Orbital Cellulitis in Children

University of Iowa Stead Family Children's Hospital Pediatric Orbital (Post-Septal) Cellulitis Guidelines

Objective

This document was created by a multidisciplinary effort among pediatric providers with the goal of providing condition/disease-specific care recommendations based on best available scientific evidence and/or consensus-based institutional recommendations. It is intended to reduce practice variation and improve the quality and safety of delivered care. These recommendations are intended to be utilized for the treatment of confirmed or suspected pediatric orbital (post-septal) cellulitis. This guideline does not replace the clinical judgment of the treating physician allowing deviation depending on unique clinical scenarios.

Definition

Orbital cellulitis (OC) is an acute infectious inflammatory process involving the tissues posterior to the orbital septum originating most often via direct spread from preceding sinus disease, skin infection, lacrimal system disease, or, less commonly, from extension of odontogenic infection, penetrating trauma or hematologic spread of a remote infection. OC may lead to formation of subperiosteal or orbital abscess, vision loss and/or extension into the central nervous system (meningitis, intracranial abscess, cavernous sinus thrombosis). Infection is often polymicrobial in children age 9 years and older, with the most common offending etiologic bacteria being Staphylococcus aureus, Streptococcus species, Haemophilus species, and anaerobic bacteria of the respiratory tract (Peptostreptococcus and Bacteroides, Prevotella, Fusobacterium and Veillonella species). In children younger than 9 years old, it is more often a single aerobic organism. The incidence of methicillin-resistant Staphylococcus aureus depends on local resistance patterns.

Inclusion Criteria

- Pediatric patients age ≥ 2 months and < 18 years old with a diagnosis of orbital cellulitis
- Hemodynamically stable without features of shock or critical illness

Exclusion Criteria (that may warrant additional studies/interventions)

- Clinical features concerning for shock and/or critical illness, including toxin-mediated shock

- Primary or acquired immunodeficiency, such as malignancy, drug-induced (chemotherapy, immunomodulator therapy or chronic high-dose steroids) or HIV
- Recent history of surgery at the site
- Environmental contamination including bite wound, presence of a foreign body or marine or freshwater exposure

Diagnosis

Manifestations of OC can be unilateral or bilateral and suggested by the following orbital signs:

- Eye pain and/or pain with extraocular eye movements
- Impairment of extraocular eye movements
- Proptosis
- Decreased visual acuity and/or abnormal pupillary response
- Conjunctival chemosis

Eyelid and periorbital edema and erythema with ptosis are signs that accompany both pre-septal and post-septal cellulitis. Systemic symptoms like fever, headache and malaise may be present with either OC or pre-septal cellulitis.

Retrograde intracranial spread can be marked by severe headaches (frontal if associated with frontal sinusitis and osteitis), nuchal rigidity and meningismus, lethargy, seizures, and altered mental status. Intracranial extension can result in meningitis, intracranial abscess, cavernous sinus thrombosis, and frontal bone osteomyelitis.

Management Recommendations

Consultations:

- Ophthalmology
- Otolaryngology (if sinus disease present)
- Pediatric Infectious Diseases (ID)
- Neurosurgery (if intracranial extension is present or suspected)

Laboratory:

should be performed to establish baseline level of inflammation and evaluate end-organ function:

- Complete blood count with differential (LAB293)
- Renal function (LAB15)
- C-reactive protein (LAB149)

- Erythrocyte sedimentation rate (LAB1035)
- Blood culture (Not required; consider obtaining with severe local disease or if there is concern for intracranial extension) (LAB7646)

Imaging:

often used to confirm the diagnosis of OC and evaluate for complications, such as subperiosteal or orbital abscess formation

- Preferred initial modality: contrast-enhanced computed tomography of the orbit and sinuses
- Magnetic resonance imaging with and without contrast can be used if intracranial extension (including cavernous sinus thrombosis) or radiolucent foreign bodies are suspected.
- Lumbar puncture: should be considered, after assessing for signs of increased intracranial pressure, in the appropriate clinical scenario (severe headache, nuchal rigidity, meningismus, lethargy, seizures, and altered mental status) and/or in very young infants for evaluation of meningitis.
    - Cerebrospinal fluid should be sent for:
        - Cell counts with differential (LAB1022)
        - Protein (LAB118)
        - Glucose (LAB611)
        - Routine bacterial Gram stain and culture
- Routine Gram stain and bacterial culture of orbital/subperiosteal abscess fluid should be performed if sample is obtained.
- Swabs of conjunctiva should not be sent for culture.

First Line Antibiotic Recommendations based on presence or absence of intracranial extension

See above for definition and examples of intracranial extension, if unclear, consult with ID.

First-line therapy (without concern for intra-cranial extension)

- Vancomycin IV (dosing per UISFCH guideline), AND
- Ampicillin/sulbactam 50 mg/kg/dose (dosing based on ampicillin component) IV (MAX 2 grams of ampicillin per dose) every 6 hours

OR

- For patients with an IgE-mediated allergy to penicillin/ampicillin:
    - Vancomycin IV (dosing per UISFCH guideline), AND
    - Ceftriaxone 50 mg/kg/dose (MAX: 2 grams) IV every 24 hours

OR

First-line therapy (with concern for intra-cranial extension, see examples above)

- Vancomycin IV (dosing per UISFCH guideline), AND
- Ceftriaxone 50 mg/kg/dose (MAX 2 grams) IV every 12 hours, AND
- Metronidazole 10 mg/kg (MAX 500 mg) IV every 8 hours

For patients with severe non-IgE mediated reactions to first-line therapies please consult pediatric infectious diseases for recommendations.

Adjust empiric antimicrobial therapy based on culture and susceptibility data.

Additional Treatment Considerations

- Head of bed elevated to greater than 30 degrees to minimize dependent edema
- Warm compresses to increase vasodilation
- Frequent vision checks (at least every 4 hours)
- Sinus protocol per otolaryngology if sinusitis present
- Surgical management:
  - Decision around the need for surgical management is largely at the discretion of ophthalmology with input from other consulting services.
- Corticosteroids:
  - There is insufficient evidence to routinely recommend systemic steroids for all patients with orbital cellulitis
  - While some studies support the safety of adjunctive corticosteroids and the potential for shorter length of stay, a recent study concluded that steroids may not reduce hospital stay and may increase 30-day readmissions in childre
  - Systemic steroids may be considered in select cases after discussion with all consultants

Abbreviations

IV: Intravenous, OC: Orbital Cellulitis, ID: Infectious Disease

References

1. Tsirouki T, Dastiridou AI, Ibánez Flores N, Cerpa JC, Moschos MM, Brazitikos P, Androudi S. Orbital cellulitis. Surv Ophthalmol. 2018 Jul-Aug;63(4):534-553.
2. Hamed-Azzam S, AlHashash I, Briscoe D, Rose GE, Verity DH. Common Orbital Infections ~ State of the Art ~ Part I. J Ophthalmic Vis Res. 2018 Apr-Jun;13(2):175-182.
3. Hauser A, Fogarasi S. Periorbital and orbital cellulitis. Pediatr Rev. 2010 Jun;31(6):242-9.
4. Leszczynska MA, Sochet AA, Nguyen ATH, Mateus J, Morrison JM. Corticosteroids for Acute Orbital Cellulitis. Pediatrics. 2021 Nov;148(5):e2021050677.
5. Kornelsen E, Mahant S, Parkin P, Ren LY, Reginald YA, Shah SS, Gill PJ. Corticosteroids

for periorbital and orbital cellulitis. Cochrane Database Syst Rev. 2021 Apr 28;4(4):CD013535.
6. Davies BW, Smith JM, Hink EM, Durairaj VD. C-Reactive Protein As a Marker for Initiating Steroid Treatment in Children With Orbital Cellulitis. Ophthalmic Plast Reconstr Surg. 2015 Sep-Oct;31(5):364-8.
7. Chen L, Silverman N, Wu A, Shinder R. Intravenous Steroids With Antibiotics on Admission for Children With Orbital Cellulitis. Ophthalmic Plast Reconstr Surg. 2018 May/Jun;34(3):205-208.
8. Harris GJ. Subperiosteal abscess of the orbit. Age as a factor in the bacteriology and response to treatment. Ophthalmology 1994;101(3):585-95.
9. Harris GJ. Subperiosteal abscess of the orbit: computed tomography and the clinical course. Ophthal Plast Reconstr Surg 1996;12(1):1-8.
10. Garcia GH, Harris GJ. Criteria for nonsurgical management of subperiosteal abscess of the orbit: analysis of outcomes 1988-1998. Ophthalmology 2000;107(8):1454-6; discussion 7-8.

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References

- CHOP Clinical Pathway
- Iowa Stead Family Childrens Hospital Guidelines v5.2023