CONDITION

Neurosyphilis

Neurosyphilis is a complication of syphilis in which the infection affects the brain, spinal cord, or related nerves.

WHAT IT IS
Syphilis infection affecting the brain, spinal cord, or nerves

BODY SYSTEM
Nervous system

MAIN SYMPTOMS
Headache, confusion, weakness, vision or hearing changes

WHAT CAUSES IT
Bacterial infection

HOW IT IS DIAGNOSED
Blood syphilis tests and cerebrospinal fluid testing

MAIN TREATMENT
Penicillin antibiotics

CAN IT BE CURED?
Yes - antibiotics clear infection, but damage may remain

IS IT AN EMERGENCY?
Sometimes - sudden stroke, vision loss, or severe confusion

LONG-TERM OUTLOOK
Early treatment improves recovery; established nerve damage may persist

Overview

Neurosyphilis happens when the bacterium that causes syphilis affects the brain, spinal cord, or nerves. Syphilis is a sexually transmitted infection caused by Treponema pallidum .

The nervous system can be affected at any stage of syphilis, including within the first years after infection. It does not occur only in people who have had untreated syphilis for decades.

Neurosyphilis can take several forms. It may inflame the tissues around the brain and spinal cord, damage blood vessels and cause a stroke, or gradually affect thinking, movement, sensation, and bladder control. Syphilis can also affect the eyes or the nerves involved in hearing and balance.

General paresis is sometimes used as another name for neurosyphilis, but they are not exactly

the same. General paresis is a late form that causes progressive changes in memory, thinking, mood, and behaviour.

Antibiotics like amoxicillin or doxycycline can clear the infection. However, they cannot always reverse damage that has already happened. Prompt assessment matters because earlier treatment generally gives the nervous system a better chance to recover.

Symptoms

Symptoms differ according to which part of the nervous system is affected. Some people have subtle changes, while others develop symptoms over a short period.

Possible symptoms include:

A late form called tabes dorsalis damages pathways in the spinal cord. It can cause sharp, stabbing pains, reduced awareness of leg position, an unsteady walk, and problems controlling the bladder. The pupils may react unusually to light.

General paresis may cause worsening memory, reduced judgment, irritability, depression, unusual beliefs, or other major changes in behaviour. These symptoms can resemble dementia or a mental health condition.

Eye involvement is called ocular syphilis. Ear involvement is called otosyphilis. Either can occur with or without other neurological symptoms.

- Persistent or severe headache
- Neck stiffness, nausea, or sensitivity to light
- Confusion, poor concentration, or memory problems
- Changes in mood, personality, or behaviour
- Weakness, numbness, poor balance, or difficulty walking
- Tremor or problems coordinating movement
- Loss of bladder control
- Seizures
- Stroke symptoms, such as sudden facial drooping or one-sided weakness
- Blurred vision, eye pain, light sensitivity, or loss of vision
- Hearing loss, ringing in the ears, dizziness, or balance problems

Causes and risk factors

Neurosyphilis is caused by Treponema pallidum , the same bacterium that causes syphilis. The bacterium can enter the nervous system early in the infection. In many people, the immune system clears it from this area, but in some it remains and causes inflammation or damage.

Anyone with syphilis can develop neurological involvement. The risk is higher when syphilis has not been diagnosed or treated adequately.

HIV can affect how syphilis behaves. People living with HIV may have neurological involvement more often, particularly when HIV is not well controlled. Most people with both infections can still be assessed and treated using established approaches.

Having had syphilis before does not provide immunity. A person can become infected again after successful treatment.

Syphilis is mainly passed through direct contact with a syphilis sore during vaginal, anal, or oral sex. It can also pass to a baby during pregnancy. It is not spread through ordinary contact such as sharing food, toilets, towels, or swimming pools.

Diagnosis

Diagnosis begins with your symptoms, medical history, neurological examination, and blood tests for syphilis. Blood testing usually combines a test that reflects current infection activity with a test that detects antibodies specific to the bacterium.

If neurosyphilis is suspected, a lumbar puncture may be recommended. During this procedure, a clinician uses a needle in the lower back to collect a small amount of cerebrospinal fluid. This is the clear fluid surrounding the brain and spinal cord.

The fluid is checked for signs of inflammation and for antibodies linked to syphilis. One commonly used test is the cerebrospinal fluid VDRL test. A positive result supports the diagnosis, but a negative result does not always rule it out. Clinicians interpret the fluid results together with your symptoms, examination, blood tests, and previous treatment history.

Brain imaging, such as an MRI or CT scan, may be used when symptoms suggest a stroke, seizure, tumour, or another possible cause. Imaging can show damage but does not by itself confirm neurosyphilis.

People with syphilis are normally offered HIV testing. Depending on personal circumstances, testing for other sexually transmitted infections may also be appropriate.

Eye symptoms require a full eye examination. Hearing or balance symptoms may require hearing tests and assessment by an ear specialist. A lumbar puncture is not always needed

before treating isolated eye or ear disease, particularly when the examination confirms the problem.

Treatment and management

Neurosyphilis is treated with antibiotics that reach effective levels in the brain and cerebrospinal fluid. Penicillin given into a vein is the standard treatment. Treatment is usually provided or arranged by a specialist service and commonly requires hospital care or closely supervised outpatient care.

Other antibiotic approaches may be considered in specific circumstances, including when penicillin cannot initially be used. A reported penicillin allergy needs careful review because penicillin remains the preferred treatment in several situations. During pregnancy, a person with a true allergy may undergo desensitisation, a supervised process that allows penicillin to be given safely.

Ocular syphilis and otosyphilis are treated in the same way as neurosyphilis, even if cerebrospinal fluid tests are normal.

Symptoms can temporarily worsen during the first day after treatment. This is called a Jarisch-Herxheimer reaction. It may cause fever, chills, headache, muscle aches, or a faster heartbeat as bacteria are destroyed. It is not the same as a penicillin allergy, but medical staff should assess significant symptoms.

Follow-up blood tests check whether measures of syphilis activity are falling as expected. Your symptoms and neurological examination are also important. A repeat lumbar puncture is not always necessary when symptoms and blood tests improve, although it may be recommended if recovery is unclear or blood results do not respond as expected.

Sexual partners may need testing and treatment. Avoiding sexual contact until the advised treatment period is complete helps prevent passing syphilis to someone else.

Complications

Untreated neurosyphilis can cause lasting injury to the brain, spinal cord, eyes, ears, or blood vessels.

Possible complications include:

Treatment stops the infection from causing further damage, but recovery depends partly on what damage was present beforehand. Headache or inflammation may improve substantially.

Long-standing problems with vision, hearing, movement, or thinking may improve only partly or remain permanent.

Syphilis during pregnancy can also affect the pregnancy or pass to the baby. This requires prompt specialist treatment.

- Stroke and permanent weakness
- Ongoing memory, thinking, or behaviour changes
- Difficulty walking or coordinating movement
- Chronic nerve pain or reduced sensation
- Seizures
- Loss of bladder control
- Permanent sight or hearing loss

Prevention

Neurosyphilis does not have its own separate prevention method. Preventing, detecting, and treating syphilis is the main way to prevent this complication. There is no vaccine against syphilis.

Condoms and internal condoms lower the risk during sex, but they do not provide complete protection. Syphilis sores may be on skin that a condom does not cover.

Testing is important if you have symptoms of syphilis, a sexual partner has been diagnosed, or you have an increased chance of exposure. Regular testing may be advised for some people based on their sexual health and HIV status.

Completing treatment and attending follow-up blood tests help confirm that the infection has responded. Because previous infection does not create immunity, safer-sex measures and future testing may still be needed after successful treatment.

Living with it and what to expect

Recovery over the first weeks and months depends on the form of neurosyphilis and how long the nervous system was affected before treatment. Fatigue, problems concentrating, weakness, or balance difficulties may take time to improve.

Some people recover with few or no lasting symptoms. Others need rehabilitation for persistent effects. This may include physiotherapy for strength and walking, occupational

therapy for everyday tasks, speech and language therapy, hearing support, or low-vision services.

Memory or behaviour changes can affect work, relationships, finances, and independent living. Neuropsychological testing can identify thinking skills that have changed and guide practical support. Mental health care may help if the condition has contributed to depression, anxiety, or major behavioural changes.

Follow-up usually includes symptom reviews and repeat blood tests over a period of months. Seek review sooner if symptoms return, worsen, or new neurological problems develop.

Successful treatment clears the infection, but it does not prevent a new syphilis infection. A later positive test may reflect old antibodies, treatment response, or reinfection, so results need to be compared with earlier tests.

When to get medical help

Call emergency services for symptoms that could indicate a stroke or another acute brain problem, including:

Seek urgent medical assessment for a rapid change in vision or hearing, new severe eye pain, increasing confusion, new weakness, or difficulty walking. Early treatment may reduce the chance of permanent loss of function.

Arrange routine medical or sexual health follow-up if you have a positive syphilis test, have been told a partner has syphilis, or develop gradual memory, balance, sensation, bladder, hearing, or vision changes. These symptoms have many possible causes and require proper assessment rather than self-diagnosis.

- Sudden facial drooping, arm weakness, or difficulty speaking
- Sudden loss of vision
- A first seizure or a seizure lasting longer than expected
- Severe confusion, collapse, or loss of consciousness
- A sudden severe headache with weakness, neck stiffness, or vomiting

Common questions

Is neurosyphilis curable?

Antibiotics can clear the syphilis infection. This is considered a cure of the infection, but

established nerve, brain, eye, or ear damage may not fully recover.

Can you have neurosyphilis without knowing you have syphilis?

Yes. Earlier syphilis symptoms can be mild, painless, hidden inside the body, or absent. A previous rash or sore may also have disappeared without treatment.

How long after syphilis does neurosyphilis develop?

Nervous system involvement can occur during any stage, including early infection. General paresis and tabes dorsalis usually appear much later. There is no single timeline that applies to everyone.

Does a negative spinal-fluid test rule it out?

Not always. Some cerebrospinal fluid tests are highly specific but can miss cases. Clinicians consider the full pattern of symptoms, examination findings, blood tests, and spinal-fluid results.

Can neurosyphilis look like dementia or a mental health condition?

Yes. General paresis can cause memory loss, poor judgment, personality changes, depression, or unusual beliefs. These symptoms have many other possible causes, so testing and a full medical assessment are needed.

Can I get neurosyphilis again after treatment?

A successfully treated infection does not return on its own, but you can acquire syphilis again through a new exposure. Untreated reinfection can again affect the nervous system.

Sources

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