Orbital cellulitis in the paediatric population

Declan Delahunty, Anthony Liu, Habib Bhurawala

CASE

A girl, aged 12 years, presented to her local emergency department with a one-day history of left-sided periorbital swelling (Figure 1). This was on the background of six weeks of intermittent cough and coryzal symptoms, with concurrent intermittent left frontal headache, for which she was awaiting review by an otolaryngologist. Examination revealed an afebrile child who appeared well but had moderate left periorbital swelling, with no ophthalmoplegia or proptosis or pain on eye movement. Bloods showed a raised white cell count (25.1×10^9/L) and elevated C-reactive protein (59 mg/L). The girl was diagnosed with periorbital cellulitis, admitted to the ward and commenced on intravenous antibiotics.

QUESTION 1

What is periorbital cellulitis?

QUESTION 2

How is periorbital cellulitis diagnosed and treated?

ANSWER 1

Periorbital cellulitis is a common paediatric condition that describes an infection of the eyelid and other tissues anterior to the orbital septum.[1] It commonly arises in children with sinusitis or following local trauma, facial or dental procedures, insect bites, impetigo, conjunctivitis and chalazion.[2–5] Commonly identified causative organisms in periorbital cellulitis include *Streptococcus pneumoniae, Staphylococcus aureus, Streptococcus pyogenes, Staphylococcus epidermidis* and *Haemophilus* species.[4]

ANSWER 2

Non-operative, medical management is appropriate when infection is confined to the anterior structures. If mild cellulitis is diagnosed, the patient can be treated with oral antibiotics (Box 1). It should also be noted that eyelid swelling without any pain or fever might occur without infection (such as after an insect bite). A trial of antihistamines might be appropriate in this scenario if not suspecting cellulitis, but review within 24 hours would be required to ensure improvement or resolution. If the infection is considered moderate or severe, intravenous antibiotics are required for at least 48 hours. However, longer courses might be necessary.[4] The child should not be considered to have mild illness if they are aged under three months, the clinician cannot perform an adequate eye exam or the child has inadequate *Haemophilus influenzae* type b immunisation.[6] If a patient is discharged with oral antibiotics, a review appointment within 24 hours is required to ensure no progression of the infection.[4] If the cellulitis is severe or there are concerns for orbital cellulitis, inpatient otolaryngology and ophthalmology reviews are needed.

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The following morning, the periorbital swelling and erythema were unchanged,

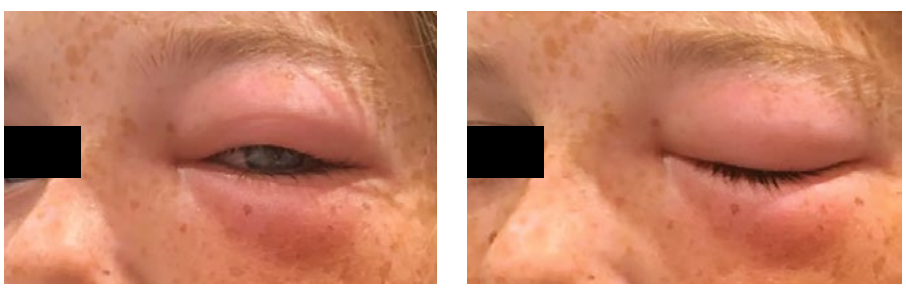

Figure 1. Evidence of moderate periorbital swelling with overlying erythema.

Box 1. Useful indicators for identifying mild periorbital cellulitis[4]

- Age >3 months
- Not immunocompromised
- Able to fully open the eye
- White sclera with non-injected conjunctiva
- Normal eye movements without pain
- Vision (including colour vision) is intact
- No fever
- Normal white cell count (if tested)

but the patient was also found to have ophthalmoplegia, and pain on left lateral gaze with no diplopia or proptosis. Visual acuity and red colour perception were normal. A computed tomography scan was performed and showed orbital cellulitis, left nasal canal subperiosteal abscess and complete opacification of the left maxillary, ethmoid and frontal sinuses (Figures 2,3).

This patient was promptly transferred to the tertiary children's hospital for ongoing management.

QUESTION 3

What is orbital cellulitis, and how can we differentiate between periorbital and orbital cellulitis?

QUESTION 4

What investigation and management are required for orbital cellulitis?

ANSWER 3

Orbital cellulitis refers to infection posterior to the orbital septum.[5] Predisposing conditions include sinusitis, orbital trauma or dental infection.[4,5,7] Orbital cellulitis is a sight- and life-threatening condition with complications such as loss of vision, cavernous sinus thrombosis, meningitis and intracranial abscess.[1,8] For this reason, prompt identification and escalation in management is required. All children will present with erythema and swelling of the eye and/or surrounding skin. Several important signs to identify when assessing for orbital cellulitis that differentiate it from periorbital cellulitis are listed in Box 2.

ANSWER 4

Any child suspected of having orbital cellulitis must be immediately referred to hospital for prompt otolaryngology and ophthalmology input. Following discussions with these specialities, a computed tomography scan of the orbits and sinuses, with or without the brain, and routine pathology investigations, including blood culture, might be recommended.[6] Management will involve intravenous antibiotics and the possibility of surgical intervention. The Paediatric Improvement Collaborative guideline advises the administration of a third-generation cephalosporin (cefotaxime or ceftriaxone) plus flucloxacillin for the management of orbital cellulitis.[6]

CASE CONTINUED

At the tertiary hospital, the patient continued intravenous antibiotic therapy, which was rationalised following the identification of *Streptococcus milleri* in blood cultures. She was managed conservatively for two days with no improvement. She therefore underwent drainage of the left nasal abscess and orbital subperiosteal abscess, with a marked improvement in symptoms. She was discharged from hospital on Day 6 postoperatively on a three-week course of oral amoxicillin.

Key points

- Orbital cellulitis is a potentially vision- and life-threatening condition that requires prompt recognition.
- A child with mild periorbital cellulitis can be safely managed in the community with oral antibiotics (eg cefalexin 33 mg/kg [maximum 1 g] oral three times daily for 7–10 days[6]); however, medical review within 24 hours is required.
- Any child that has signs suggestive of orbital cellulitis must be immediately referred to their closest hospital for further investigation and management.
- Important clinical features that might suggest orbital cellulitis include proptosis, ophthalmoplegia painful eye movements, abnormal pupillary reflexes, decreased visual acuity and impaired colour perception.

Figure 2. Post-septal stranding with thickening adjacent to the lamina papyracea (early abscess; circled) with maxillary sinus (yellow arrow) and ethmoid sinus (blue arrow) opacification.

Figure 3. Subperiosteal abscess in the anterior left nasal canal (red arrow) and opacification of maxillary sinus (yellow arrow).

Box 2. Signs indicating possible orbital cellulitis[4,6,9]

- Moderate swelling with impaired eyelid opening reducing ability to examine pupils and eye movements
- Conjunctival injection, chemosis and discharge
- Proptosis
- Reduced eye movements
- Pain on eye movements
- Diplopia
- Reduced visual acuity
- Visual field defects
- Asymmetric pupillary size
- Abnormal pupillary reflexes
- Evidence of rhinosinusitis or odontogenic infection
- Impaired colour perception (specifically red) because this is an early sign of optic nerve injury (can be identified using Ishihara colour plates)
- Severe headaches or other features indicating intracranial involvement

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