GUIDELINES FOR MANAGEMENT OF PEDIATRIC ORBITAL CELLULITIS

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Definition: Pediatric orbital cellulitis (POC) is defined as inflammation of the orbital contents posterior to the orbital septum. The degree of orbital involvement is variable, ranging from orbital fat inflammation to abscess formation and potential venous sinus thrombosis seen in severe cases. It is a serious condition that if not recognized and managed appropriately can lead to significant visual and life-threatening complications.

Incidence: Orbital complications are cited to occur from 0.5-3.9% of cases of acute sinusitis. Cases of POC appear to peak during the winter months, mirroring that of acute sinusitis and viral respiratory illnesses. Dell Childrens Medical Center sees approximately 10 cases of POC a year, with December and January having the highest frequency.

Etiology: The majority of cases of POC are caused from direct extension of a paranasal sinusitis, with the ethmoid sinus being the most commonly involved. Bacteria that have been associated with POC include Staphylococcus aureus (MRSA and MSSA), Haemophilus influenzae, Streptococcus pneumoniae, Streptococcus pyogenes, Streptococcus milleri group, Moraxella catarrhalis, and anaerobic organisms. Though single isolates occur most frequently, infections can be polymicrobial, especially in older children.

Differential Diagnosis:
- Infection
  - Bacterial
  - Fungal
- Idiopathic inflammation
  - Orbital pseudotumor
  - Myositis
  - Sarcoidosis
- Malignancy
  - Retinoblastoma
  - Leukemia
  - Rhabdomyosarcoma
- Trauma

Guideline Eligibility Criteria:
Patients >6mo of age with periorbital edema and clinical signs concerning for orbital involvement.

Guideline Exclusion Criteria:
- Known or clinically obvious orbital trauma
- Known malignancy or immunodeficiency
- Abnormal orbit or maxillofacial anatomy
- Clinical signs of severe sepsis/shock

Diagnostic Evaluation:
Clinical suspicion is based on exam findings suggestive of orbital involvement and should be evaluated in any patient presenting with periorbital edema and/or erythema.

Physical Examination:
In the presence of periorbital edema and/or erythema:

Mild to Moderate Symptoms
- Alert, appropriate mental status for age
- Pain with extraocular movements
- Ophthalmoplegia
- Proptosis
- Chemosis
- Conjunctivitis

Severe Symptoms
- Altered mental status
- Change in visual acuity
- Severe headache
- Pupillary defect
- Bilateral symptoms
- Seizure or history of seizure on presentation
Evidence Supports

- Initial medical management alone for patients with mild to moderate symptoms\textsuperscript{10-17}
- Empiric MRSA coverage based on regional data\textsuperscript{1,3,5-9}
- Transitioning to PO antibiotics for completion of therapy once clinical improvement documented for patients with mild to moderate disease\textsuperscript{4}

Evidence Lacking/Inconclusive

- Use of systemic steroids in routine management of POC\textsuperscript{18-20}
- Use of intranasal saline and decongestants in routine management of POC

Evidence Against

- Use of routine laboratory tests for assessment of disease severity\textsuperscript{3,7,16}

Practice Recommendations and Clinical Management

Imaging

CT of orbits with IV contrast is the recommended initial study for evaluation of patient with suspected POC.
If able, use of image-guidance protocol for the study can provide valuable intra-operative assistance if needed.

MRI/MRV of brain to be considered in patients presenting with severe disease or if concern for intracranial extension or thrombosis.

Surgical intervention

Not routinely indicated as part of initial management in patients with mild to moderate disease even in the presence of a subperiosteal abscess.
\textbf{(Strong recommendation, moderate-quality evidence)} indicated in patients with severe, vision threatening symptoms and to be considered in patients not responding to medical management alone.

Laboratory Evaluation

No laboratory test has been shown to correlate directly with clinical severity on presentation.

Trending laboratory values such as WBC count, CRP may be a helpful adjunct to clinical exam in determining response to therapy.

Blood culture, when positive, can be helpful in identifying causative organism, particularly in moderate to severe disease. Overall positivity reported between 7-10% of patients with pediatric orbital cellulitis.

Patients on Vancomycin need appropriate monitoring laboratory evaluations including serum creatinine.

Adjunctive Therapies

Systemic steroids may be beneficial in reducing symptoms of acute sinusitis and therefore may be helpful in symptom management of children with pediatric orbital cellulitis, though there currently is not adequate evidence for their role in this specific disease process.
\textbf{(Weak recommendation, low-quality evidence)}

Antibiotics

See Addendum #1 for specific details

- IV Clindamycin + Ceftriaxone is recommended as initial therapy for patients with POC classified as mild to moderate.
- IV Vancomycin + Ceftriaxone is recommended as initial therapy for patients with POC classified as severe, failure to improve on initial therapeutic regimen or concern for intracranial involvement.
- Narrow antibiotic coverage if able based on culture results.
- ID consultation suggested for patients not responding to initial therapy, patients with severe disease or for assistance with antibiotic directed therapy against specific organism.
- Transition to PO antibiotics is recommended based on documented clinical improvement and readiness for discharge (see discharge criteria).
- PO transition to Clindamycin + Augmentin is recommended in patients who demonstrate clinical improvement and in whom no species is identified as the source of infection.
- Total duration of therapy should be 14 days based on recommended treatment for acute bacterial sinusitis.

Decongestants\textsuperscript{1}

- Consider use of intranasal oxymetazoline for children $>$6 years of age as adjunctive therapy to decrease sinus inflammation
  - Dose 2-3 sprays in each nostril BID. Maximum duration of therapy: 3 days.
  \textbf{(Moderate recommendation, low-quality evidence)}

- Generally not recommended in children $<$6 years of age due to risk of CNS depression. May consider usage in younger children ($>$1 year of age) in the inpatient setting with close clinical monitoring.

- Consider use of intranasal saline as adjunctive therapy to promote sinus drainage.
\textbf{(Weak recommendation, low-quality evidence)}
Steroids

- Though not recommended for routine use, can consider systemic steroids in patients with POC classified as Chandler I or II (no abscess) after 24h of IV antibiotics if felt necessary by the care team
  - Dosing range cited in the literature is typically 1-1.5 mg/kg/day divided BID for 1 week
  - (Weak recommendation, low-quality evidence)
  - No specified evidence identified for adjunctive decongestant therapies in treatment of pediatric orbital cellulitis. Recommendation based on expert opinion and evidence extrapolated from management of acute sinusitis as POC is most often identified as a complication of such.

Monitoring

- Patients should be placed with the head of the bed elevated 30°
- Visual acuity and symptom documentation should occur at least BID (photographic documentation preferred)
- Patients should be managed in conjunction with Pediatric Ophthalmology and Pediatric ENT. Oculoplastics may also need to be involved for patients requiring drainage of non-medial abscesses (unable to be drained via FESS procedure)

Admission Criteria

- All patients with evidence of orbital disease should be admitted for initiation of medical management
- Patients with severe symptoms require urgent discussion with Pediatric Ophthalmology and ENT to determine need for immediate surgical intervention

Discharge Criteria

- Improved periorbital edema (able to fully open eye)
- Afebrile for minimum of 48 hours
- Full or baseline extraocular movements

Patient Disposition

Follow-Up Care

- Patients should have scheduled follow-up with pediatric ENT and pediatric ophthalmology as well as their primary care pediatrician prior to discharge
- Appropriate anticipatory guidance should be given regarding when to return to ED or notify providers prior to discharge

Prevention

- Patients with recurrent sinusitis should be followed by pediatric ENT to ensure appropriate preventative therapies
- Early recognition of symptoms is key in appropriate diagnosis and intervention to reduce sequelae

Outcome Measures

- Antimicrobial guideline adherence
- Hospital Length of Stay
- Provider documentation of symptoms
- Readmissions for same diagnosis/failure of outpatient management
Inclusion Criteria
Children > 6 months of age with periorbital edema with any of the following:
- Pain with EOM
- Ophthalmoplegia
- Proptosis
- Chemosis
- Conjunctivitis

EXCLUSION CRITERIA
- Known or clinically obvious orbital trauma
- Known malignancy or immunodeficiency
- Abnormal orbit or maxillofacial anatomy
- Clinical signs of severe sepsis/shock

Antibiotic Therapy:
- **Clindamycin** 13 mg/kg IV q8h | max 600 mg/dose
- **Ceftriaxone** 75 mg/kg IV q24h | max 2000 mg/dose

Evidence of orbital disease?

Document (if able):
- Visual Acuity
- Limitations in EOM
- Ability to open eye
- Degree of proptosis
- Mental status

Medical Management:
- Oxymetazoline nasal spray BID
- Elevate HOB 30°
- BID visual acuity, symptom documentation
- Serial photographs of involved eye (if able)
- Laboratory Tests: CBC, CRP, & Blood Culture

DISCHARGE CRITERIA
- Improved periobital edema (able to fully open eye)
- Afebrile for minimum of 48 hours
- Full baseline extraocular movements

DISCHARGE

1. Transition to oral antibiotics
   First-Line Antibiotic: (Refer to Addendum 1 for antibiotic guidance)
   TOTAL 14 day course of antibiotic therapy IV + PO
2. Prescribe probiotics
3. Outpatient ENT, Ophthalmology follow-up appointment scheduled prior to discharge.
Addendum 1:
Antimicrobial Management Recommendation for Pediatric Orbital Cellulitis at Dell Children’s Medical Center

Severe Disease or Concern for CNS involvement

- **Vancomycin** 15mg/kg IV q6h (max 1000mg/dose)
  and
- **Ceftriaxone** $100mg/kg/day IV divided q12 (max 2000mg/dose)

*Can also add **Metronidazole** 30mg/kg/day IV divided q8h (max 1500mg/day) for increased anaerobic coverage

Clinically Stable Patients with Mild-Moderate Disease

- **Clindamycin** 13mg/kg IV q8h (max 600mg/dose)
  and
- **Ceftriaxone** 75mg/kg IV q24h† (max 2000mg/dose)

Oral Antibiotic Transition§

- **Clindamycin** 10mg/kg PO TID (max 450mg/dose)
  and
- **Amoxicillin-Clavulanate**† 90mg amoxicillin/kg/day divided BID (1000mg/dose max)

§ Treatment duration should be for a total of 14-21 days as recommended for the management of acute bacterial sinusitis
† For patients with a history of Type I reaction or SEVERE adverse reaction to penicillin and/or cephalosporins

Documented acceptable substitution includes:

- **Levofloxacin** <5 years: 10mg/kg/dose IV q12h (max 750mg/day)
  ≥5 years: 10mg/kg/dose IV q24h (max 750mg/day)
  *Then*
- **Levofloxacin** <5 years: 10mg/kg/dose PO BID (max 750mg/day)
  ≥5 years: 10mg/kg/dose PO Daily (max 750mg/day)
References

Microbiology

Surgical Management

Steroids
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Approved by the Pediatric Orbital Cellulitis Evidence-Based Outcomes Center Team

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