scans (if available)
- Steroids:
 - › Topical: Monitor IOP, cataract and any signs of bacterial/ fungal infection
 - › Systemic steroids: Monitor body weight, blood sugar & blood pressure

ABBREVIATIONS

ATT: Antitubercular treatment

E: Ethambutol

H: Isoniazid

IOP: Intraocular pressure

R: Rifampicin

RAPD: Relative Afferent Pupillary Defect

OCT: Optical coherence tomography

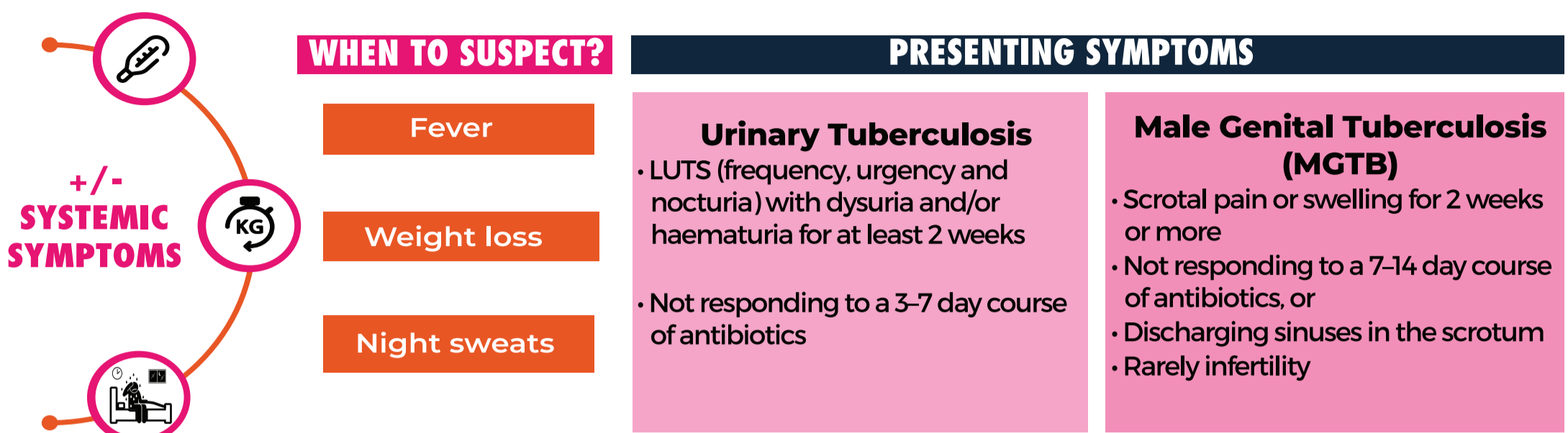
Z: Pyrazinamide

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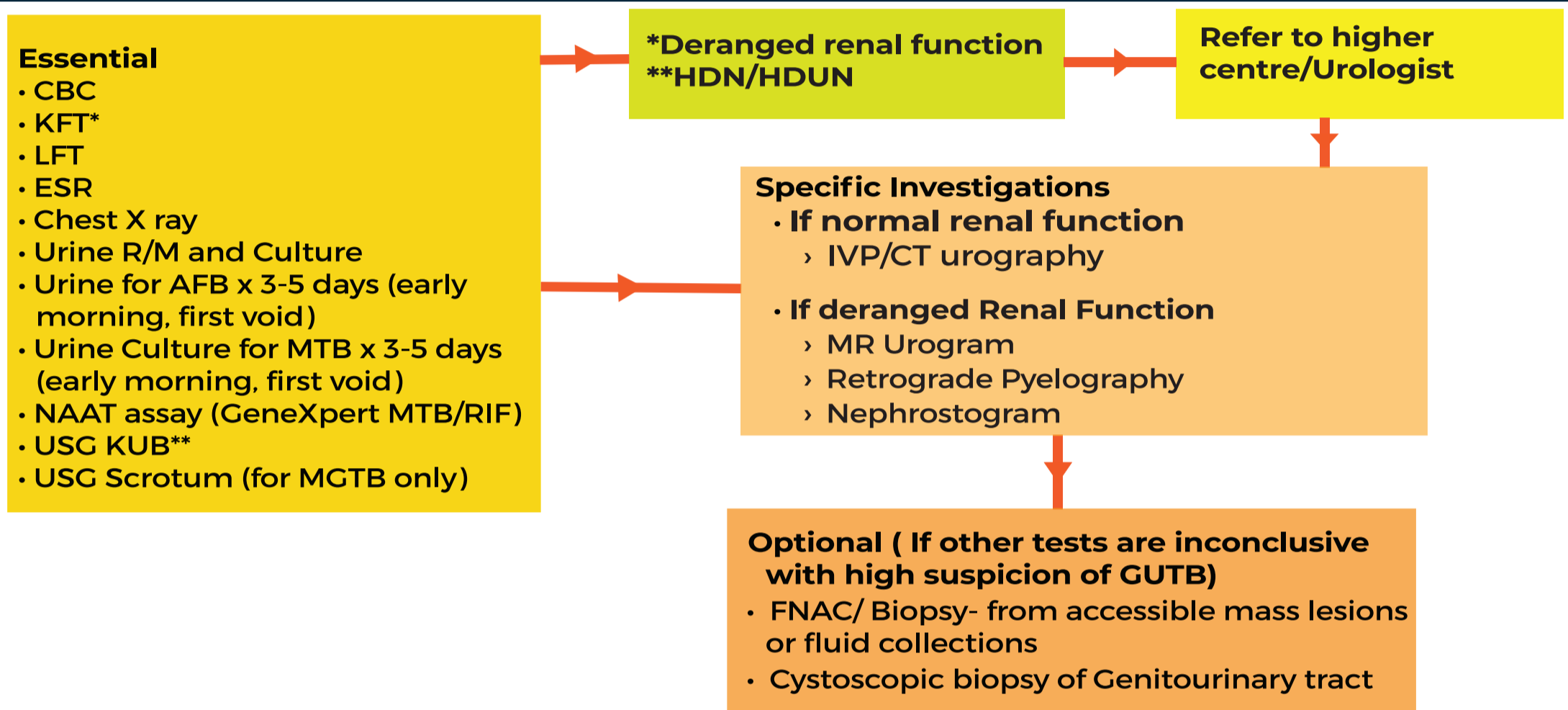
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Standard Treatment Workflow (STW) for the Management of GENITOURINARY TUBERCULOSIS ICD-A18.10



INVESTIGATION



TREATMENT

TYPE OF TB	TYPE OF REGIMEN	DRUGS	EXTENSION CRITERIA
DRUG SUSCEPTIBLE TB	DS-TB REGIMEN	2 MONTHS H,R,E,Z 4 MONTHS H,R,E	Extension packets of infection, concurrent smear positive cavitory pulmonary disease, CNS involvement, Delay in positive cultures converting to negative Duration can be increased up to 9 to 12 months
MDR/RR OR XDR-TB	TREATMENT AS PER NTEP GUIDELINES		

FOLLOW UP

At 8 weeks : Resolution of systemic symptoms, improved urinary symptoms, repeat culture if baseline culture positive

After completion of ATT: Repeat culture if baseline culture positive

Repeat imaging: If partial or impending ureteric stricture

Watch for the following complications at each Follow-up visit:

- Severe LUTS suggestive of small capacity bladder
- Deteriorating renal function

ABBREVIATIONS

ATT: Anti-tubercular treatment	ESR: Erythrocyte Sedimentation Rate	MDR: Multi Drug Resistant	RR: Rifampicin Resistant
CT: Computed Tomography	H: Isoniazid	MTB: Mycobacterium Tuberculosis	USG KUB: Ultrasonography Kidney, Ureter and Bladder
CBC: Complete Blood Count	HDN: Hydronephrosis	MR: Magnetic Resonance	URINE AFB: Urine for Acid-fast Bacillus
CXR: Chest X- Ray	HDUN: Hydroureteronephrosis	NAAT: Nucleic Acid Amplification Test	XDR: Extensively Drug Resistant
DJS: Double J Stent	IVP: Intravenous Pyelogram	NTEP: National Tuberculosis Elimination Programme	Z: Pyrazinamide
DS-TB: Drug Susceptible Tuberculosis	LFT: Liver Function Test	RFT: Renal Function Test	
E: Ethambutol	LUTS: Lower Urinary Tract Symptoms	R: Rifampicin	

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Standard Treatment Workflow (STW) for the Management of FEMALE GENITAL TUBERCULOSIS

ICD-10-A18.17

WHEN TO SUSPECT?



SUSPECT

Consider following symptoms in history :

- H/O infertility (primary or secondary)
- Chronic lower abdominal or pelvic pain
- Amenorrhoea or other menstrual disturbances
- Abnormal vaginal discharge
- Constitutional symptoms of TB (low grade fever, weight loss etc.)
- Other symptoms related to extra-genital TB (abdominal, CNS, bone and lymph nodes etc.)

In addition, standard investigations for TB to be carried out

EXAMINE AND INVESTIGATE

Clinical Examination

- General Physical Examination
- Pelvic Examination (cervical growth, uterine size and mobility, adnexal tenderness & mass)

Abdominal and Pelvic USG (TVS)

- Uterus, adnexa & pelvis to be evaluated preferably by transvaginal scan
- Endometrial cavity & vascularity to be looked carefully with colour Doppler

Specific Investigations

- Endometrial sampling or biopsy with Pipelle device or Karman cannula (4 mm) for microbiological & histopathological examination
- Endoscopy :
 - › Hysteroscopy & laparoscopy to evaluate uterus, adnexa & other pelvic organs along with lower abdomen
 - › Laparoscopic biopsy from peritoneum or abdominal/pelvic lesions
- MTB diagnosis from biopsy specimen (endometrium & other tissues) by
 - › Smear microscopy (AFB smear) & culture
 - › Gene Xpert or other NAAT
 - › HPE of biopsy specimen

DIAGNOSIS

SUGGESTIVE FINDINGS IN FGTB

Imaging and Radiological

- HSG : to be avoided in acute phase
- Findings : blocked fallopian tubes, usually cornual; tobacco pouch appearance of the tubes; beaded tubes; filling defect in the uterine cavity (Asherman syndrome)
- USG : cogwheel appearance of tubes; uterine cavity may show thin diffuse endometrium with irregular borders
- CT/MRI : can be used for tubo-ovarian mass

Endoscopy

- Hysteroscopy : To look for tubercles, pale endometrium & endometrial adhesions
- Laparoscopy : Direct visualization of tubercle like lesions on the uterus, tubes and other pelvic organs including peritoneum, & caseous nodules

FEMALE GENITAL TB (STEPWISE DECISION)

- Clinical history
- General physical and pelvic examination
- Pelvic ultrasound
- HSP as indicated in infertility HSG

Definite FGTB needing ATT if any of the following tests are positive

- AFB microscopy positive
- AFB culture positive
- Gene Xpert or other NAAT +ve
- Histopathological demonstration of epithelioid granuloma

Probable FGTB needing ATT if any of following positive

- Clinical findings/suspicion of TB with tubo-ovarian masses on imaging studies
- Clinical findings/suspicion of TB with laparoscopic findings of beaded tubes, caseous nodules, tubercles, adhesions, hydrosalpinx & pyosalpinx etc.
- Clinical findings/suspicion of TB with hysteroscopic findings of tubercles, caseous nodules, pale endometrium, intrauterine adhesions etc.

Negative FGTB : No ATT

- No microbiological, histological, radiological, laparoscopic & hysteroscopic evidence of FGTB

Menstrual blood should not be used for NAAT.

MANAGEMENT

TREATMENT

- Treatment of FGTB should be as per NTEP
- Patients requiring specific treatment such as infertility, Asherman syndrome & tubo-ovarian mass etc. should be referred to higher centres

FOLLOW UP

Follow-up of the patient should be flexible depending on the clinical presentation and response to ATT

- 1 month : Clinical Evaluation (General & Gynaecological)
- 3 months : Clinical Evaluation (General & Gynaecological)
- 6 months : Clinical Evaluation & Investigations (endometrial biopsy, hystero-laparoscopy & USG as needed)

ABBREVIATION

AFB: Acid-Fast Bacilli

FGTB: Female Genital TB

MRI - Magnetic Resonance Imaging

PCR: Polymerase Chain Reaction

ATT: Anti-Tuberculosis Therapy

FNAC: Fine-needle Aspiration Cytology

MTB: Mycobacterium Tuberculosis

TB: Tuberculosis

CNS: Central Nervous System

HSE: Histopathology Examination

NAAT: Nucleic Acid Amplification Test

TVS: Transvaginal Scan

CT: Computed Tomography

HSG: Hysterosalpingography

NTEP: National Tuberculosis Elimination Programme

USG: Ultrasonography

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Standard Treatment Workflow (STW) of MICROBIOLOGICAL WORK-UP FOR ADULT EXTRAPULMONARY TUBERCULOSIS

LOGISTICS INVOLVED IN SAMPLE COLLECTION AND TRANSPORTATION

- Collect Samples for Microbiological work-up in sterile containers before treatment is started. (Mention date & time of collection)
- Specimens to be sent in sterile saline (NOT in formalin)
- Establish linkages between peripheral centres, District centres and Tertiary centre/medical colleges/ IRL. Specify details of person to be contacted, department and contact number during referrals
- Transportation at 2-8 °C
- Maximum time for transportation in cold chain should be 5 days from time of collection
- Quantity of sample mentioned is only for microbiological work-up. Tests like histopathology, cytology, ADA, glucose, protein, etc will require additional sample
- Microbiological tests for TB (smear, molecular tests, culture) will be performed as per availability and preparedness of site
- PHC and CHC should perform smear microscopy and molecular diagnostic tests. If sample less than 500 µl, refer directly to Tertiary centre/medical colleges/IRL for culture. Residual sample in the needle and syringe used to collect the specimen can be used for smear
- MGIT to be used for culture. However, if MGIT is not available, LJ medium should be used

REJECTION OF SAMPLES

- Unlabelled samples (All specimens MUST be labelled & have a unique patient identifier)
- Have no collection date indicated
- Insufficient quantity - No specimen in container
- Damaged - Specimen leaked or broken in transit
- Samples greater than 3 days old at room temperature and more than 5 days in refrigeration are unreliable specimens for testing

Precious samples should be transported to IRL.

Diagnostic algorithm of NTEP to be followed in the Microbiology labs

MICROBIOLOGICAL GUIDANCE FOR COMMON TYPES OF EXTRAPULMONARY TUBERCULOSIS

OSTEOARTICULAR/ MUSCULOSKELETAL

- **Sample:** Tissue, pus, synovial fluid
- **Sample amount:** Biopsy: Specimen material 1 cm x 1 cm biopsies. Any caseous area should be sampled. Add 0.5-2 ml sterile saline to biopsy depending on its size to avoid drying of tissue specimen
- **Optimum fluid/pus:** 2-3ml.
- Swabs are sub-optimal samples

PLEURAL

- **Sample:** Pleural fluid
- **Sample amount:** 10-15 ml

MENINGITIS

- **Sample:** CSF:
- **Sample amount:** 3-5 ml

LYMPHADENITIS

- **Sample:** FNA/ Biopsy
- **Sample amount:** Specimen material 1 cm x 1 cm biopsy. Add 0.5-2 ml sterile saline to biopsy depending on its size to avoid drying of tissue specimen
- **Optimum FNA sample:** 2 ml

UROGENITAL

- **Sample:** urine
- **Sample amount:** Entire early morning urine sample (3-5 days)

FEMALE GENITAL

- **Sample:** Endometrial curettage/biopsy
- **Sample amount:** Biopsy: Specimen material 1cm x 1 cm biopsies. Any caseous area should be sampled. Add 0.5-2 ml sterile saline to biopsy depending on its size to avoid drying of tissue specimen

GASTROINTESTINAL

- **Sample:** Tissue, pus, peritoneal fluid
- **Sample amount:** Biopsy: Specimen material 1 cm X 1 cm biopsy (Atleast 6 biopsies for microbiological diagnosis including any caseous area). Any caseous area should be sampled. Add 0.5-2 ml sterile saline to biopsy depending on its size to avoid drying of tissue specimen
- **Optimum fluid/pus:** 5-10ml

Processing:

- Preferably immediately. If not possible- store/transport at 2-8 °C
- *If sample is adequate, attempt molecular testing at that site*
- *If biopsy is not possible or at an inaccessible site, refer patient to the next higher centre immediately where appropriate test can be done*
- *If sample obtained at a centre is inadequate, send directly to nearest Tertiary centre/medical colleges/IRL*

Microbiological procedures :

- AFB Smear Microscopy except in GI TB
- NAAT
- Culture (MGIT. If MGIT is not available LJ medium should be used)
- Drug susceptibility testing, if culture is positive

ABBREVIATIONS

ADA: Adenosine Deaminase
AFB: Acid fast bacilli
CHC: Community Health Centre

FNA: Fine needle aspirate
LJ medium: Lowenstein Jensen medium
MGIT: Mycobacteria Growth Indicator tube (Liquid culture medium for mycobacteria)
NAAT: Nucleic Acid Amplification Tests-Xpert MTB/RIF/TrueNat

PHC: Primary health Centre
TB: Tuberculosis
IRL: Intermediate Reference laboratory

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Standard Treatment Workflow (STW) for the Management of ANTITUBERCULAR THERAPY RELATED HEPATITIS

PATIENT TO BE STARTED ON ATT

Risk factors for ATT Hepatitis

- History of underlying liver disease (jaundice, ascites, GI bleeding)
- Physical findings suggestive of liver disease (Splenomegaly, ascites, icterus, edema)
- Alcoholism
- Hypoalbuminemia and Malnutrition
- Elevated aminotransferases at baseline
- HIV
- IV drug abuse
- Elderly age

Yes

Evaluate for underlying liver disease
HBsAg, Anti-HCV, Ultrasound

Chronic Liver disease +

- Intensive education & counselling
- Modified ATT may be needed based on Child Pugh Status
- LFT monitoring

No

No CLD or Cirrhosis

- Start ATT
- Counsel about symptoms of ATT Hepatitis

START ATT

Diagnosis of ATT hepatitis Clinical symptoms present (abdominal pain, vomiting, unexplained fatigue, yellowing of sclera, altered sensorium)

- AST/ALT increased to 3 times of baseline/ULN
- Jaundice (Bilirubin 2 ULN)

No clinical symptoms

- AST/ALT increased to 5 times of baseline/ULN

Exclude viral hepatitis (HBsAg, Anti-HCV, IgM- antiHAV, IgM-AntiHEV, Get PT/INR, Ultrasound liver)

Stop all hepatotoxic drugs

- Need urgent ATT: Change to non-hepatotoxic drugs (Fluroquinolones, ethambutol & aminoglycosides)
 - No need for urgent ATT: repeat LFT after a week & reintroduce (see later)
 - Non-resolution of LFT abnormalities: exclude alternative causes of liver disease
- Jaundice and coagulopathy/encephalopathy**
- Refer to higher center immediately

Urgent ATT: life or organ threatening

- Sputum + Pulmonary TB
- TB meningitis or CNS TB
- Pericardial TB
- Any form that is lif threatening, eg., Intestinal TB with intestinal obstruction
- Ocular TB
- Joint or Spinal TB

No need for Urgent ATT

- Sputum -ve Pulmonary
- TB lymphadenitis
- Tubercular pleural effusion
- Tubercular ascites
- Intestinal TB
- Genitourinary TB
- Bone TB

REINTRODUCTION OF ATT HEPATOXIC DRUGS

- Reintroduce only if ALT and AST < 2 ULN & normal bilirubin
- Start one drug at a time: helps identify the culprit
- Rifampicin may be introduced at 10 mg/kg dose
- After one week add Isoniazid 5 mg/kg if LFT normal
- After one week add pyrazinamide 25 mg/kg if LFT is normal
- If ATT hepatitis severe (liver failure, coagulopathy or altered sensorium): Pyrazinamide reintroduction may be avoided
- Another approach could be low dose of one drug followed by full dose after three days
- Duration of ATT: count only when full ATT is started

REINTRODUCTION OF ATT: IF AST AND ALT < 2 ULN

SEQUENTIAL

Initiate one at a time Rifampicin 10 mg/kg

1 week: repeat LFT

Initiate Isoniazid 5 mg/kg

1 week: repeat LFT

Initiate Pyrazinamide 25 mg/kg

INCREMENTAL

Initiate Rifampin 150 mg/day
Gradually increase dose by day 4

Initiate Isoniazid 100 mg/day at day 8
Gradually increase dose by day 11

Initiate Pyrazinamide 500 mg/day on day 15
Gradually increase dose by day 18

CHILD PUGH (CTP) SCORE

	Score 1	Score 2	Score 3
Bilirubin	< 2 mg/dl	2-3 mg/dl	>3 mg/dl
Albumin	>3.5 gm/dl	2.8-3.5 gm/dl	<2.8 gm/dl
INR	<1.7	1.7-2.2	>2.2
Ascites	Absent	Slight	Moderate
Encephalopathy	Absent	Grade 1-2	Grade 3-4

HEPATIC ENCEPHALOPATHY GRADE

- **Grade 0:** normal consciousness, personality & neurological examination
- **Grade 1:** restless, disturbances in sleep, irritability or agitated, tremors, handwriting affected
- **Grade 2:** lethargy, disorientation to time, asterixis, ataxia
- **Grade 3:** somnolent & stuporous, disoriented to place, hyperactive reflexes, rigidity
- **Grade 4:** unrousable coma, decerebrate

ATT SELECTION FOR UNDERLYING LIVER DISEASE

Child Status	Suggested ATT
Child A Cirrhosis (Score 1-6) Stable Liver disease	9 months of therapy with HRE OR 2 months of therapy with HRE followed by 7 months of HR
Child B Cirrhosis (Score 7-10) Advanced Liver Disease	One hepatotoxic drug regimen can be used: Two months of therapy with INH (or) RIF with ETH & aminoglycoside, followed by 10 months of therapy with INH/RIF & ETH
Child C Cirrhosis (Score 11-15) Very advanced liver disease	No hepatotoxic drug 18 to 24 months treatment using a combination of ETH, FQL, cycloserine & aminoglycoside/ capreomycin
In Acute hepatitis	Avoid hepatotoxic drugs ATT with non-hepatotoxic drugs if urgent ATT required Wait till improvement in liver function if no urgent need of ATT

ABBREVIATIONS

ALT: Alanine transaminase	GI: gastro-intestinal	HRE: Isoniazid, Rifampicin, Pyrazinamide	LFT: Liver function tests
AST: Aspartate transaminase	HAV: Hepatitis A virus	IgM: Immunoglobulin M	PT: Prothrombin time
ATT: Anti-tubercular treatment	HBsAg: Hepatitis B surface Antigen	INH: Isoniazid	RIF: Rifampicin
ETH: Ethambutol	HCV: Hepatitis C virus	INR: International normalized ratio	TB: Tuberculosis
FQL: Fluoroquinolone	HEV: Hepatitis E virus	IV: Intravenous	ULN: Upper limit of normal

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Standard Treatment Workflow (STW) Guidelines for DRUG SENSITIVE-TB TREATMENT AS PER NTEP

- For all TB patients whether being treated in public or private sector, clinicians should follow Standards for TB care in India guidelines
- In NTEP, the principle of TB treatment (except confirmed DR-TB) is to administer daily FDC of 1st line ATT in appropriate weight bands, under direct observation
- For patients being treated in private sector, FDCs may be provided by NTEP whenever requested

Regimen for Drug-Sensitive TB cases: 2HRZE/4HRE

- This regimen is for H & R sensitive TB cases and cases where the sensitivity pattern can not be established
- Treatment is given in two phases:**
 - Intensive phase consists of 8 weeks (56 doses) of isoniazid (H), rifampicin (R), pyrazinamide (Z) and ethambutol (E) given under direct observation in daily dosages as per weight band categories
 - Continuation phase consists of 16 weeks (112 doses) of isoniazid, rifampicin and ethambutol in daily dosages. Only pyrazinamide will be stopped in the continuation phase. The CP needs to be extended upto 24 weeks in certain forms of TB like CNS TB, Skeletal TB. In disseminated TB or slow response treating physician may extend on case to case basis.

Regimen for DS-TB	IP	CP
Drugs	2 HRZE	4 HRE
Doses	56	112

ADULT TB TREATMENT

Drug dosages for first-line anti- TB drugs		Special considerations for Adult TB Meningitis	Special considerations for Adult abdominal TB
Drugs	Doses		
Isoniazid (H)	5 mg/kg daily (4 to 6 mg/kg)	<ul style="list-style-type: none"> Intensive Phase: 2 months of RHZE or RHZS Continuation phase: 3 drugs-RHE for at least 10 months* STERIODS <ul style="list-style-type: none"> Preferably Dexamethasone 0.4 mg/kg/day intravenously in 3-4 divided doses during hospital stay If not feasible, give oral Dexamethasone 0.4 mg/kg/day in divided doses or oral Prednisolone 1 mg/kg/day in a single morning dose Discharge on oral steroids on tapering doses for total duration of 8-12 weeks Regular follow up is essential every month for at least first 3 months & can be increased thereafter till treatment is stopped Monitor liver function tests & any other features of drug toxicity Observe for clinical improvement or any deterioration Closely observe for development of any complications <p>*treatment duration may be increased in some cases as per the clinician decision</p>	<ul style="list-style-type: none"> Extend duration of treatment in cases of inadequate response Refer for surgical management for complications [intestinal obstruction (due to strictures), perforation] Consider endoscopic dilatation for treatment for accessible strictures Refer for biliary drainage in case of Jaundice due to biliary obstruction (hepatobiliary obstruction/pancreatic TB)
Rifampicin (R)	10 mg/kg daily (8 to 12 mg/kg)		
Pyrazinamide (Z)	25 mg/kg daily (20 to 30 mg/kg)		
Ethambutol (E)	15 mg/kg daily (12 to 18 mg/kg)		
Streptomycin (S)*	15 mg/kg daily (15 to 20 mg/kg)		
*Streptomycin is administered only in certain situations, like TB meningitis or if any first line drug need to be replaced due to ADR as per weight of the patient			
Pyridoxine may be given at a dosage of 10 mg per day			
Weight category	Number of tablets (FDCs)		Special considerations for intra-ocular TB
	Intensive Phase H: 75mg; R: 150 mg; Z: 400 mg; E: 275 mg)	Continuation Phase H: 75mg; R: 150 mg; E: 275 mg)	
25 to 34 kg	2	2	<ul style="list-style-type: none"> ATT : 2 months of RHEZ + 7 months of RH depending on clinical response & side effects to treatment Add pyridoxine 10 mg/day Corticosteroids : Topical steroids eye drops for severe/anterior chamber inflammation For treatment in children refer to paediatrician Systemic corticosteroids for severe inflammation in consultation with Uveitis expert
35 to 49 kg	3	3	
50 to 64 kg	4	4	
65 to 75 kg	5	5	
> 75 kg	6	6	
<ul style="list-style-type: none"> Fixed Dose Combinations (FDCs) refer to products containing two or more active ingredients in fixed doses, used for a particular indication(s) In NTEP, for Adults: 4-FDC (given in IP) consists of HRZE and 3-FDC (given in CP) consists of HRE During treatment if weight of the patient increases by > 5 kg and crosses the next weight band then patient should be given the next higher weight band FDC drugs 			

PAEDIATRIC TB TREATMENT

- Paediatric cases are to be treated under NTEP in daily dosages as per 6 weight band categories
- Children & adolescents up to 18 years of age weighing less than 39 kg, are to be treated using paediatric weight bands. Those weighing more than 39 kg to be treated with adult weight bands.

Available paediatric dispersible FDCs and loose drugs

- Dispersible FDC, flavoured**
 - Rifampicin 75 mg + Isoniazid 50 mg + Pyrazinamide 150 mg
 - Rifampicin 75 mg + Isoniazid 50 mg
- Dispersible Loose drugs**
 - Ethambutol 100 mg
 - Isoniazid 100 mg

Drug dosages for first-line anti- TB drugs	
Isoniazid (H)	7-15 mg/kg (maximum dose 300 mg/day)
Rifampicin (R)	10-20 mg/kg (maximum dose 600 mg/day)
Pyrazinamide (Z)	30-40 mg/kg (maximum 2000 mg/day)
Ethambutol (E)	15-25 mg/kg (maximum 1500 mg/day)

Weight Band	Number of tablets (dispersible FDCs)			
	Intensive phase		Continuation phase	
	HRZ	E	HR	E
4-7 kg	1	1	1	1
8-11 kg	2	2	2	2
12 -15 kg	3	3	3	3
16 -24 kg	4	4	4	4
25 -29 kg	3 + 1A *	3	3 + 1A *	3
30-39 kg	2 + 2A *	2	2 + 2A *	2

*A=Adult FDC (HRZE = 75/150/400/275; HRE = 75/150/275). It is added in higher weight band categories i.e. > 25 kg as these children may be able to swallow tablets

Pyridoxine may be given at a dosage of 10 mg per day

Special considerations for paediatric TB meningitis

ATT for paediatric TB Meningitis

- > 2 HRZE and 10 HRE (in appropriate doses)

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

Special considerations for paediatric osteoarticular TB

- Regimen** : 2HRZE + 10HRE
- Follow up every month during treatment & subsequently every 3 months: Potts spine with X-ray or MRI & Tubercular dactylitis or arthritis with plain X-ray

Special considerations for paediatric Abdominal TB

- Steroids- Not recommended
- Supportive treatment- Management of SAM/Malnutrition as per national guidelines
- Surgical treatment:
 - Acute intestinal obstruction, Bowel perforation
 - Persistence of obstructive symptoms despite conservative management & ATT
- DO NOT start Empirical ATT with isolated:
 - Recurrent/Chronic abdominal pain without danger signs
 - Chronic diarrhoea without proper evaluation

ABBREVIATIONS

ADR: Adverse drug reaction	DR-TB: Drug resistant Tuberculosis	H: Isoniazid	R: Rifampicin
ATT: Anti-Tubercular treatment	DS-TB: Drug sensitive Tuberculosis	IP: Intensive phase	S: Streptomycin
CNS: Central Nervous system	E: Ethambutol	MRI: Magnetic Resonance imaging TB: Tuberculosis	SAM: Severe acute malnutrition
CP: Continuation phase	FDC: Fixed dose combination	NTEP: National TB Elimination Programme	Z: Pyrazinamide

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Standard Treatment Workflow (STW) for the Management of PAEDIATRIC ABDOMINAL TUBERCULOSIS

ICD-10-A18.31

WHEN TO SUSPECT?

- Presence of Fever >2 weeks
 - Anorexia
 - Unexplained weight loss* or no weight gain in last 3 months
 - History of contact with TB patient
 - With one or more of following
 - Recurrent/chronic abdominal pain in presence of red flag signs
 - Abdominal distension/mass
 - Altered bowel habits
- *Constitutional symptoms may or may not be present in suspected case of Abdominal TB



CLINICAL FEATURES SPECIFIC TO TYPE OF ABDOMINAL TB

- #### PERITONEAL TB
- Abdominal pain, distension
 - Fever
 - Weight loss

- #### NODAL TB
- Pain abdomen
 - Fever
 - Palpable abdominal lump

- #### INTESTINAL TB
- Recurrent intestinal colic
 - Altered bowel habits
 - Chronic diarrhoea
 - Partial/complete intestinal obstruction
 - Weight loss, anorexia
 - Palpable abdominal lump
 - Lower gastrointestinal bleeding

VISCERAL TB (LIVER, SPLEEN, PANCREAS)

- Abdominal pain
- Fever
- Jaundice
- Weight loss
- Anorexia
- Hepatomegaly
- Splenomegaly
- Hepatic abscess
- Palpable abdominal lump
- Abnormal LFTs

EXAMINATION FINDINGS

- Anthropometry
- General physical & systemic examination
- Look for peripheral LAP, ascites, hepatosplenomegaly, doughy feel of abdomen, palpable abdominal lump, visible peristalsis

RED FLAGS

- Pain abdomen waking child from sleep
- Chronic, severe, or nocturnal diarrhea
- Gastrointestinal blood loss
- Localized distension or mass

INVESTIGATION

ESSENTIAL

- Ultrasound abdomen

SPECIFIC FINDINGS

- Abdominal LN : measuring >15 mm in short axis, conglomerate and/or central necrosis
- Omental/mesenteric thickening >15 mm with increased echogenicity
- Ileocaecal wall thickening

NON SPECIFIC FINDINGS

- Intraabdominal fluid (free or loculated) or Inter-loop ascites
- Ascitic fluid with multiple septations
- Abdominal LAP with SAD <15 mm in absence of red flag signs

- Chest X Ray
- sputum/GA/IS (If CXR abnormal) for NAAT, culture
- Ascitic fluid (If present) for cytology, protein & albumin
- Peripheral LN-FNA (If size >2 cm) for cytology, NAAT, culture

Ascites

Essential

- If exudative ascites, ascitic fluid for NAAT, culture
- No role of ADA

Enlarged Abdominal LN (SAD>15 mm)

Desirable

- USG guided Abdominal LN-FNA for cytology, NAAT, culture

Optional

- USG/CT guided biopsy of LN for histology, NAAT, culture

Intestinal involvement

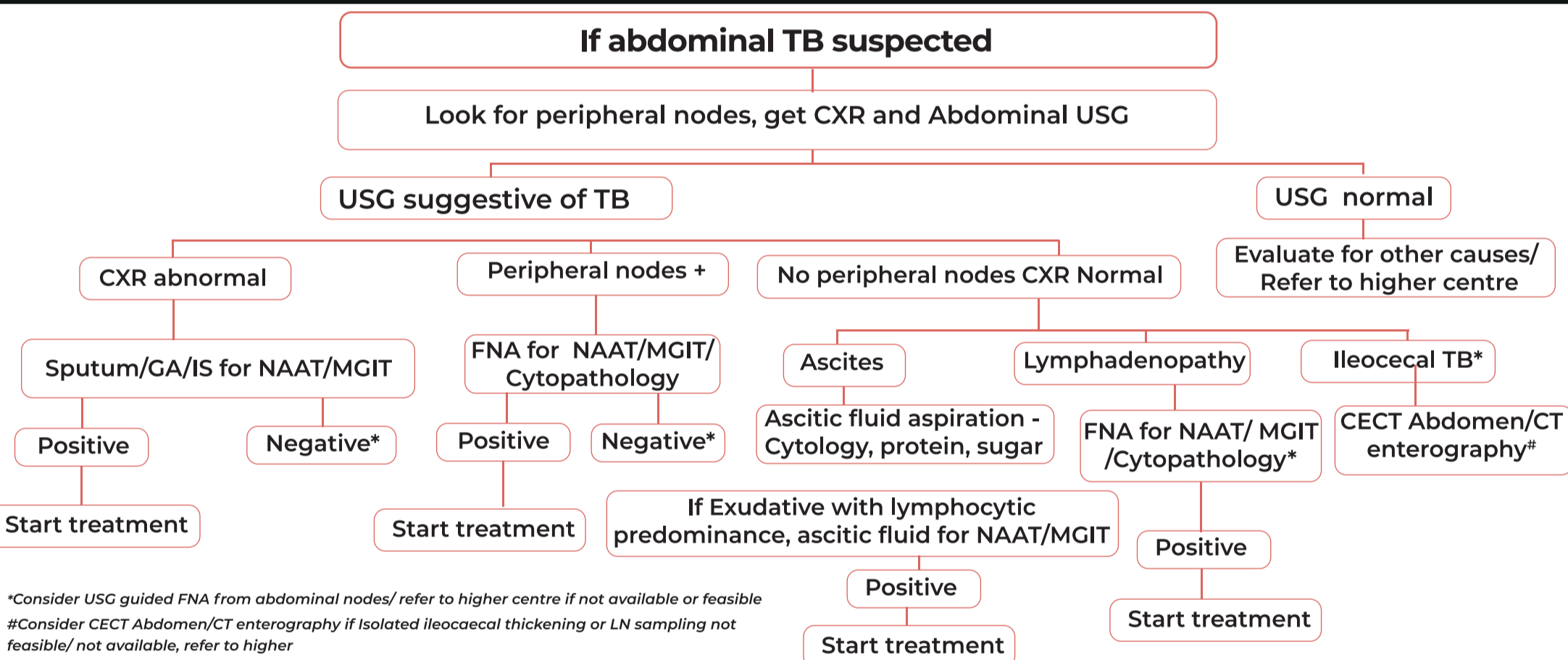
Desirable

- If Ileocaecal thickening with enlarged nearby LN
- USG guided Abdominal LN-FNA for cytology, NAAT, culture
- Isolated ileocaecal thickening/LN sampling not feasible
- CECT Abdomen/CT enterography

Optional

- Ileocolonoscopy, tissue biopsy (HPE, NAAT, culture)
- Laparoscopy, tissue biopsy for HPE, NAAT, culture

DIAGNOSIS ALGORITHM



*Consider USG guided FNA from abdominal nodes/ refer to higher centre if not available or feasible
#Consider CECT Abdomen/CT enterography if Isolated ileocaecal thickening or LN sampling not feasible/ not available, refer to higher

MANAGEMENT

TREATMENT

- Start treatment & follow-up as per NTEP
- ATT for 6 months (2HRZE + 4HRE)
- Pyridoxine supplementation- 10 mg/day
- Steroids- not useful & not recommended
- Supportive treatment- Management of SAM/Malnutrition as per national guidelines
- Surgical treatment:
 - Acute intestinal obstruction, Bowel perforation
 - Persistence of obstructive symptoms despite conservative management & ATT
- DO NOT start Empirical ATT with isolated:
 - Recurrent/Chronic abdominal pain without red flag signs
 - Chronic diarrhoea without proper evaluation

MONITORING

- Assessment of response to treatment:**
 - Clinical follow up - every month during treatment & after that every 3 months
 - Radiologically by USG - At the end of treatment or if worsening or non response to treatment
 - Microbiological - If worsening or non response to treatment
- Pointers towards DR TB investigation:**
 - Non response to treatment or Worsening or deterioration of constitutional symptoms after initial improvement
 - Obstructive symptoms may persist or worsen despite treatment with ATT
- Monitor for**
 - Adherence to treatment (ATT)
 - Adverse drug reactions- ATT induced

WHEN TO REFER?

- Diagnosis is uncertain & additional investigations are required
- Acute intestinal obstruction or bowel perforation
- DR TB
- No response to appropriate treatment
- Oral drug (ATT) intolerance/cannot be given

ABBREVIATIONS

ATT- Antitubercular treatment	E- Ethambutol	IS- Induced Sputum	R- Rifampicin
CECT- Contrast Enhanced Computed Tomography	FNA- Fine Needle Aspiration	LAP: Lymphadenopathy	SAD- Sagittal Abdominal Diameter
CT- Computed Tomography	GA- Gastric Aspirate	LN- Lymph Node	SAM- Severe Acute Malnutrition
CXR- Chest X-Ray	H- Isoniazid	MGIT- Mycobacteria Growth Indicator Tube	USG- Ultrasonography
DR-TB- Drug Resistant tuberculosis	HPE- Histopathological Examination	NAAT- Nucleic Acid Amplification Test	Z- Pyrazinamide

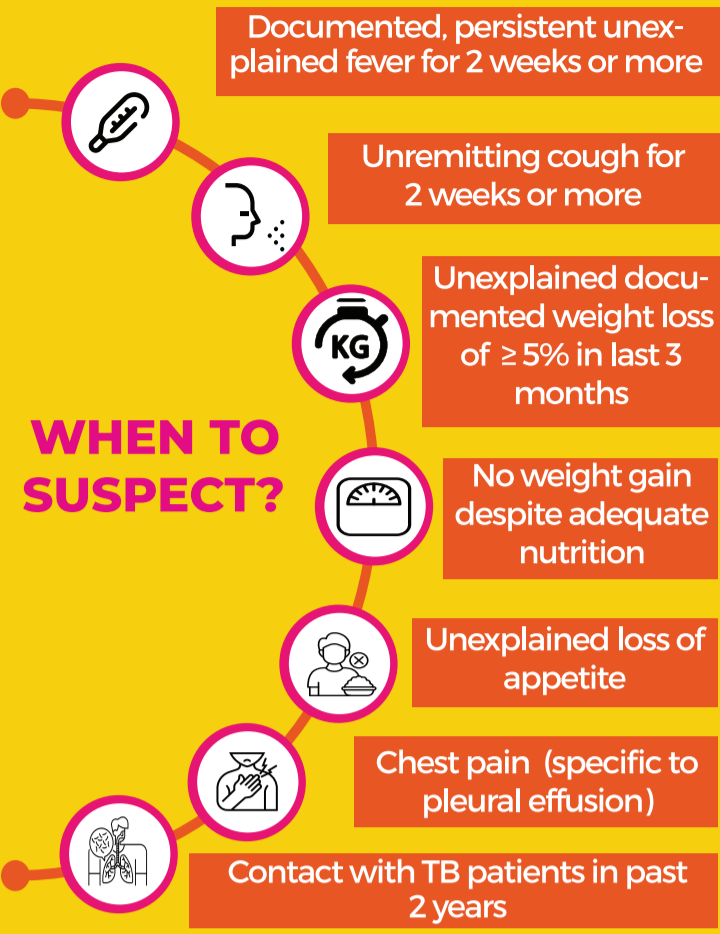
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Standard Treatment Workflow (STW) for the Management of PAEDIATRIC INTRATHORACIC TUBERCULOSIS (PULMONARY, PLEURAL, MEDIASTINAL) ICD-10-A15



EXAMINATION

- Temperature, Weight, Mid Arm Circumference (MAC), Lymphadenopathy, cold abscess, discharging sinus
- Chest examination findings depend upon underlying pathology like consolidation, pleural effusion etc.

INVESTIGATIONS

Essential

- Chest x-ray
 - TB suggestive: Hilar/ paratracheal lymph nodes, fibrocavitary disease, Miliary pattern
 - Non Specific : effusion, consolidation, bronchopneumonia, other shadows etc.
- Sputum/Induced Sputum/Gastric Lavage/Aspirate /pleural fluid for NAAT
- Smear examination (if NAAT unavailable)
- If facilities exist, send aliquot of sample for culture, if NAAT negative for MTB
- Pleural tap*: Gross, Cytology, Biochemistry, NAAT, MGIT/LJ, ZN if NAAT not available

*If can't be done at primary level then refer

Desirable

- Chest x-ray of family members

Optional (to be done in institutions)

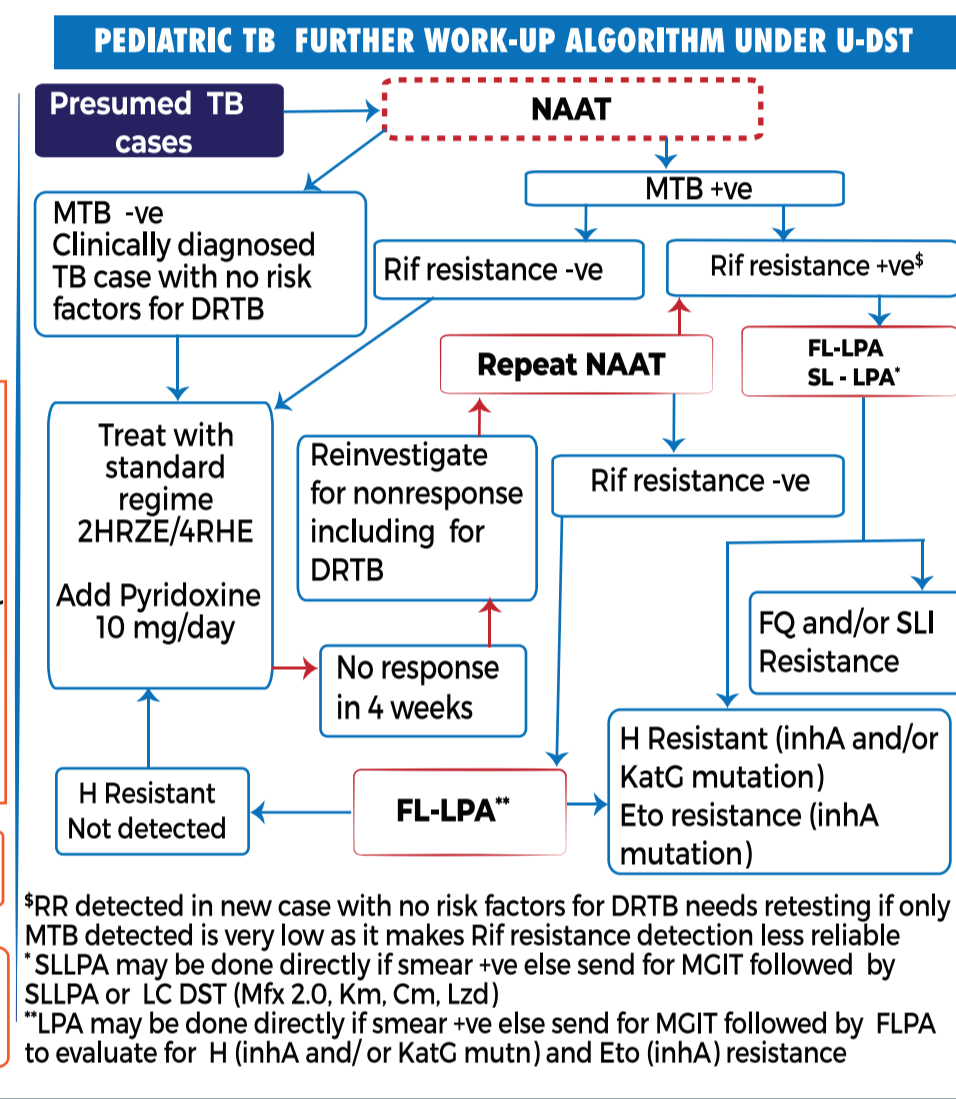
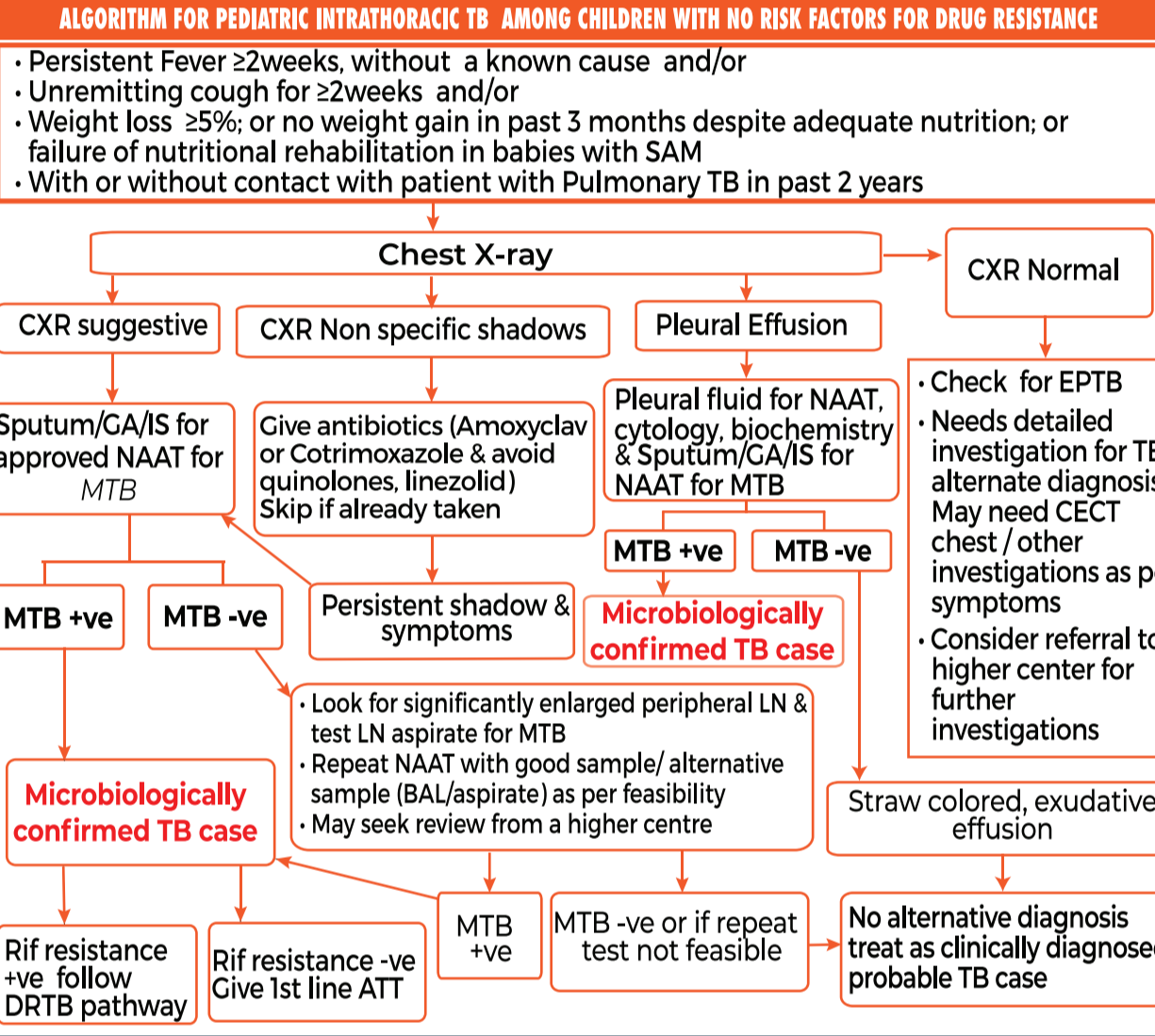
- Pleural Biopsy (caseating granulomas with Langerhans giant cells, epithelioid cells & lymphocytes)
- Image guided (USG/CT) mediastinal LN biopsy
- CECT scan
- Bronchoscopy & BAL

DO NOT DO

- TST/Mantoux test
- Overemphasized, supportive only
- Not to diagnose TB or to start ATT on basis of +ve TST ONLY
- Serological tests- IGRA (Quantiferon/Quantiferon-Gold etc)
- Pleural fluid ADA

Do HIV testing for all cases with TB

DIAGNOSTIC ALGORITHM



TREATMENT

TYPE OF PATIENTS	TB TREATMENT REGIMENS
Microbiologically confirmed RS Pulmonary TB	2HRZE + 4HRE
Clinically diagnosed Pulmonary TB	
Drug sensitive previously treated TB (recurrent, failure, treatment after default)	

***DR TB algorithm-DST**

DRUG	DOSE
ISONIAZID (H)	7-15 mg/kg (maximum dose 300mg/day)
RIFAMPICIN (R)	10-20 mg/kg (maximum dose 600mg/day)
PYRAZINAMIDE (Z)	30-40 mg/kg (maximum 2000mg/day)
ETHAMBUTOL (E)	15-25 mg/kg (maximum 1500mg/day)

WEIGHT BAND	Number of tablets (dispersible FDCs)			
	Intensive phase		Continuation	
	HRZ 50/75/15	E 100	HR 50/75	E 100
4-7 kg	1	1	1	1
8-11 kg	2	2	2	2
12-15 kg	3	3	3	3
16-24 kg	4	4	4	4
25-29 kg	3 + 1A*	3	3 + 1A*	3
30-39 kg	2 + 2A*	2	2 + 2A*	2

*A=Adult FDC (HRZE = 75/150/400/275; HRE = 75/150/275)

- Consider steroids in miliary TB with hypoxia, Endobronchial TB, disseminated TB
- Prednisone dose 2 mg/kg daily or Dexamethasone 0.6 mg/kg/day for 4 weeks
- Reduce dose gradually over next 4 weeks before stopping
- Pyridoxine 10 mg/day for 6 months
- Nutritional support
- Treat co-morbid conditions: HIV, SAM

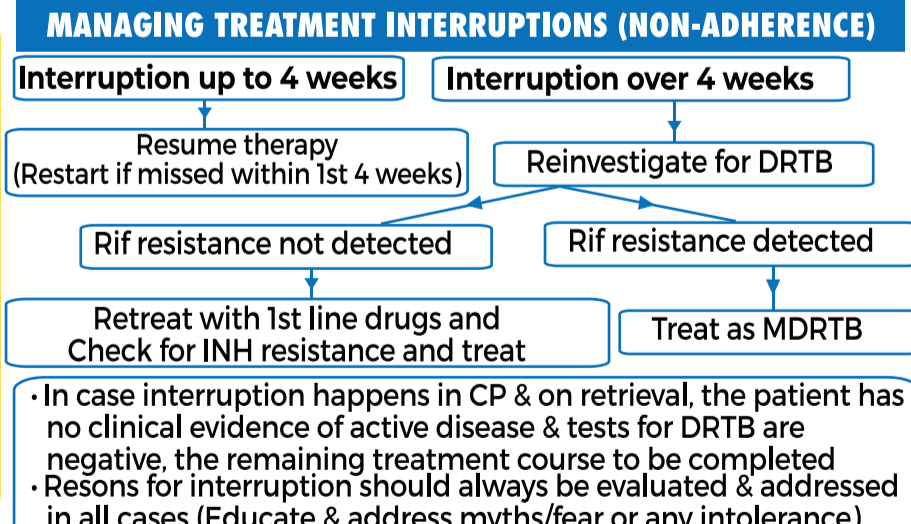
MONITORING

When to assess

- 15th day: For adherence, correct dose, combination & tolerance to drugs
- Then every month till completion of treatment

What to assess

- Appropriateness of therapy:
 - Correct combination, acceptance/tolerance
 - Counsel about need to complete & not miss on doses (Inform, if doses are missed)
- Response to therapy:
 - Clinical (symptoms, adverse effects, weight, dose revision)
 - X-ray at end of therapy
 - Do X-ray for worsening at any time OR slow resolution OR persistent symptoms at end of IP
 - NAAT is not appropriate follow up tool for monitoring progress of disease
 - Smear examination at end of treatment (to declare outcome)
 - Repeat microbiological test (smear, MGIT, NAAT) at end of IP & at end of therapy, if still symptomatic or any deterioration/failure to respond
- After treatment completion, follow up patients clinically at end of 6, 12, 18 & 24 months



ABBREVIATIONS

ADA: Adenosine Deaminase	DRTB: Drug resistant TB	FQ: Fluoroquinolones	IS: Induced sputum	RIF: Rifampicin
BAL: Broncho-alveolar lavage	DST: Drug sensitivity test	GA: Gastric aspirate	LN: Lymph node	SAM: Severe acute malnutrition
CBNAAT: Cartridge-based Nucleic Acid Amplification test	EPTB: Extra-pulmonary TB	H: Isoniazid	MAC: Mid Arm Circumference	SLI: Second line injectables
CECT: Contrast enhanced CT	ETO: Ethionamide	HIV: Human Immunodeficiency virus	MTB: Mycobacterium Tuberculosis	SL-LPA: Second line - Line probe assay
CP: Continuation phase	FDC: Fixed dose combination	HRZE: Isoniazid; Rifampicin; Pyrazinamide; Ethambutol	NAAT: Nucleic acid amplification test	TST: Tuberculin skin test
CT: Computed tomography	FL-LPA: First line - Line probe assay	IGRA: Interferon Gamma Release assay	PPD: Purified Protein Derivative	USG: Ultrasonography
				ZN: Ziehl Neelson

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Standard Treatment Workflow (STW) for the Management of PAEDIATRIC LYMPH NODE TUBERCULOSIS

ICD-10-A18.2



WHEN TO SUSPECT?

- Persistent enlargement of lymph node for >2 weeks in one or more areas in cervical/axillary/inguinal regions
 - > 2 cm size or matted lymph nodes ± chronic sinus
- With/without associated systemic symptoms: fever, cough, poor appetite, weight loss
- With no evidence of recent scalp/skin lesions of draining area



TB is unlikely if: the lymphnode are few, small (< 2 cm) and may be persisting for a long time (months to years) without any systemic symptoms

INVESTIGATIONS

Essential

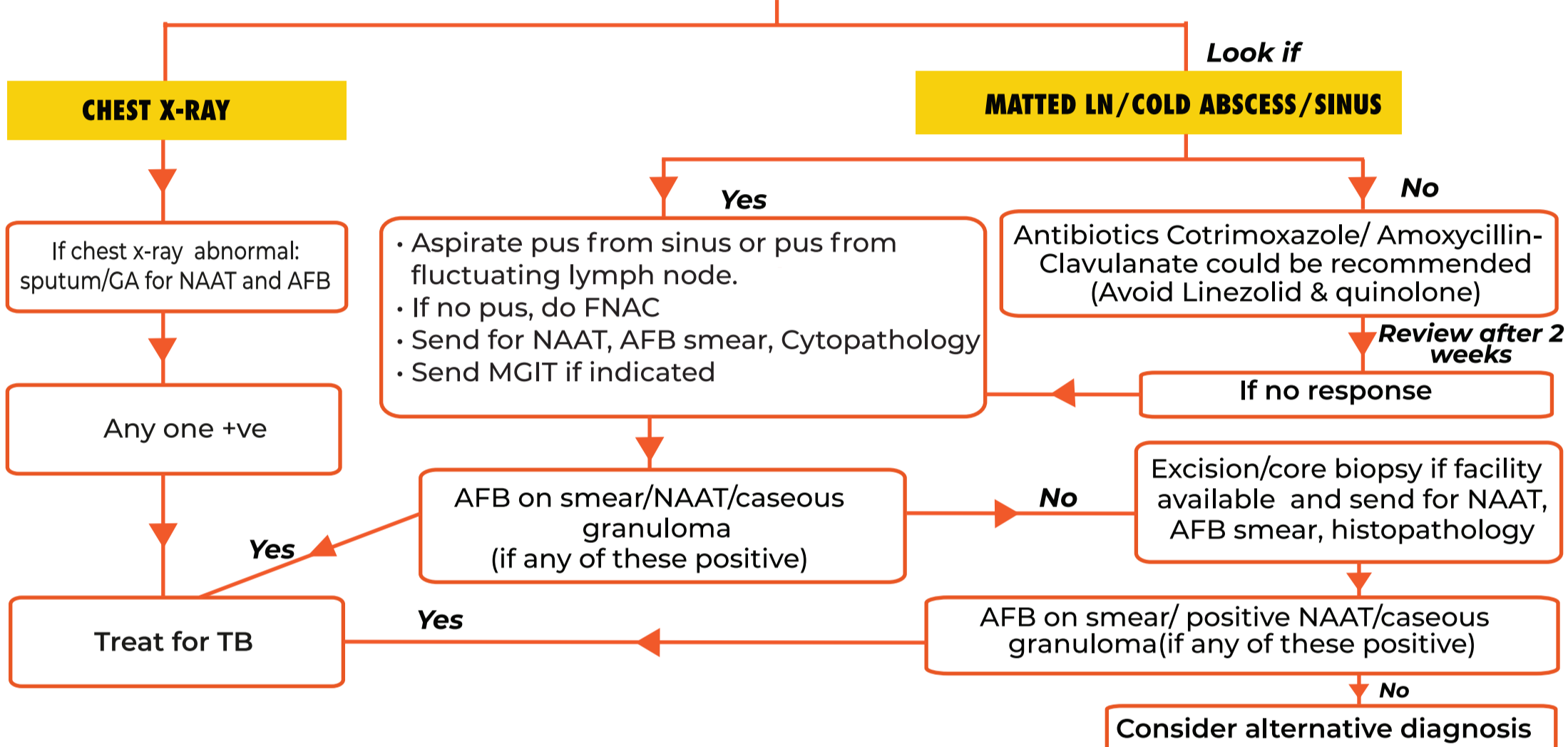
- Lymphnode aspirate:
 - Send for NAAT (+/- MGIT)
 - Smear for AFB
 - Cytopathology

Desirable

- Lymphnode cytopathology (If NAAT and smear negative)
- Lymphnode Biopsy (Core/Excision)
- Chest X-ray
- Hemogram with peripheral smear

DIAGNOSTIC

Peripheral Lymph node > 2cm in one or more sites



TREATMENT AND MANAGEMENT

TREATMENT AND RESPONSE

- Treatment should be started and follow-up should be conducted as per NTEP guidelines
- 2 HRZE + 4 HRE (standard doses)
- Disappearance of constitutional symptoms with decrement or no increment in lymph node size suggests response to treatment
- Increment in lymph node size with disappearance of constitutional symptoms may suggest paradoxical reaction, provided drug resistance has been ruled out
- Increment in lymph node size without disappearance of constitutional symptoms suggests drug resistant TB/ alternate cause



- Do not treat for TB based on only positive mantoux test or FNAC suggestive of reactive lymph node with negative NAAT/AFB on smear
- Children with disappearance of constitutional symptoms with no increase in lymphnode size at the end of 6 months therapy, can be kept in follow-up

WHEN TO REFER TO AN EXPERT?

- Diagnosis is not established with FNAC/NAAT
- Surgical facility is not available to do excision or core biopsy
- DR is suspected due to any reason including non-response and the facility for DRTB testing are not available
- If there is any pointer towards possible malignancy e.g. skin or mucosal bleed or significant pallor or generalised adenopathy irrespective of the size or associated hepato-splenomegaly

BCG LYMPHADENITIS

- Age is usually < 2 years
- Axillary and or supraclavicular lymphnode on the same side as BCG vaccination (usually given on the left)
- No systemic symptoms in immunocompetent children
- Treatment:
 - Wait and watch if small
 - If large and suppurative, repeated aspiration or rarely incision and drainage is required

*NAAT or AFB smear positivity can not differentiate between BCG and MTB

ABBREVIATIONS

AFB: Acid fast bacillus

BCG: Bacille Calmette Guerin vaccine

DR: Drug resistant

FNAC: Fine needle aspiration cytology

HRZE: Isoniazid; Rifampicin; Pyrazinamide; Ethambutol

MGIT: Mycobacteria Growth Indicator Tube

NAAT: Nucleic acid amplification test

NTEP: National TB Elimination Programmet

TB: Tuberculosis

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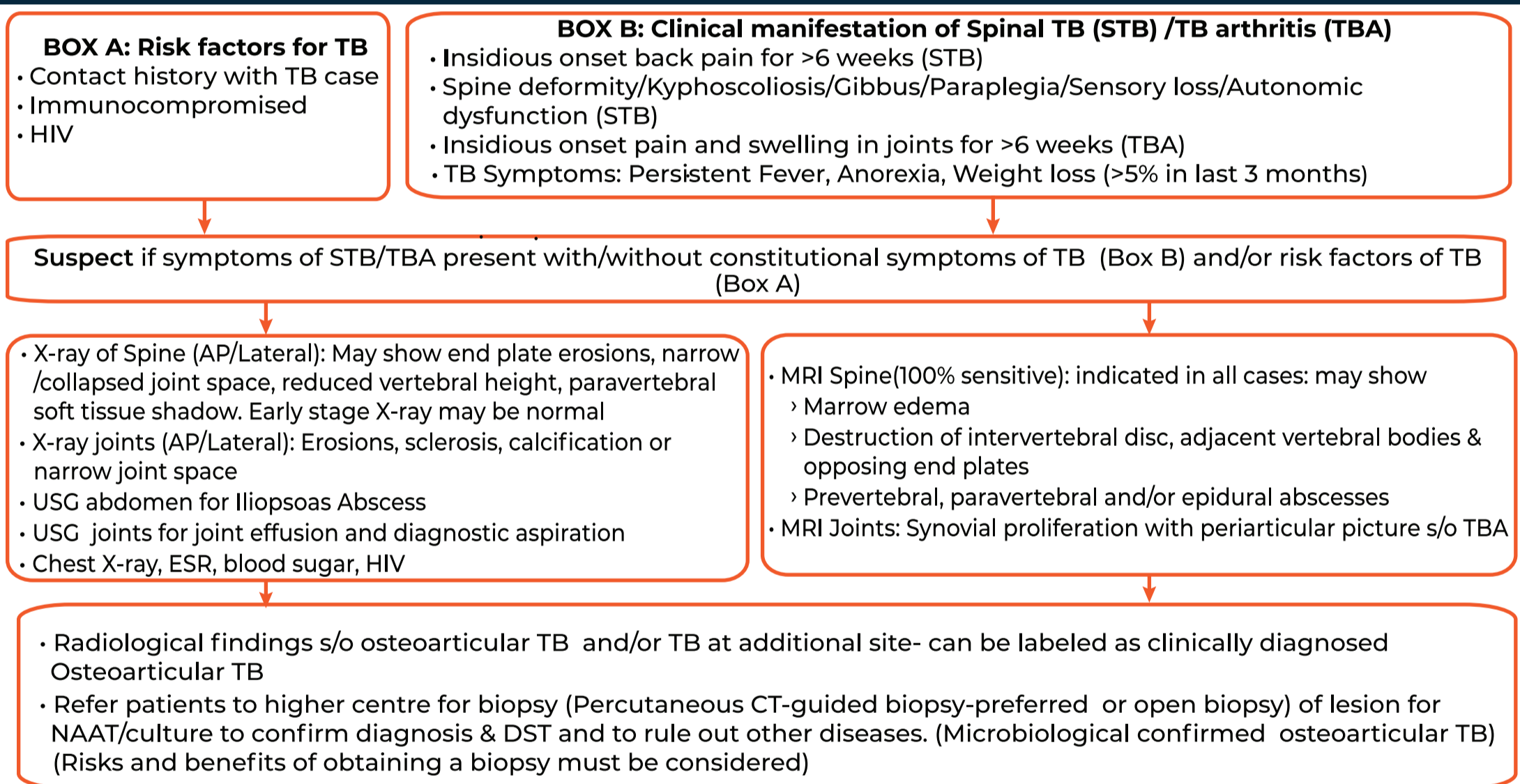
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Standard Treatment Workflow (STW) for the Management of PAEDIATRIC OSTEOARTICULAR TUBERCULOSIS ICD-10-18.0

	POTT'S SPINE (COMMONEST, 50% OF OSTEOARTICULAR TB)	DACTYLITIS (SHORT BONES)	ARTHRITIS (LARGE JOINTS-HIP /KNEE COMMONEST)
WHEN TO SUSPECT	<ul style="list-style-type: none"> Insidious onset back pain for >6 weeks (Commonest thoracic > lumbar >cervical) Localized/Referred root pain TB Symptoms: Fever/anorexia/weight loss CNS complications like Paraparesis (20-50%), cauda equina syndrome, paraspinal muscle wasting, severe pain Examination: Local tenderness/deformity 	<ul style="list-style-type: none"> Swelling of short tubular bones of hands & feet (Proximal phalanx or metacarpals of index/middle/ring fingers are commonly affected) In children multiple or consecutive bones are involved, compared to a single bone in adults May present without pyrexia or signs of inflammation 	<ul style="list-style-type: none"> Insidious onset joint pain, swelling Monoarticular arthritis Commonly associated with pulmonary or lymph node TB
INVESTIGATION	<p>ESSENTIAL</p> <ul style="list-style-type: none"> X-ray Spine <ul style="list-style-type: none"> In early stage X-ray may be normal May show end plate erosions, joint space narrowing/collapse, decreased vertebral height, paravertebral soft tissue shadow MRI Spine preferred if not feasible do CT <ul style="list-style-type: none"> Marrow edema Destruction of intervertebral disc, adjacent vertebral bodies & opposing end plates Pre/para vertebral or epidural abscess Sputum/GA for NAAT, MGIT/LJ (if CXR abnormal) FNAC (if peripheral lymphnodes enlarged) for Cytology, NAAT & MGIT/LJ <p>DESIRABLE</p> <ul style="list-style-type: none"> Image guided (USG/CT) aspiration of abscess (if feasible) for NAAT & MGIT/LJ. (No need of biopsy) 	<p>ESSENTIAL</p> <ul style="list-style-type: none"> Plain X-ray of involved parts <ul style="list-style-type: none"> Diaphyseal expansile lesion Periosteal reaction is uncommon Healing is by sclerosis (usually gradual) X-ray film of chest <ul style="list-style-type: none"> Sputum/GA for NAAT & MGIT/LJ, if CXR abnormal FNAC (if peripheral lymphnodes enlarged) for Cytology, NAAT & MGIT/LJ <p>DESIRABLE</p> <ul style="list-style-type: none"> Image guided (USG/CT) aspirate from involved bones for NAAT & MGIT/LJ. (No need of biopsy) 	<p>ESSENTIAL</p> <ul style="list-style-type: none"> Plain X-ray: A triad of X-ray abnormalities (Phemister's triad) includes <ul style="list-style-type: none"> Peri-articular osteoporosis Peripherally located osseous erosion Gradual joint space narrowing Early stage synovitis & arthritis imaging may show wide joint space due to effusion Bony ankylosis development is rare in TB arthritis in contrast to Pyogenic arthritis USG/ MRI of joint X-ray film of chest Sputum/GA for NAAT, MGIT (if CXR abnormal) FNAC (if peripheral lymphnodes enlarged) for Cytology, NAAT & MGIT/LJ <p>DESIRABLE</p> <ul style="list-style-type: none"> Image guided (USG/CT) aspirate from joint fluid for NAAT & MGIT/LJ. (No need of biopsy)

DIAGNOSTIC ALGORITHM



MANAGEMENT

TREATMENT & MONITORING

- Start treatment for microbiologically /Lab confirmed TB and probable TB
- Regimen : 2HRZE + 10HRE (Standard doses)+ Pyridoxine 10 mg/day
- Follow up every month during treatment & subsequently every 3 months: Pott's spine with X-ray or MRI & Tubercular dactylitis or arthritis with plain X-ray
- Monitor on each visit :
 - Symptomatic improvement, weight gain, side effects of medicines
 - Microbiology : sputum/GA if CXR abnormal at end of IP. Site samples like aspiration of pus from lesions including psoas abscess (if worsening of symptoms/poor response)
- Imaging: MRI/CT/X ray of affected parts: at end of treatment or early if worsening

Surgical Indications in Potts Spine

- Progressive neurological deficit
- Paraplegia of recent onset or severe paraplegia
- Persistent pain with spinal instability
- Spinal deformity-severe kyphotic deformity at presentation, or in children (<10 years of age) at high risk of progression of kyphosis with growth after healing of disease

WHEN TO REFER

- Suspected osteoarticular disease if essential investigations are not available
- Diagnosis (microbiological or probable) not established by investigations
- Surgery needed: imaging suggest compressive myelopathy, motor deficits
- No improvement with appropriate treatment
- DR TB : diagnosed or high suspicion

Confirm microbiologically in all cases, if possible, before ATT

OTHER INFORMATION

- In case of synovial fluid or cold abscess aspiration (against gravity), send samples for confirmation of TB in following 3 ways
 - Two dry slide for demonstration of AFB (ZN staining)
 - Two samples in formalin for histopathological examination
 - Two samples in saline for culture followed by DST and/or NAAT
- Confirmed cases to undergo HIV/blood sugar testing/parent counselling *MGIT/LJ (if MGIT not available)

ABBREVIATIONS

AFB: Acid fast bacillus	DST: Drug Sensitivity Test	HRZE: Isoniazid; Rifampicin; Pyrazinamide; Ethambutol	NAAT: Nucleic Acid Amplification Test
AP: Antero-Posterior	ESR: Erythrocyte Sedimentation Rate	IP: Intensive Phase	s/o: Suggestive of
CT: Computed Tomography	FNAC: Fine Needle Aspiration Cytology	LJ: Lowenstein Jensen	STB: Spinal TB
CXR: Chest X-ray	GA: Gastric Aspirate	MGIT: Mycobacteria Growth Indicator Tube	TBA: TB Arthritis
DR: Drug Resistant TB	HIV: Human Immunodeficiency Virus	MRI: Magnetic Resonance Imaging	USG: Ultrasonography
			ZN: Ziehl Neelson

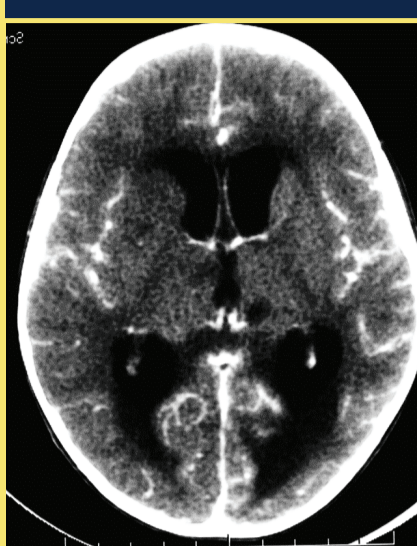
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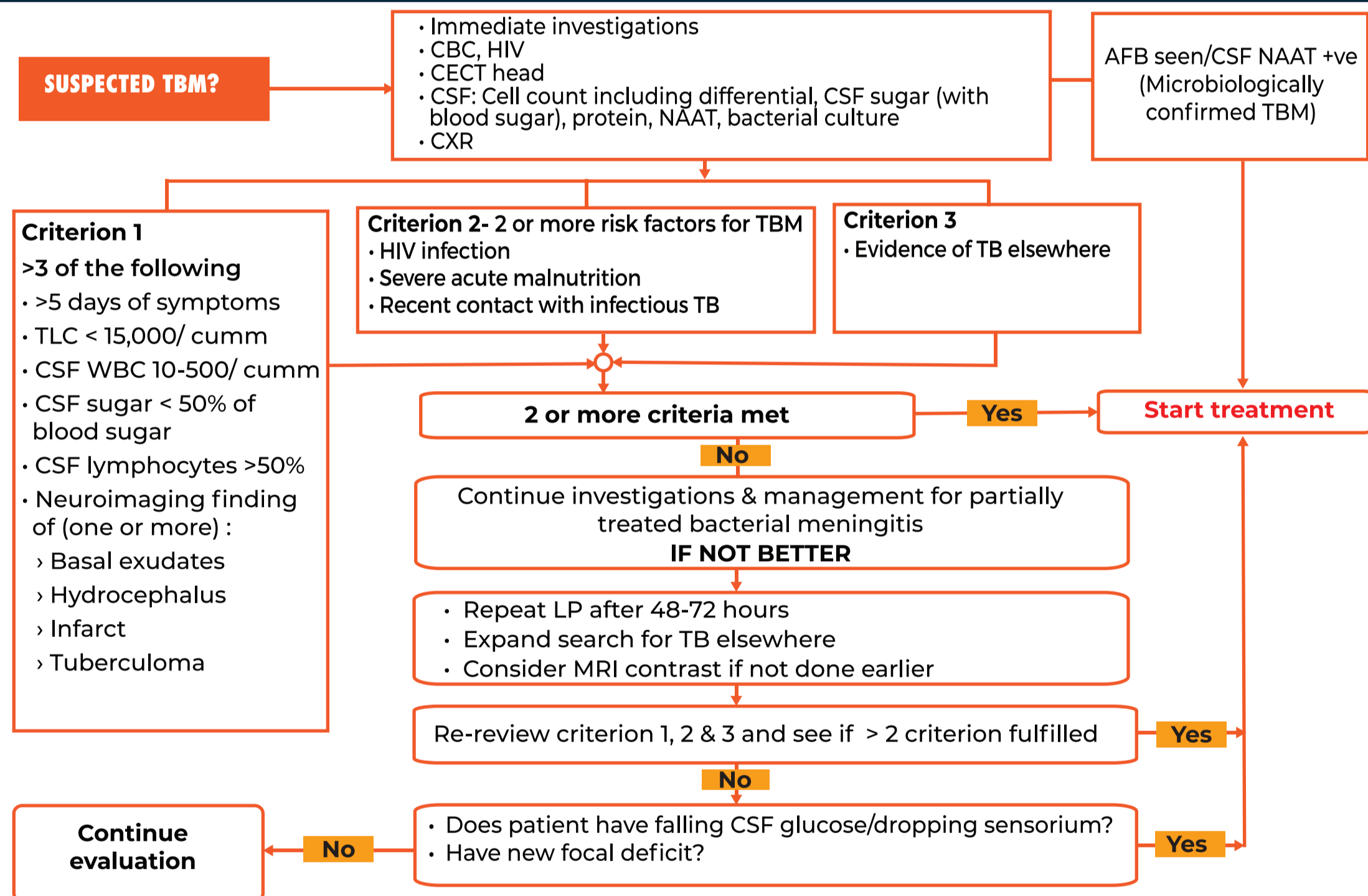
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Standard Treatment Workflow (STW) for the Management of PAEDIATRIC TUBERCULAR MENINGITIS ICD-10-A17.0

WHEN TO SUSPECT?	EXAMINATION	INVESTIGATIONS	NEUROIMAGING IN TB
<ul style="list-style-type: none"> Fever with one or more of the following <ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Assessment of sensorium* Full/bulging anterior fontanelle Meningeal irritation- Neck stiffness, Kernig's sign & Brudzinski's sign Examine eye, if feasible for papilloedema/ choroid tubercles/ optic atrophy Cranial nerves Motor system including power, reflexes & plantar responses Peripheral lymph nodes Chest examination for signs of pulmonary involvement <p><i>*Use any standardized scale including Glasgow Coma scale/ AVPU scale</i></p>	<p>Essential</p> <ul style="list-style-type: none"> CBC CSF examination <ul style="list-style-type: none"> 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 <p><i>*ICMR/NTEP approved NAAT test, use 3-5 ml CSF if possible</i></p> <p>Desirable</p> <ul style="list-style-type: none"> MRI brain with contrast when CECT is not contributory <p>Optional</p> <ul style="list-style-type: none"> CSF cryptococcal antigen Contrast CT chest/abdomen to look for extracranial sites of infection 	 <p>CECT showing</p> <ul style="list-style-type: none"> Hydrocephalus (ventricular dilatation) Thick basal exudates Tuberculoma

DIAGNOSTIC ALGORITHM



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

REFERRAL

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

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