Case report

Resolution of refractory orbital cellulitis in an immunocompetent child: A case report

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ABSTRACT

Introduction: Orbital cellulitis in children is a potentially fatal emergency and develops rapidly, leading to severe visual loss and life-threatening complications.

Presentation of case: We report a case of a 16-month-old girl who presented to the emergency department unconscious with a four-day history of a swollen right eyelid. CT scan revealed soft tissue swelling at the superior and inferior palpebral region with bilateral maxillary sinusitis. She had a severe sepsis and received intravenous antibiotics. After her general condition improved, she underwent surgical drainage in conjunction with mini-FESS (functional endoscopic sinus surgery)-the culture of purulent material from which Staphylococcus Aureus was isolated. After a few days, she had hospital-acquired pneumonia, and an abscess in her right eyelid reformed. Immunoglobulin test and lymphocyte subset test was normal. The patient underwent re-surgical drainage and had complete resolution of refractory orbital cellulitis.

Discussion: Severe refractory orbital cellulitis secondary to indolent infection is oftentimes found in immunocompromised patients or in those with underlying ocular diseases; our immunocompetent patient had a seemingly mild case of sinusitis which quickly progressed to severe orbital cellulitis. Oftentimes, broad-spectrum antibiotics are sufficient to treat orbital cellulitis, however, the same cannot be said for our patient, abscess reformed despite appropriate definitive antibiotic therapy in accordance with the culture results.

Conclusion: While the main treatment of orbital cellulitis is administration of antibiotics, in certain conditions as found in our patient, patients may not respond well to conservative treatment. Thus, close monitoring is essential, and any sign of progression warrants prompt surgical drainage.

1. Introduction

Orbital cellulitis is an infective process that involves the tissues posterior to the orbital septum [1,2]. Orbital cellulitis can affect all age groups and pediatric patients more frequently because the immune system is still immature [3]. Early diagnosis and prompt treatment of orbital cellulitis, especially in children, is crucial because orbital cellulitis is an emergency case that can potentially progress to numerous complications [4,5]. Orbital cellulitis typically resolves well after antibiotic therapy; however, refractory cases require special attention.

Here, we describe a case of refractory orbital cellulitis in an immunocompetent child who initially had a seemingly indolent infection that presented at our academic institution. The case eventually resolved with a good visual outcome following antibiotic therapy and surgical drainage.

Our case has been prepared and reported in line with the SCARE 2020 criteria in: “The SCARE Statement: Consensus-based surgical case report guidelines” [6].

2. Presentation of case

A 16-month-old female patient presented to the emergency room in an unconscious state with right eyelid swelling which had progressed rapidly over four days (Fig. 1). Patient had no history of medication prior to this. Patient was admitted and continuously monitored for clinical changes supported by repeat laboratory tests and radiological imaging. On admission, the patient was febrile at 102 ºF. Ophthalmologic examination revealed conjunctival chemosis with subconjunctival hemorrhage. Eye movement and visual acuity could not be assessed due to the patient’s unstable condition. CT scan revealed marked soft tissue...
swelling at the superior and inferior palpebral region to the right pre-auricular region with bilateral maxillary sinusitis (Fig. 2). One day after admission, the patient had a seizure and diarrhea. White blood cell count was 5.17 × 10⁹/µL with a procalcitonin (PCT) of 3.97 ng/mL and C-Reactive protein (CRP) of 37.2 mg/L, and cerebrospinal fluid analysis was within normal limits. The patient received intravenous ampicillin-sulbactam for four days. On the fourth day of treatment, the patient had severe sepsis and in accordance with our hospital protocol was immediately started on intravenous meropenem as an additional antibiotic, especially considering the patient’s deteriorating condition along with elevated infection marker where PCT increased to 46.59 ng/mL. The right palpebra became tender and the inferior palpebra produced purulent discharge. Although blood culture upon admission showed no bacterial growth, the discharge culture results taken on the fourth day was found to be positive for *Staphylococcus aureus*.

On the eighth day of treatment, the patient’s general condition improved. Meropenem was stopped after being given for 5 days and was switched to intravenous cefoperazone-sulbactam based on the discharge culture results and the patient’s general improvement. The following day, however, the right peri-orbital swelling began to worsen (Fig. 3). A repeat CT scan demonstrated that the cellulitis had progressed with thickening of the anterior orbita until the right post-septal area and isodense mass at the extraconal region at the lateral side of the right orbita with thickening of the wall mass due to inflammation (Fig. 4). She underwent surgical incision and complete drainage of the right eyelid abscess in conjunction with Functional Endoscopic Sinus Surgery (mini-FESS) which was conducted by the author as the consultant ophthalmology surgeon. Biopsy of the fat and nasal mucosa was done, and the purulent discharge from drainage was taken for culture. After the procedure, significant improvement of the periorbital swelling was noted (Fig. 5).

Three days after first procedure, the patient had hospitalized-acquired pneumonia (HAP) and received intravenous vancomycin, a third-line antibiotic, based on hospital protocol and intra-operative discharge culture results that showed *Staphylococcus aureus* resistant to ampicillin. Methylprednisolone was also administered to the regimen when her infection marker results decreased (CRP of 7.3 mg/L and PCT of 0.16 ng/mL).

On the 20th day of the treatment, the right eyelid swelling increased again, with excessive production of purulent discharge in the drainage tube indicating the formation of refractory abscess. The patient was tested for immunocompetence; however the immunoglobulin test and lymphocyte subset test were within normal limits, indicating the patient was an immunocompetent child. Administration of methylprednisolone and vancomycin was stopped. The patient then underwent surgical re-drainage and received only intravenous cefoperazone-sulbactam afterwards.

Over the next five days, gradual improvement of periorbital swelling and the absence of purulent discharge was observed (Fig. 5) and the patient was discharged after 29 days of inpatient care. The patient was instructed to return for routine monitoring at a weekly rate via outpatient care, and we assessed for any clinical changes and visual acuity. Patient was given oral amoxiclav for six weeks through outpatient clinic at our centre. After one month of follow-up, her visual acuity was good, and no late complication was detected. Patient and guardian expressed satisfaction and relief with the patient’s good outcome after nearly one month of inpatient treatment.

3. Discussion

Orbital cellulitis is diagnosed clinically by the presence of proptosis, orbital pain, chemosis, restriction of the extraocular muscles, and conjunctival injection [7]. An orbital scan, the culture of discharge, blood culture, and immediate treatment with intravenous broad spectrums antibiotics are essential in managing orbital cellulitis [8]. Orbital CT Scan with paranasal sinuses expansion 24 h after the onset can help to exclude differential diagnosis and monitor the progression of cellulitis [9].

Sinusitis is one of most common causes of orbital cellulitis, and the most common source, especially in young children, is the ethmoid sinus [10]. Infection from the ethmoid sinus can easily spread to orbit and may lift off the loosely attached periosteum in the anterior orbit resulting in a subperiosteal abscess [11]. In our case, the evaluation of CT scan showed bilateral maxillary sinusitis. However, the severity of sinusitis was mild, and we suspect that this was not the likely source of the right orbital cellulitis. Nevertheless, we immediately administered a broad-spectrum antibiotic, ampicillin-sulbactam, to our patient. The empirical antibiotic should be given immediately after orbital cellulitis is diagnosed in children, and the initial regimen can be modified accordingly based upon culture results [1,12].

*Staphylococcus aureus* was isolated from our patient’s purulent secretion and is consistent with other studies, in which the most common bacterial causes of periorbital and orbital cellulitis are *Staphylococcus aureus* and *Streptococcus* sp. [13]. Recent reports have also documented infection of methicillin-resistant *Staphylococcus aureus* (MRSA) as an etiology of orbital cellulitis even in a non-immunocompromised child [14,15]. Empirical antibiotic therapy of suspected orbital cellulitis should cover a broad-spectrum of pathogens, including gram-positive, gram-negative, and anaerobic bacteria [16]. In regions with high incidence of MRSA infection, addition of vancomycin or meropenem may be warranted [12]. Our patient received intravenous ampicillin-sulbactam as the initial empirical therapy before switching to cefoperazone-sulbactam. Due to the patient’s sudden worsening condition and additional diagnosis of hospital-acquired pneumonia, the patient was then given intravenous vancomycin.

Administration of systemic corticosteroids in addition to antibiotics has been reported to be potentially beneficial in treating refractory orbital cellulitis in children [17]. In our patient, despite systemic corticosteroid administration in addition to broad-spectrum antibiotics, the abscess still reformed. As for surgical intervention, the presence of a

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**Fig. 1.** External photograph demonstrating the right eyelid swelling.
Fig. 2. Computer tomography of head and orbits showing a soft tissue swelling at the superior and inferior palpebral region until the right preauricular region with bilateral maxillary sinusitis.

Fig. 3. (a) Preoperative photograph prior to drainage of the right orbital cellulitis, 7 days after administering the broad-spectrum antibiotic. (b) Postoperative photograph after surgical drainage.

Fig. 4. Repeat CT scan demonstrated that the cellulitis had progressed with thickening of the anterior orbita until the right post-septal area and isodense mass at the extraconal region at the lateral side of the right orbita with thickening of the wall mass due to inflammation.
well-defined abscess, significant visual impairment and/or complete ophthalmoplegia, and no clinical improvement despite appropriate antibiotic therapy are indications for surgical drainage for orbital cellulitis [8]. The patient finally improved after the second surgical drainage. Kobayashi et al. and another study reported that surgical drainage might be necessary to be performed in infantile orbital cellulitis associated with MRSA due to rapid development of the abscess [14,15]. A study by Sharma et al. also reported patients with worsening clinical condition of orbital cellulitis and were proceeded to be treated with surgery [4]. More indolent infections causing refractory orbital cellulitis in MRSA are associated with underlying ocular disease, nosocomial infections, and immunocompromised status [18]. As such was found in our patient, in which she was not immunocompromised and yet a seemingly mild case of sinusitis leads to septic refractory severe orbital cellulitis. The patient having nosocomial infection of hospital-acquired pneumonia may have lead to this progression into refractory orbital cellulitis.

4. Conclusion

This case highlights the importance of surgical drainage in treatment of refractory orbital cellulitis, and it can occur in young immunocompetent children despite the use of broad-spectrum antibiotics.

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Ethical approval

None declared, ethical approval was not required for case reports in our institution.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Dian Estu Yulia: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization, Project Administration.

Mutmainah Mahyuddin: Conceptualization, Methodology, Validation, Formal analysis, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization, Project Administration.

Sahar SS Alatas: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization, Project Administration.

Diajeng Ayesha Soeharto: Formal analysis, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization, Project Administration.

Research registration (for case reports detailing a new surgical technique or new equipment/technology)

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None declared.

References

[1] L.T. Lim, D. Miller, E.Y. Ah-Kee, A. Ferguson, Preseptal cellulitis or orbital cellulitis? West Indian Med. J. 65 (2) (2015 Jun) 304–307.
[2] American Academy of Ophthalmology Orbital disorders. In: Pediatric Ophthalmology and Strabismus. San Francisco: American Academy of Ophthalmology; p. 49–50.
[3] T. Tsirouki, A.I. Dastiridou, N. Ibáñez Flores, J.C. Cerra, M.M. Moschos, P. Brazinikos, et al., Orbital cellulitis, Surv. Ophthalmol. 63 (4) (2018) 534–553.
[4] A. Sharma, E.S. Liu, T.D. Le, F.A. Adatia, J.R. Buncic, S. Blazer, et al., Pediatric orbital cellulitis in the haemophilus influenzae vaccine era, J. AAPOS 19 (2015) 206–210.
[5] J.C. Liao, G.J. Harris, Subperiosteal abscess of the orbit: evolving pathogens and the therapeutic protocol, Ophthalmology 122 (3) (2015 Mar) 639–647.
[6] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines, Int. J. Surg. 84 (2020) 226–230.
[7] A possible clinical sign for orbital cellulitis, J. AAPOS 23 (2019) 251.
[8] S. Nageswaran, C.R. Woods, D.K.J. Benjamin, L.B. Givner, A.K. Shetty, Orbital cellulitis in children, Pediatr. Infect. Dis. J. 25 (2006) 695–699.
[9] S.J. Wong, J. Levi, Management of pediatric orbital cellulitis: a systematic review, Int. J. Pediatr. Otorhinolaryngol. 110 (2019 Jul) 123–125.
[10] A. Miller, M. Castanes, M. Yen, D. Coats, K. Yen, Infantile orbital cellulitis, Ophthalmology 115 (2008) 594.
[11] R.A. Crosbie, W.A. Clement, H. Kubba, Paediatric orbital cellulitis and the relationship to underlying sinonasal anatomy on computed tomography, J. Laryngol. Otol. 131 (2017) 714–718.
[12] S. Torretta, C. Guastella, P. Marchisio, T. Marom, S. Bosis, T. Ibbi, et al., Sinonasal-related orbital infections in children: a clinical and therapeutic overview, J. Clin. Med. 8 (1) (2019 Jan) 101.
[13] D. McKenna, E. Reddy, E. McKenna, Pediatric intraorbital abscess: early recognition and management, Clin. Case Rep. 7 (2019) 593–594.
[14] D. Kobayashi, L.B. Givner, R.P. Yeatts, E.Y. Anthony, A.K. Shetty, Infantile orbital cellulitis secondary to community-associated methicillin-resistant Staphylococcus aureus, J. AAPOS 1 (15) (2011 Apr) 208–210.
[15] D.F. Vazan, S.R. Kodsi, Community-acquired methicillin-resistant Staphylococcus aureus orbital cellulitis in a non-immunocompromised child, J. AAPOS 12 (2008) 205–206.
[16] I. Devrim, G. Kanra, A. Kara, A.B. Cengiz, M. Orhan, M. Geyhan, et al., Preseptal and orbital cellulitis: 15-year experience with subbactam ampicillin treatment, Turk. J. Pediatr. 50 (2008) 214–218.
[17] A. Brameli, L. Ashkenazi-Hoffnung, D. Giloni, R. Friling, G. Chodick, D. Landau, et al., Systemic corticosteroids may be beneficial for managing severe or refractory orbital cellulitis in children, Acta Pediatr. 107 (2018) 2028–2029.
[18] M. Amato, S. Pershing, M. Walvick, S. Tanaka, Trends in ophthalmic manifestations of methicillin-resistant Staphylococcus aureus (MRSA) in a northern California pediatric population, J. AAPOS 17 (3) (2013 Jun) 243–247.