CONDITION

Tuberculous meningitis

Tuberculous meningitis is a serious infection that causes inflammation around the brain and spinal cord.

WHAT IT IS
Tuberculosis infection of the brain and spinal cord coverings

BODY SYSTEM
Nervous system

MAIN SYMPTOMS
Headache, fever, vomiting, confusion

WHAT CAUSES IT
Infection with Mycobacterium tuberculosis bacteria

HOW IT IS DIAGNOSED
Tuberculosis tests on spinal fluid, supported by brain imaging

MAIN TREATMENT
Several anti-tuberculosis medicines plus corticosteroids

CAN IT BE CURED?
Yes - effective treatment can clear infection

IS IT AN EMERGENCY?
Yes - suspected symptoms need immediate hospital assessment

LONG-TERM OUTLOOK
Early treatment improves survival; lasting disability is possible

Overview

Tuberculous meningitis, often called TB meningitis or TBM, is an infection of the meninges. These are the thin layers of tissue covering the brain and spinal cord. It is caused by the same bacteria that cause tuberculosis, or TB.

The infection usually begins elsewhere in the body, most often in the lungs. Bacteria can then travel through the bloodstream and reach the brain. This may happen during a new TB infection or when a previously inactive infection becomes active again.

Inflammation can affect the brain, its blood vessels, and the flow of cerebrospinal fluid. This clear fluid surrounds and protects the brain and spinal cord. Swelling or blocked fluid flow can raise pressure inside the skull.

TB meningitis is a medical emergency. Symptoms often develop more gradually than those of some other forms of meningitis, but delaying treatment can increase the risk of brain injury, disability, or death. Treatment is usually started in hospital as soon as the condition is strongly suspected, sometimes before every test result is available.

Symptoms

Symptoms often build over several days or weeks. Early symptoms may resemble a common infection and can be easy to overlook.

Possible symptoms include:

Neck stiffness may be mild or absent, so its absence does not rule out meningitis.

Babies and young children may have less specific symptoms. These can include poor feeding, vomiting, unusual irritability, reduced alertness, a high-pitched cry, seizures, or a bulging soft spot on the head. Children may stop meeting developmental milestones or lose skills they had gained.

Symptoms may be accompanied by signs of TB elsewhere, such as a long-lasting cough, weight loss, swollen lymph nodes, or night sweats. However, some people with TB meningitis have no obvious lung symptoms.

- A persistent or worsening headache
- Fever, night sweats, or feeling unusually tired
- Nausea, vomiting, or poor appetite
- Neck pain or stiffness
- Sensitivity to bright light
- Irritability, personality changes, or unusual behaviour
- Confusion, difficulty concentrating, or increasing sleepiness
- Weakness or reduced movement on one side of the body
- Problems speaking, walking, seeing, or hearing
- Seizures
- Loss of consciousness

Causes and risk factors

TB meningitis is caused by Mycobacterium tuberculosis . These bacteria spread mainly through the air when someone with infectious TB of the lungs or throat coughs, speaks, or sings.

After entering the body, the bacteria may remain inactive for months or years. This is called latent TB infection. Latent TB causes no symptoms and is not contagious, but it can later become active.

TB meningitis is more likely when the body has difficulty controlling TB bacteria. Factors associated with a higher risk include:

TB meningitis itself is not usually what makes someone contagious. However, a person may also have infectious TB in the lungs. The hospital may use isolation precautions until lung TB has been assessed.

This condition is not inherited. Family members may share exposure to TB, but the infection is not passed through genes.

- Recent exposure to someone with infectious TB
- Untreated latent TB infection
- HIV infection, especially when the immune system is weakened
- Medicines or conditions that suppress the immune system
- Very young age, particularly in children exposed to TB
- Poor nutrition
- Living in or travelling from an area where TB is common

Diagnosis

Diagnosis takes place urgently in hospital. The medical team will ask about symptoms, possible TB exposure, travel or residence history, immune system conditions, and previous TB testing or treatment. A neurological examination checks alertness, movement, reflexes, vision, and other brain functions.

A lumbar puncture, sometimes called a spinal tap, is a key test. A needle is placed into the lower back to collect cerebrospinal fluid. The fluid can be checked for inflammation and tested for TB bacteria using:

Culture can confirm the infection, but results may take several weeks. Molecular tests are faster and may identify resistance to certain medicines. No spinal-fluid test finds every case, so a negative result does not always exclude TB meningitis.

A CT or MRI scan of the brain may show swelling, small strokes, collections of infected tissue called tuberculomas, or hydrocephalus. Hydrocephalus is a build-up of cerebrospinal fluid that raises pressure around the brain. Imaging may be needed before a lumbar puncture if raised pressure or a mass is suspected.

Other tests may include chest imaging, sputum testing, blood tests, and samples from another possible site of TB. HIV testing is usually offered because it affects treatment planning and follow-up.

Because waiting for confirmation can be dangerous, treatment may begin when the overall evidence strongly suggests TB meningitis.

- Molecular tests that look for TB genetic material
- Culture, which grows the bacteria and tests which medicines can kill them
- Microscopy to look for acid-fast bacteria

Treatment and management

Treatment uses several anti-tuberculosis medicines together. Combining medicines reduces the chance that bacteria will survive and become drug-resistant. Treatment continues for many months and is generally longer than treatment for uncomplicated lung TB.

The exact combination and length of treatment are based on factors such as age, test results, previous TB treatment, medicine resistance, other health conditions, and local guidance. Drug-resistant TB meningitis requires specialist treatment with medicines selected for the resistance pattern and their ability to reach the brain.

A corticosteroid, such as dexamethasone or prednisolone, is commonly given for a limited period. Corticosteroids like prednisone or hydrocortisone reduce damaging inflammation around the brain. They are gradually reduced rather than stopped suddenly when used over a longer course.

Hospital care may also include:

Anti-tuberculosis medicines can affect the liver, vision, nerves, or other body systems. Blood tests and symptom checks help identify problems early. Some medicines also interact with birth control, blood thinners like warfarin or apixaban , seizure medicines, HIV treatment, and other drugs.

If you also have HIV, TB and HIV specialists will coordinate both treatments. The timing of HIV treatment needs careful planning because starting it too early during TB meningitis can sometimes cause intense immune inflammation.

Taking every dose for the full treatment course is important, even after symptoms improve. Support may include reminder systems, supervised treatment, community nursing, or help with transport and medicine access.

- Treatment to control raised pressure around the brain
- A temporary drain or permanent shunt for hydrocephalus
- Medicines for seizures
- Fluids and nutritional support
- Physical, speech, or occupational rehabilitation
- Treatment for TB elsewhere in the body

Complications

TB meningitis can cause complications during the initial illness or leave lasting effects after the infection has been controlled.

Possible complications include:

Some people worsen after starting effective treatment because the recovering immune system produces more inflammation. This is called a paradoxical reaction. It may cause enlarging tuberculomas, new symptoms, or worsening scans without meaning that the bacteria have become resistant. Medical assessment is still essential because medicine resistance, missed doses, and other complications can cause similar changes.

- Hydrocephalus and raised pressure inside the skull
- Stroke caused by inflammation of brain blood vessels
- Seizures or epilepsy
- Hearing or vision loss
- Weakness, poor balance, or movement difficulties
- Problems with memory, concentration, learning, or behaviour
- Speech or swallowing difficulties
- Hormone or salt-balance problems caused by brain inflammation
- Coma or death

Prevention

TB meningitis cannot always be prevented. Prevention focuses on stopping TB infection or treating it before bacteria reach the nervous system.

Important measures include early diagnosis and effective treatment of infectious lung TB. Contact tracing helps identify household members and other close contacts who may need testing. People with latent TB may be offered preventive treatment after active TB has been excluded.

Good ventilation and appropriate masks can reduce airborne spread in places where someone has infectious lung TB. Hospitals may use specialised rooms and respirators.

The BCG vaccine can help protect young children from severe forms of TB, including TB meningitis, but it does not give complete protection. Vaccination policies differ between countries and are based on local TB risk.

There is no inherited tendency that can be removed through lifestyle changes. General health measures cannot replace TB testing, preventive treatment, or vaccination when these are recommended.

Living with it and what to expect

Recovery is often slow. The infection may begin to respond before headaches, fatigue, weakness, or thinking problems fully improve. Hospital treatment may be followed by months of medicines, rehabilitation, and outpatient appointments.

Follow-up commonly includes blood tests, checks for medicine side effects, and assessment of movement, hearing, vision, learning, or memory. Repeat brain imaging or spinal-fluid testing may be needed if symptoms worsen or recovery does not follow the expected pattern.

Some people recover with few lasting effects. Others need ongoing support for weakness, seizures, hearing loss, learning difficulties, or changes in memory and behaviour. The outcome is generally better when treatment begins before severe confusion, coma, stroke, or hydrocephalus develops, but no individual course can be predicted with certainty.

Children may need developmental, hearing, and school assessments over time. Adults may need a gradual return to work, driving, or independent activities. Fatigue and reduced concentration can persist even when the infection has been treated.

Missing medicines or stopping early can allow the infection to return or become harder to treat. Tell the treating team about barriers such as side effects, cost, travel, housing, or difficulty remembering doses. These are problems the treatment service can often help

address.

When to get medical help

Call emergency services or go to an emergency department now for a severe or worsening headache with fever, confusion, unusual sleepiness, a seizure, fainting, new weakness, trouble speaking, repeated vomiting, or loss of consciousness. A baby with poor feeding, unusual drowsiness, a bulging soft spot, or a seizure also needs emergency assessment.

Do not wait for a routine appointment if TB meningitis is suspected or if neurological symptoms appear during TB treatment.

During treatment, seek urgent medical advice for:

Routine follow-up is the place to discuss milder nausea, fatigue, appetite changes, medicine scheduling, rehabilitation progress, or help taking doses. Do not stop prescribed TB medicines without speaking with the treatment team unless emergency clinicians tell you to do so.

- Yellow skin or eyes, dark urine, or severe abdominal pain
- New blurred vision, colour-vision changes, or loss of vision
- Persistent vomiting that prevents medicines staying down
- A widespread rash, facial swelling, or breathing difficulty
- New confusion, weakness, seizures, or worsening headache

Common questions

Is tuberculous meningitis contagious?

The meningitis itself is not usually spread from person to person. However, someone with TB meningitis may also have infectious TB in the lungs or throat. Close contacts may therefore need TB screening.

Can tuberculous meningitis be cured?

Anti-tuberculosis treatment can clear the infection. However, treatment cannot always reverse brain or nerve damage that occurred before the infection was controlled. Early treatment offers the best chance of recovery.

How long does treatment take?

Treatment usually lasts many months and is often longer than treatment for uncomplicated lung TB. The length is based on age, response, medicine sensitivity, and national guidance.

Drug-resistant infection may require a different and longer course.

Can a negative spinal-fluid test rule it out?

No single test detects every case. Molecular testing and culture are important, but either may be negative when few bacteria are present. Clinicians combine spinal-fluid findings, brain imaging, symptoms, and evidence of TB elsewhere.

Why are steroids used for an infection?

The bacteria cause inflammation that can damage the brain and block fluid flow. Corticosteroids calm this inflammation while anti-tuberculosis medicines treat the bacteria. They do not replace antibiotics like amoxicillin or doxycycline .

Can TB meningitis come back?

It can return if treatment is ineffective, stopped early, not absorbed properly, or affected by drug resistance. New symptoms can also result from a paradoxical inflammatory reaction rather than returning infection. Either situation needs prompt specialist assessment.

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