CONDITION

Petrositis

Petrositis is infection and inflammation in the petrous part of the skull bone beside the inner ear.

WHAT IT IS
Infection and inflammation of the petrous temporal bone

BODY SYSTEM
Ears, skull, and nervous system

MAIN SYMPTOMS
Deep ear pain, headache, discharge, double vision

WHAT CAUSES IT
Usually spread of a middle-ear infection

HOW IT IS DIAGNOSED
Temporal-bone CT and contrast-enhanced MRI

MAIN TREATMENT
Hospital antibiotics, with drainage surgery when needed

CAN IT BE CURED?
Yes - infection usually clears with treatment

IS IT AN EMERGENCY?
Yes - suspected cases need urgent hospital assessment

LONG-TERM OUTLOOK
Usually good, though nerve symptoms may linger

Overview

Petrositis is infection and inflammation of the petrous part of the temporal bone. This bone lies deep in the skull, beside the middle and inner ear. Its pointed inner portion is called the petrous apex, so the condition is also described medically as petrous apicitis.

Petrositis usually develops when a middle-ear or mastoid infection spreads deeper into the temporal bone. The mastoid is the air-containing bone behind the ear. In some people, connected air cells extend from the mastoid into the petrous apex, giving infection a route through the bone.

Several important nerves and blood vessels pass close to this area. Infection can irritate the nerve that moves the eye outward, causing double vision. It can also affect branches of the trigeminal nerve, which carries sensation from the face. Rarely, infection spreads to the tissues

around the brain or into nearby veins.

The traditional combination of ear infection or discharge, deep facial pain, and double vision is called Gradenigo syndrome. Many people with petrositis do not have all three features, so the condition cannot be ruled out because one is missing.

Petrositis is uncommon, but it needs urgent hospital assessment. Prompt imaging and treatment help limit damage to nearby nerves and prevent infection from spreading.

Symptoms

Symptoms may begin during an ear infection, after symptoms seemed to improve, or despite treatment. They can develop gradually or become more noticeable over a short period.

Possible symptoms include:

Double vision can develop when inflammation affects the sixth cranial nerve, also called the abducens nerve. This nerve controls the muscle that turns the eye outward. If it is not working normally, the affected eye may turn slightly inward.

Children may not describe deep pain or double vision clearly. They may cover one eye, appear cross-eyed, become unusually irritable, vomit, or have trouble walking steadily.

These symptoms can also have other causes. They require medical assessment rather than self-diagnosis.

- Persistent or worsening pain deep in or behind the ear
- Headache, often around the temple, forehead, or behind the eye
- Fluid or pus draining from the ear
- Fever or feeling generally unwell
- Double vision, especially when looking toward the affected side
- Pain or altered sensation around the eye, forehead, cheek, or upper jaw
- Reduced hearing or a blocked-ear feeling
- Dizziness, nausea, or difficulty with balance

Causes and risk factors

Petrositis is most often caused by bacteria spreading from an acute or long-lasting middle-ear infection. It may also develop as part of mastoiditis, which is infection of the bone behind the

ear.

Bacteria can enter air cells within the petrous bone and become difficult to clear. Swelling and infected material may then affect nearby nerves or spread beyond the bone.

Factors that may increase the chance of this complication include:

Petrositis is not contagious by itself. However, the respiratory infection that came before an ear infection may be contagious.

It is different from necrotising otitis externa, a severe infection that begins in the outer ear canal and may spread into the skull base. Doctors distinguish these conditions because their usual starting points and treatment needs are not identical.

- A persistent or recurrent middle-ear infection
- Mastoiditis
- Ear discharge that continues despite treatment
- A cholesteatoma, which is an abnormal collection of skin cells in the middle ear
- Previous ear or mastoid surgery
- A weakened immune system or poorly controlled diabetes

Diagnosis

A clinician will ask about recent ear infections, ear surgery, discharge, headache, facial pain, and changes in vision. The examination usually includes the ear, eye movements, facial sensation, hearing, balance, and other nerve functions.

Imaging is central to diagnosis. A computed tomography, or CT, scan of the temporal bones provides detailed pictures of bone and air cells. It may show fluid, loss of normal air spaces, bone damage, mastoid infection, or a possible route for surgical drainage.

Magnetic resonance imaging, or MRI, gives more detail about nerves and soft tissues. Contrast material is often used to make inflamed tissue and abscesses easier to see. MRI can also look for spread toward the lining of the brain, nearby veins, or the brain itself. CT and MRI provide different information, so both may be needed.

Blood tests can look for signs of infection and inflammation. Blood cultures may identify bacteria if they have entered the bloodstream.

A sample of ear drainage or material collected during a procedure may be sent for culture. This identifies the organism and shows which antibiotics like amoxicillin or doxycycline are likely to work. Previous antibiotic treatment can make cultures negative even when infection remains.

Other conditions can cause similar symptoms, including migraine, blood clots in veins near the brain, tumours of the petrous apex, and other forms of skull-base infection. Imaging and the full clinical picture help separate them.

Treatment and management

Petrositis is usually treated in hospital by an ear, nose, and throat team. Specialists in infectious diseases, neurology, neurosurgery, eye care, or radiology may also be involved.

Antibiotics are the main treatment. They are usually given through a vein at first so that high levels reach the infected area. Initial treatment may cover several likely bacteria. It can then be narrowed if cultures identify a specific organism.

Treatment is often prolonged because infection inside bone clears more slowly than a simple ear infection. The route and length of treatment are based on symptoms, examination findings, laboratory results, imaging, the organism involved, and whether infected material has been drained.

Procedures may be needed to release pressure, obtain a culture, or improve drainage. These can include making a small opening in the eardrum or placing a ventilation tube. If mastoid infection, an abscess, damaged bone, or trapped infected material remains, surgery may be required to clear the mastoid or drain the petrous apex.

Surgery is more likely to be considered when there is:

Pain relief, fluids, nausea treatment, and temporary measures for double vision may also be offered. Covering one eye or using a temporary prism in glasses can reduce double vision, but this should be guided by an eye specialist.

Follow-up examinations and sometimes repeat imaging are used to check that the infection is resolving.

- An abscess or another collection that needs drainage
- A cholesteatoma or infected dead bone
- Worsening nerve problems
- Spread inside the skull
- Little improvement with appropriate antibiotics

Complications

The petrous apex lies close to the brain, important veins, the inner ear, and several cranial nerves. Complications are not inevitable, but they explain why urgent treatment is needed.

Possible complications include:

Some nerve symptoms take longer to improve than pain or fever. In a smaller number of people, hearing loss, eye-movement problems, or other nerve changes may persist after the infection has cleared.

- Continuing double vision from sixth-nerve injury
- Hearing loss or balance problems
- Weakness or altered sensation in the face
- Meningitis, an infection of the lining around the brain
- An abscess near or within the brain
- A blood clot in a vein that drains the brain
- Infection involving a wider area of the skull base
- Sepsis, the body's dangerous whole-body response to infection

Prevention

Petrositis cannot always be prevented. It can occur even when an ear infection has been recognised and treated.

The most useful step is to seek reassessment when an ear infection does not improve as expected. Persistent drainage, worsening deep pain, new headache, or symptoms returning after treatment need medical review.

If antibiotics are prescribed for an ear infection, take them exactly as directed and complete the advised course unless the prescriber tells you to stop. Attend planned follow-up if there is mastoiditis, a cholesteatoma, ongoing ear drainage, or previous ear surgery.

Avoid putting cotton buds or other objects into the ear canal. This will not specifically prevent petrositis, but it reduces injury and outer-ear infection that can complicate assessment.

Living with it and what to expect

Most people with petrositis spend at least part of their treatment in hospital. Discharge is considered when the infection is stable or improving and there is a safe plan for continuing

treatment and follow-up.

Pain, fever, and ear drainage may improve before scans return to normal. Bone changes can remain visible for a time, so clinicians consider symptoms, nerve examination, blood tests, and imaging together.

Double vision may improve as swelling around the sixth cranial nerve settles. Recovery can take weeks or months, and it is not possible to predict the exact timing for one person. An eye specialist may suggest temporary help with vision while the nerve recovers.

Hearing should be checked after the acute infection. Fluid behind the eardrum can cause temporary hearing loss, while damage involving the middle or inner ear may last longer. Children may need follow-up because reduced hearing can affect speech, learning, and classroom participation.

After recovery, many people return to their usual activities without ongoing limits. Others need longer-term hearing support, eye care, or monitoring for chronic ear problems. Recurrence is possible if an underlying drainage problem or cholesteatoma remains.

Keep all planned ear and hearing appointments, even when you feel better. These are routine follow-up visits. They help confirm that treatment has worked and identify any lasting effects.

When to get medical help

Suspected petrositis requires urgent hospital assessment. Go to an emergency department now if an ear infection or recent mastoiditis is accompanied by:

Seek same-day medical advice for persistent deep ear pain, continuing ear discharge, worsening headache, or symptoms that return after an ear infection was treated. These symptoms do not always mean petrositis, but they should not wait for a routine appointment.

Routine follow-up is appropriate after hospital treatment when symptoms are stable or improving. Contact the treating service sooner if pain, fever, discharge, hearing, balance, or double vision worsens during recovery.

- New double vision or an eye that is not moving normally
- A severe or rapidly worsening headache
- Confusion, unusual sleepiness, fainting, or a seizure
- Neck stiffness, repeated vomiting, or marked sensitivity to light
- New facial weakness, numbness, limb weakness, or trouble speaking
- Sudden difficulty walking or severe loss of balance

- Fever with rapidly worsening illness
- Swelling or severe tenderness behind the ear with neurological symptoms

Common questions

Is petrositis the same as an ear infection?

No. A routine ear infection affects the middle ear or ear canal. Petrositis involves the deep petrous part of the temporal bone and is usually a complication of infection spreading beyond the middle ear or mastoid.

What is Gradenigo syndrome?

Gradenigo syndrome describes ear infection or discharge together with deep facial pain and weakness of the nerve that moves the eye outward. This nerve weakness causes double vision. Not everyone with petrositis has the complete combination.

Can antibiotics cure petrositis without surgery?

Sometimes antibiotics are enough, particularly when treatment begins promptly and there is no trapped collection, cholesteatoma, or severely damaged bone. Surgery may be needed when drainage is poor, complications are present, or infection does not improve adequately.

Will the double vision go away?

It often improves when the infection and inflammation settle, but nerve recovery may take longer than the rest of the illness. Some people have lasting eye-movement problems. Eye follow-up can monitor recovery and provide temporary ways to manage double vision.

Is petrositis cancer?

No. Petrositis is usually an infection and inflammatory condition, not cancer. However, some growths and other abnormalities in the petrous apex can cause similar pain or nerve symptoms. Imaging helps identify the cause.

Can petrositis come back?

It can recur, especially if there is chronic middle-ear disease, a cholesteatoma, poor drainage, or infection that has not fully cleared. Follow-up may include ear examinations, hearing tests, blood tests, or repeat imaging.

Sources

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