CONDITION

Cavernous sinus thrombosis

Learn about cavernous sinus thrombosis, including emergency symptoms, common causes, diagnostic tests, hospital treatment, possible complications, and follow-up care.

WHAT IT IS
Blood clot in the cavernous sinus

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Severe headache, fever, eye swelling, double vision

WHAT CAUSES IT
Usually infection, sometimes clotting risks

HOW IT IS DIAGNOSED
MRI with MRV or contrast CT venography

MAIN TREATMENT
Hospital antibiotics, anticoagulation, source control

CAN IT BE CURED?
Sometimes - complications may cause permanent damage

IS IT AN EMERGENCY?
Yes, severe headache with fever and eye symptoms

LONG-TERM OUTLOOK
Prompt treatment improves recovery, but permanent problems may persist

Overview

Cavernous sinus thrombosis is a blood clot in a large vein-filled space called the cavernous sinus. The two cavernous sinuses sit deep inside the skull, behind the eyes and on either side of the pituitary gland.

These spaces help drain blood from the brain, eyes, nose, and upper face. Several important nerves and the internal carotid artery pass through or next to them. These nerves control eye movement, eyelid position, facial sensation, and some parts of vision.

Most cases occur when an infection in the face or nearby structures spreads into the cavernous sinus. Common starting points include the sinuses, teeth, ears, nose, or skin around the eyes. Less commonly, a clot develops without infection because of an injury, surgery, cancer, inflammation, pregnancy, or another condition that makes blood more likely to clot.

Cavernous sinus thrombosis is uncommon, but it is a medical emergency. Swelling, infection, and reduced blood flow can quickly affect the eyes, brain, cranial nerves, and bloodstream. Early hospital treatment can reduce the risk of permanent vision problems, stroke, severe infection, and other complications.

Symptoms

Symptoms may develop over several hours or days. A severe or worsening headache is often an early symptom. Pain may be felt behind or around one eye before affecting both sides.

Possible symptoms include:

Eye symptoms may begin on one side. Because the right and left cavernous sinuses are connected, symptoms can spread to the other eye.

Some symptoms overlap with sinus infections, migraine, orbital cellulitis, and other conditions. Symptoms alone cannot confirm cavernous sinus thrombosis.

Seek emergency medical care now for a severe headache with fever and new swelling around an eye, abnormal eye movement, double vision, a bulging eye, reduced vision, confusion, a seizure, fainting, or new weakness. Do not wait for a routine appointment or try to drive yourself if vision, alertness, or movement is affected.

- Severe, persistent, or rapidly worsening headache
- Fever, chills, or feeling very unwell
- Swelling or redness around an eye
- A bulging eye, called proptosis
- Eye pain, especially with movement
- Double vision or difficulty moving an eye
- A drooping eyelid
- Blurred or reduced vision
- Numbness or unusual sensation on the forehead, cheek, or around the eye
- Nausea or vomiting
- Increasing sleepiness, confusion, weakness, or seizures

Causes and risk factors

Infectious, or septic, cavernous sinus thrombosis is the most common form. It happens when germs spread from nearby tissue into the veins and trigger inflammation and clotting.

The infection may begin as:

Staphylococcus aureus is an important bacterial cause. Streptococci, anaerobic bacteria, and other organisms may also be involved. Anaerobic bacteria can grow in places with little oxygen, such as some dental or sinus infections.

Noninfectious cavernous sinus thrombosis is less common. Possible contributing factors include major facial or head injury, recent surgery, pregnancy or the weeks after delivery, cancer, severe dehydration, inflammatory disease, and inherited or acquired blood-clotting disorders.

A risk factor does not mean that someone will develop the condition. Some people have more than one contributing factor, while no clear cause is found in others.

- Sinusitis, especially infection of the sphenoid or ethmoid sinuses deep behind the nose
- A facial or nasal skin infection
- An infected tooth or dental abscess
- An infection around the eye, including orbital cellulitis
- An ear or mastoid infection
- An infection following facial surgery or injury

Diagnosis

Diagnosis requires urgent assessment in a hospital. The medical team will ask when symptoms began and whether there has been a recent sinus, dental, facial, eye, or ear infection. They will also ask about injuries, operations, pregnancy, cancer, medicines, and any personal or family history of blood clots.

The examination usually includes checks of vision, pupils, eyelids, eye position, eye movement, facial sensation, strength, coordination, and alertness. The nose, mouth, teeth, ears, and skin may be examined for a possible source of infection.

Brain and vein imaging is central to diagnosis. Magnetic resonance imaging, or MRI, can create detailed pictures of the brain, eyes, cavernous sinuses, and nearby structures. Magnetic resonance venography, or MRV, is designed to show the veins.

A contrast-enhanced computed tomography scan, often combined with CT venography, may be used when MRI is unavailable, unsafe, or would cause a harmful delay. "Contrast" is a

substance given through a vein to make blood vessels and areas of inflammation easier to see.

Blood tests may look for infection, inflammation, organ function, and clotting problems. Blood cultures can identify bacteria in the bloodstream and help guide antibiotic like amoxicillin or doxycycline selection. When possible, cultures are collected before antibiotics are started, but testing should not delay urgent treatment.

Samples may also be taken from an infected sinus, tooth, wound, or other suspected source. A lumbar puncture, sometimes called a spinal tap, is not routinely required to diagnose the clot. It may be considered if meningitis is suspected, but only after clinicians assess brain imaging and bleeding risk.

Doctors must also consider conditions that can look similar, such as orbital cellulitis, a collection of infection behind the eye, inflammation around the eye, a carotid-cavernous fistula, aneurysm, tumor, or another type of cerebral venous clot.

Treatment and management

Treatment begins in the hospital, often before every test result is available. Care may involve specialists in infectious diseases, neurology, ophthalmology, ear, nose and throat surgery, neurosurgery, hematology, or dentistry.

When infection is suspected, antibiotics are given through a vein. Initial treatment usually covers several likely bacteria, including resistant Staphylococcus aureus , streptococci, gram-negative bacteria, and anaerobic bacteria when appropriate. The antibiotic plan is adjusted when cultures or other test results identify the organism. Treatment commonly continues for several weeks, but the exact duration depends on the infection, response, and complications.

The original source of infection must also be treated. A blocked or infected sinus, dental abscess, facial collection, or infection around the eye may need drainage or surgery. Surgery is generally directed at the source rather than at removing the clot from the cavernous sinus itself.

Anticoagulants like warfarin or apixaban are medicines that reduce further blood clotting. Heparin-based anticoagulation is often considered for cavernous sinus thrombosis, including many infection-related cases, unless there is a major reason it would be unsafe. The available evidence for septic cavernous sinus thrombosis is mainly observational because randomized trials are lacking. Clinicians therefore weigh possible benefits, such as limiting clot extension, against bleeding risk for each patient.

People with noninfectious cavernous sinus thrombosis are usually treated for the clot and its

underlying cause. The type and length of anticoagulant treatment depend on factors such as temporary triggers, ongoing clotting risks, bleeding risk, and follow-up imaging.

Corticosteroids like prednisone or hydrocortisone are not a routine treatment for every case. They may be used for a specific reason, such as certain inflammatory conditions or reduced pituitary function. Other hospital care may include fluids, oxygen, pain and nausea control, seizure treatment, blood sugar management, and close checks of vision and neurological function.

Complications

The cavernous sinus is close to the brain, eyes, pituitary gland, arteries, and cranial nerves. Complications can result from infection, pressure, impaired drainage, or spread of the clot.

Possible complications include permanent double vision, abnormal eye movement, facial numbness, eyelid drooping, or partial or complete vision loss. Some nerve problems improve slowly over weeks or months, while others may persist.

Infection can spread to the tissues around the brain and cause meningitis. It can also form a brain abscess or enter the bloodstream, causing sepsis. A clot may extend into other brain veins. Reduced blood drainage can contribute to brain swelling, venous stroke, or bleeding within the brain.

Less common problems include narrowing or damage to the internal carotid artery and impaired pituitary gland function. The pituitary gland helps control hormones involved in stress response, growth, reproduction, thyroid function, and fluid balance.

Prompt treatment improves the chance of recovery, but follow-up remains important even when fever, headache, and swelling have settled.

Follow up

After discharge, follow-up is usually arranged with the teams involved in treatment. Appointments may assess vision, eye movement, facial sensation, headaches, neurological recovery, and whether the original infection has cleared.

Repeat MRI, MRV, or CT venography may be used to check the clot and nearby structures. The timing depends on the clinical course and will not be the same for everyone.

People taking an anticoagulant need instructions about missed doses, interactions, planned dental or surgical procedures, and signs of abnormal bleeding. Some anticoagulants require

blood tests, while others do not. They should not be stopped or changed without advice from the prescribing clinician.

Testing for an underlying clotting disorder may be considered, especially when there was no clear infection or temporary trigger. Some tests are affected by an active clot, pregnancy, severe illness, or anticoagulant treatment, so clinicians may delay them until results are more reliable.

Double vision or reduced eye movement may require continuing care from an eye specialist. Temporary prisms, patching, rehabilitation, or later procedures may be considered depending on recovery. Ongoing dental, sinus, or ear care may help address the original source.

Contact the treating team promptly for a returning headache, fever, increasing eye swelling, new double vision, or medication concerns. New vision loss, confusion, seizure, fainting, weakness, severe breathing difficulty, or uncontrolled bleeding requires emergency care.

Sources

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