Toxoplasmosis

What is toxoplasmosis?
Toxoplasmosis is an infection caused by the parasite *Toxoplasma gondii* (*T. gondii*). The parasite is transmitted to people through eating undercooked meat, especially pork, lamb, beef, wild meat (deer and so on), or raw shellfish such as oysters, clams and mussels, contaminated with the parasite. Cats are natural hosts of this parasite, and it may be transmitted to people through contact with cat feces.

Toxoplasmosis infection most often causes disease in the brain and spinal cord, although other parts of the body, including the eyes, heart, lungs, skin, liver, and gastrointestinal (GI) tract, can be infected. In North America, toxoplasmosis in HIV-positive people is usually a reactivation of an old infection that did not initially cause disease. When someone is first infected with the parasite, there are usually no symptoms, and the immune system is able to control and contain the infection. However, in untreated HIV infection the immune system degrades and loses the ability to control the parasite. As your CD4 count falls below the 200 cell/mm³ mark, your risk for developing symptoms of toxoplasmosis and other AIDS-related infections increases. HIV-positive people who have been exposed to the parasite and who have less than 50 CD4 cells/mm³ are at greatest risk for toxoplasmosis.

Taking HIV treatment (commonly called ART) every day exactly as directed to maintain a high CD4 count helps prevent toxoplasmosis from occurring.

Symptoms
Symptoms of toxoplasmosis can include the following:
- dull, constant headache
- intermittent fever
- confusion

Symptoms may also include focal neurological deficits, such as:
- weakness, or even paralysis, of one side of the body
- speech disorder, especially slurred words
- weakness or loss of sensation in any limb
- loss of an area of vision

Focal neurological deficits are problems caused by disturbances (lesions, tumours, infections, stroke) in a particular area of the brain. They cause a specific loss of sensory or motor function. For example, a toxoplasmosis lesion on the brainstem may cause difficulty swallowing or speaking; a lesion near the area of the brain that controls sight can cause the loss of an area of vision.

Diagnosis
The symptoms of toxoplasmosis are similar to those of many other conditions that can affect the brain and spinal cord. Physical examinations, lab tests, and radiological scans (CAT scans and MRI) are necessary to confirm the diagnosis.
A patient who has any of the symptoms described above will receive a physical examination, including some general tests of the nervous system. If there seem to be neurological problems, the patient will be referred to a neurologist (a doctor whose specialty is the brain and nervous system).

Blood samples will be taken and tested to find out if the patient has been exposed to the toxoplasmosis parasite or to other germs that could cause similar symptoms. Most physicians rely on assessing a combination of symptoms and results of laboratory tests and CAT or MRI scans in order to make a diagnosis of toxoplasmosis. However, initially the symptoms of toxoplasmosis may be mild or mimic other conditions and so a consultation with a neurologist may be necessary to help your doctors understand the cause of your symptoms. The neurologist will conduct an extensive physical examination which will assess cognition (ability to think and reason); motor function (including size, strength, and tone of muscles); sensory nerve function (ability to tell the difference between light and firm touch, etc.); coordination (ability to perform certain movements, balance, walk, etc.); and reflexes. This series of tests can allow the neurologist to pinpoint the location of the lesion in the brain. These tests will not confirm the diagnosis of toxoplasmosis, but they can eliminate some other possible diagnoses.

A lumbar puncture (spinal tap) may be done to remove a sample of cerebrospinal fluid (CSF). This fluid will be tested to find out if the patient has been exposed to the parasite or to other germs that could cause similar symptoms. Although antibodies to toxoplasmosis may be found in the CSF, this test cannot confirm the diagnosis of toxoplasmosis, but can eliminate other possible diagnoses.

Images of the inside of the brain and spinal cord can be produced with a CT scan. In a patient with toxoplasmosis, the scan can reveal multiple lesions in the cortex and deep grey-matter structures such as the basal ganglia. However, the CT images can vary widely: there may be single lesions, lesions with diffuse enhancement, as well as non-enhancing lesions.

The only definitive way to diagnose toxoplasmosis is through a brain biopsy. This involves cutting open the skull and removing a small piece of brain for analysis in the lab. This procedure is so invasive and potentially so dangerous that it is almost never performed.

**Treatment**

Treatment for toxoplasmosis may be taken at home or in hospital depending on the size, number, and location of the lesions, the symptoms experienced, and the patient's ability to tolerate the medications.

The most effective treatment is a combination of the oral antibiotic drugs pyrimethamine (50 to 100 mg per day) and sulfadiazine (4 to 8 grams per day), plus the B vitamin folinic acid (10 mg per day). Although improvement in symptoms is usually seen within seven days and on CT scans after 14 days, treatment should continue for at least six weeks.

Pyrimethamine is fairly well tolerated by most people, but its side effects can include nausea, vomiting, and diarrhea in the first few days of treatment. Sulfadiazine can cause skin rashes, itching, sensitivity to light, joint pain, fever, and chills. Both drugs can cause allergic reactions; “sulfa” reactions are common among HIV-positive people. Folinic acid is taken to help protect the bone marrow from the suppressive effects of both drugs.

After all symptoms and signs have cleared up, and the infection has been controlled, daily treatment to suppress the parasite is required. Suppressive therapy usually consists of lower doses of the same drugs that successfully treated the active infection. The most commonly used suppressive therapy combines 25 to 50 mg of pyrimethamine daily with 500 mg of sulfadiazine taken four times a day plus 5 to 10 mg of folinic acid daily. Eventually, as
the immune system improves because of ART, doctors discontinue prescribing suppressive therapy; see the section on preventing toxoplasmosis for details.

The combination of pyrimethamine + sulfadiazine may not be appropriate for everyone. Another treatment option includes the following:

- pyrimethamine + clindamycin (intravenously) + folinic acid

For people who cannot tolerate pyrimethamine, sulfadiazine or clindamycin, the following treatments have been studied in small numbers of people:

1. pyrimethamine + azithromycin
2. atovaquone + pyrimethamine
3. atovaquone + sulfadiazine

Note that atovaquone must be taken with meals to help its absorption.

**ART and toxoplasmosis**

U.S. treatment guidelines state that most physicians would likely encourage patients with toxoplasmosis to initiate ART within “two to three weeks after the diagnosis of toxoplasmosis.”

**Preventing toxoplasmosis**

U.S. treatment guidelines recommend that doctors screen HIV-positive people for exposure to toxoplasmosis. If people have antibodies to *T. gondii* and have less than 100 CD4+ cells/mm³, drugs should be prescribed to help prevent the occurrence of toxoplasmosis. For people who have never had toxoplasmosis, taking drugs to prevent an episode of this disease is called primary prophylaxis. Guidelines recommend the following for primary prevention:

One double-strength tablet of Bactrim/ Septra (sold generically as trimethoprim-sulfamethoxazole) taken every day. Alternatively the guidelines also suggest that the same dose of these drugs can be taken once daily, three days each week.

The same guidelines make this statement about discontinuing prophylaxis against toxoplasmosis:

“Prophylaxis against toxoplasmosis should be discontinued in adult and adolescent patients receiving ART whose CD4 counts increase [above] 200 cells/mm³ for more than 3 months. Multiple observational studies and two randomized trials have reported that primary prophylaxis can be discontinued, with minimal risk for development of [toxoplasmosis], in patients receiving ART whose CD4 counts increase from less than 200 cells/µL to more than 200 cells/mm³ for more than 3 months.”

On average, in these studies, participants discontinued taking prophylaxis when their CD4+ count was about 300 cells/mm³.

Taking reduced doses of medicines to prevent another occurrence of toxoplasmosis is called secondary prophylaxis. Once a person has recovered from toxoplasmosis, doctors prescribe suppressive therapy to deter a recurrence. U.S. guidelines state the following: “the combination of pyrimethamine plus sulfadiazine plus leucovorin is highly effective as suppressive therapy for patients with [toxoplasmosis] and provides protection against PCP [pneumocystis pneumonia; another life-threatening complication of AIDS].

**Cat care**

Pets are an important source of companionship and emotional support for people. HIV-positive cat owners may help reduce the risk of developing toxoplasmosis with the following steps:

- using dust-free cat litter
- wearing gloves and a mask to remove feces from the litter box daily
- dust-free litter may help prevent the toxoplasmosis parasite from being inhaled with the dust
• always wash your hands thoroughly after cleaning cat litter
• keep cats indoors and avoid handling stray cats
• feed cats canned or dried commercial food or well-cooked table food
• wash hands after contact with raw meat and after contact with soil
• wash raw fruit and vegetables before eating them
• avoid eating raw or undercooked meats (including beef, chicken, pork, lamb and wild meat) and shellfish

References:


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