

Preseptal (Periorbital) Cellulitis and Postseptal (Orbital) Cellulitis in Children — Symptoms and Treatment

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Preseptal and orbital cellulitis are possible complications to paranasal sinusitis or trauma to the eye orbit. In preseptal cellulitis, the infection is limited to the eyelid and tissues posterior to the orbital septum; the condition is usually milder with pain, discoloration, and swelling; eye vision and ophthalmological examination are usually normal, and medical antibiotic therapy with oral antibiotics is sufficient. Patients with orbital cellulitis have fever, malaise, and proptosis ophthalmoplegia, which can be toxic; impaired vision; optic nerve edema; and they usually require inpatient treatment with intravenous antibiotics. Surgical intervention is more common with orbital cellulitis.



Definition of Periorbital and Orbital Cellulitis

Orbital cellulitis is an infectious inflammation of the tissue posterior to the orbital septum. Orbital fat, muscles, and even bony structures can be involved. Periorbital cellulitis differs from orbital cellulitis in that the infected tissues are anterior to the orbital septum.

Orbital cellulitis	Periorbital cellulitis
Mixed flora	
Includes Gram-positive and Gram-negative organisms, anaerobes	Usually GAS or Staph
Requires broad-spectrum antibiotics	Requires narrow-spectrum antibiotics

Epidemiology of Periorbital and Orbital Cellulitis

Periorbital cellulitis is more common compared to orbital cellulitis, but the morbidity and complications of orbital cellulitis are more severe. Periorbital and orbital cellulitis are **more common in children**, with periorbital cellulitis occurring frequently in children 5 to 10 years of age.

Periorbital cellulitis begins superficially, whereas orbital cellulitis starts deeper in the septum of the orbit. A possible predisposing factor is paranasal sinusitis. Patients typically have an extension of a paranasal or dental infection. Other risk factors include trauma, insect bites, and skin infections of the eyelid.

The most common risk factor for the two infections is similar, which is an infection that is often a direct extension of infected paranasal sinuses. In orbital cellulitis, however, eye surgery or trauma plays a significant role in a predisposition to the condition. The metastatic spread of infection from other areas can also cause either condition.

Pathophysiology of Periorbital and Orbital Cellulitis

Patients can develop periorbital cellulitis due to a direct extension of infected paranasal sinuses to tissues anterior to the orbital septum. The spread of the infection in soft tissues such as the skin, subcutaneous fat, and eye adnexa is also common. Certain conditions such as dacryocystitis, sinusitis, orbital bone fractures, and recent trauma or surgery involving the eyelid or the eye itself can cause periorbital cellulitis.

Orbital cellulitis can result from the direct hematogenous spread of causative organisms, especially in patients with [diabetes](#) or in immunocompromised individuals. Patients can also develop the condition as a complication of the direct extension of an infection from the paranasal sinuses separated only by a partition of bone. In one series, almost all patients with orbital cellulitis had some form of paranasal sinusitis. The infection is severe and extensive. Orbital cellulitis can spread to cause cavernous sinus thrombosis, cerebral abscess, and meningitis.

Historically, the most common etiology of orbital and periorbital cellulitis was ***Haemophilus influenzae type b***. Since the widespread introduction of *H. influenzae* vaccination, the organism is less likely to cause orbital cellulitis. Currently, the most commonly identified organisms in children with periorbital cellulitis are *Streptococcus pneumoniae*, *Streptococcus pyogenes*, and *Staphylococcus aureus*. *S. aureus* and *S. pneumoniae* are also commonly identified in cases of orbital cellulitis. Patients who develop periorbital cellulitis present to the clinic with a swollen eyelid, warmth, redness, or discoloration of the eye and eyelid, with or without fever, but with no protrusion of the eye.

Visual examination reveals normal visual acuity with intact ocular movement and no proptosis. Patients who develop orbital cellulitis are usually unable to move their eyes because of severe pain. Visual acuity might be impaired, and eye protrusion is common. Eyelid edema and redness can be seen in both orbital and periorbital cellulitis. In both conditions, patients might describe a recent history of [upper respiratory tract infection](#) or sinusitis. History-taking is essential for excluding other risk factors such as eye surgery or

trauma to the orbit.

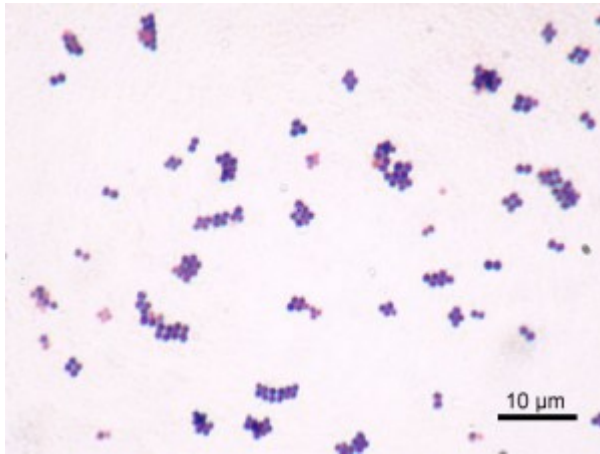


Image: *Staphylococcus aureus*. By Y Tambe. License: [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)

Symptom	Orbital	Periorbital
Eyelid swelling, redness, discharge	Yes	Yes
Normal pupil response	Yes	Yes
Diplopia	Common	No
Abnormal eye movement	Common	No
Pain with eye movements	Usually	No
Proptosis	Rare	No

Diagnostic Workup for **Periorbital** and Orbital Cellulitis

A full ophthalmologic examination should be conducted as part of the evaluation of the patient presenting with periorbital or orbital cellulitis. Visual acuity, pupillary response, intraocular pressure with tonometry, and ophthalmoscopy should be normal in patients with periorbital cellulitis but might be impaired in patients with orbital cellulitis.

Ophthalmoscopy can show optic nerve edema and posterior segment venous engorgement in patients with orbital cellulitis.

Imaging is essential in evaluating a patient presenting with possible orbital cellulitis.

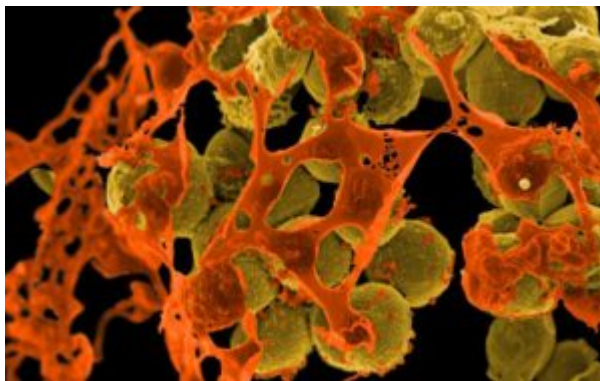
Magnetic resonance imaging (MRI) of the orbit can reveal soft tissue involvement, multiple loculations of the posterior segment of the eye, and signs of endophthalmitis. A **computed tomography (CT) scan** of the orbital bone can show orbital bone fractures, which is a risk factor for orbital cellulitis due to trauma. MRI is preferred to CT if there is cavernous sinus thrombosis. Possible indications for orbital imaging include young age, significant periorbital edema, presence of fever, severe eye pain on movement, and presence of focal neurological signs. Focal neurological signs suggest the **spread of the infection to the central nervous system**.

Blood cultures enable the selection of the best antibiotic based on the microorganism detected. A lumbar puncture can be performed if meningitis is suspected.

Treatment of **Periorbital** and Orbital Cellulitis

Treatment for periorbital and orbital cellulitis can either be medical or surgical. Medical management of periorbital cellulitis includes the administration of adequate [antibiotic therapy](#) to treat the infection and limit its spread. Patients with mild periorbital cellulitis who are above 1 year of age can be treated in an outpatient setting with oral antibiotics. Antibiotics of choice should cover the most commonly implicated organisms, which include *S. aureus* and *Streptococcus spp.*

Patients who have severe periorbital cellulitis or those who do not respond to oral antibiotic therapy should be admitted to the hospital for intravenous antibiotic therapy. Infants below 1 year of age who present with periorbital cellulitis should be treated in an inpatient setting regardless of the severity of the condition.



[Image](#): Scanning electron micrograph of methicillin-resistant *Staphylococcus aureus* (MRSA, brown) surrounded by cellular debris. MRSA resists treatment with many antibiotics. By NIAID/NIH. License: Public Domain

Those who develop orbital cellulitis should always be treated in an inpatient setting with intravenous antibiotics. Patients suspected to have methicillin-resistant *S. aureus* should receive intravenous vancomycin. Combination therapy with intravenous cefotaxime, metronidazole, or clindamycin is usually indicated in cases of orbital cellulitis to cover Gram-negative organisms and anaerobes.

Intranasal corticosteroids are indicated in cases of chronic sinusitis to facilitate nasal drainage. Treatment of sinusitis in cases of orbital cellulitis has been found to provide improved outcomes especially in the case of subperiosteal abscesses.

Surgical intervention is rarely needed for periorbital cellulitis and is only indicated in the case of the following:

- Impairment of vision
- Suspected pus formation or presence of a foreign body
- Identification of orbital or large subperiosteal abscess by imaging
- Failure of antibiotics to resolve the infection

Patients who develop abscesses might need **open drainage of the periorbital abscess**. Patients with orbital cellulitis are more likely to require surgical intervention to remove foreign bodies and bony fragments in case of orbital trauma, to drain abscesses, or to remove an infected eye globe to avoid extension to other adjacent structures in the central nervous system.

Periorbital	Orbital
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Oral antibiotics usually sufficient	Unasyn
	Ceftriaxone and vancomycin if severe or eye-threatening
Cephalexin or clindamycin if allergic	MRI scan for abscess
	Surgery if the abscess can be drained
	Nose drops for sinuses (saline, α-agonist)

References

Lee S, Yen MT. Management of preseptal and orbital cellulitis. *Saudi Journal of Ophthalmology*. 2011;25(1):21-29. doi:10.1016/j.sjopt.2010.10.004.

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