

Bilateral Orbital Cellulitis: A Case Report and Management Challenges

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Abstract

To report a case of bilateral orbital cellulitis in a conscious 11-year-old Nigerian girl and the management challenges. Bilateral orbital cellulitis secondary to rhinosinusitis is uncommon but has been reported in the literature in other countries where the diagnosis was made with the aid of necessary tools such as the computerized tomography scan among others. In this case, the challenge associated with the management of the index child is a reflection of the difficulties encountered in the treatment of patients in the developing countries and the importance of a good clinical judgment, early diagnosis, and prompt intervention in the management of bilateral orbital cellulitis. This is a case report of an 11-year-old Nigerian girl of the Igbo tribe. She presented with painful progressive protrusion of the eyeballs and swelling of the lids of 3 days duration. The left eyeball protruded 2 days after the right with no associated history of altered sensorium. A working diagnosis of bilateral orbital cellulitis secondary to rhinosinusitis was made. She was placed on parenteral and topical antibiotics until she recovered. Bilateral orbital cellulitis occurring in a conscious child is uncommon. Prompt and specific treatment should be started empirically, especially in developing countries where the facilities for investigation may not be available or the patients may be financially handicapped. This is particularly important to prevent the possible loss of vision and severe life-threatening complications. This study will be of interest particularly to the ophthalmologists, the otorhinolaryngologists, and the pediatricians.

Keywords: Bilateral, conscious, management challenges, orbital cellulitis

INTRODUCTION

Orbital cellulitis is a common life-threatening infection of the postseptal tissues of the orbit and one of the common causes of orbital inflammation. It occurs most commonly in children and young adults.^[1,2] As many as 11% of cases of orbital cellulitis result in visual loss.^[3]

Orbital cellulitis is an acute inflammatory disorder of the orbit. It is thought to occur as a result of an acute spread of infection from the blood, adjacent sinuses, and facial skin.^[2] Periorbital trauma and dental infection are other sources of spread to the orbit.^[2]

Most cases seen in the hospital and reported in texts are unilateral, only involving the second eye if the cavernous sinus is involved. Direct spread of the disease through the ophthalmic veins to the cavernous sinus and centrifugally to the contralateral orbit through the dura mater has been postulated as the mechanism of involvement of the orbit resulting in bilateral orbital cellulitis.^[4,5] Until recently, this was the only reported

pathway to the development of bilateral orbital cellulitis and thus it influenced the classification of orbital cellulitis with bilateral involvement occurring at the late stages with cavernous sinus infection.^[6,7] There are, however, more recent classifications, most of which are modifications of the classifications by Chandler *et al.*^[6] and Moloney *et al.*^[8] The latest proposal suggested incorporation of radiologic findings to the Moloney classification.^[9]

Regarding the management of orbital cellulitis, the standard protocol includes immediate hospitalization with prompt empirical medical intervention targeting the likely causative organisms with respect to the age of the patient and the presenting history.^[2,3] Prior to medical therapy, a computerized tomography scan (CT scan) should be obtained

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Access this article online

Quick Response Code:



Website:

www.nigerianjournalofophthalmology.com

DOI:

10.4103/0189-9171.207374

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How to cite this article: Achigbu EO, Achigbu KI. Bilateral orbital cellulitis: A case report and management challenges. Niger J Ophthalmol 2017;25:52-5.

and blood samples taken for full blood count analysis and blood culture.^[2,3] Purulent materials from the nose and eyes are also collected for microscopy, culture, and sensitivity.^[3] Magnetic resonance imaging (MRI) is required to make a diagnosis of orbital abscess or determine cavernous sinus involvement.^[3]

Treatment is with broad-spectrum antibiotics and surgical drainage of subperiosteal or orbital abscess when required.^[2,3] The patient stays admitted in the hospital and the intravenous medication continued until he/she is fever-free. Secondary complications such as glaucoma are treated as they arise.^[3]

To the best of authors' knowledge, there has been no previously reported case of bilateral orbital cellulitis in a conscious child in Nigeria.

CASE REPORT

An 11-year-old Nigerian girl of the Igbo tribe presented with painful progressive protrusion of the eyeballs and swelling of the lids of 3 days duration. The right eyeball protruded 48 h before the left eyeball [Figure 1].

There was a history of catarrh of less than a week's duration prior to this. There was also associated history of fever, headache, generalized body ache, and diminution of vision.

Examination revealed an acutely ill looking young girl in severe prostration with a right-sided mid-facial (malar) and nasal swelling displacing the alae nasi. There was nasal blockage and mouth breathing. She was febrile with a temperature of 38.5°C, anicteric, not pale but had tenderness over the maxillary, ethmoidal, and frontal sinuses. There was no swelling or tenderness at the mastoid area.

Ocular examination revealed a visual acuity of 6/24 in the right eye and 6/12 in the left eye and bilateral periorbital swelling worse on the right. There was a non-axial proptosis with inferonasal displacement of the right globe and axial proptosis of the left globe. Other findings include external ophthalmoplegia involving the 3rd, 4th, and 6th cranial nerves, severe conjunctival chemosis, injection, and purulent



Figure 1: Photograph taken on the 2nd day of admission

discharge in the right eye with sluggishly reacting pupils. In the left eye, the features were less marked with no external ophthalmoplegia and brisk pupillary reflex, but tenderness was elicited over the ethmoidal sinus.

The vertical cup disc ratio was 0.7 in the right eye and 0.4 in the left eye. Neither disc edema nor engorged retinal veins were seen.

The patient was admitted into the eye ward as an emergency without an initial admission deposit as the parents had refused admission of the girl on the grounds of financial constraint. The same reason also accounted for the delay in obtaining results of requested investigations. She was, however, started on antimicrobial treatment bearing in mind the common organisms implicated in childhood orbital cellulitis.

The investigations requested were white blood count (WBC) (total and differentials), skull X-ray, CT scan, blood culture, microscopy, culture, and sensitivity of conjunctival discharge.

The investigation results were: packed cell volume: 34%, WBC: 11,000 mm³ with neutrophil: 78%, lymphocytes: 22%, and others: nil. The culture was sterile.

The patient was started empirically on intravenous (IV) ceftriaxone 1 g 12 hourly, IV metronidazole 200 mg 8 hourly, Voltaren eye drop 8 hourly, Lomefloxacin eye drop 12 hourly after an initial loading dose of one drop every 5 min for 25 min, chloramphenicol ointment nocte and oral Diclofenac tablet 25 mg 12 hourly. The drugs for treatment and duration of treatment were subject to review based on clinical findings.

The visual acuity and pupillary reaction were monitored regularly. The ear, nose, throat (ENT) surgeon and the pediatrician were invited to review the patient. A right antral washout was performed on the 3rd day of admission, and about 20 ml of frank pus was drained.

She responded to treatment and became fever-free by day 4 post-admission. She was discharged home after 8 days in the hospital on tablet metronidazole 200 mg 8 hourly, Augmentin (Amoxicillin/Clavulanate) tablet 325 mg 8 hourly, and Betaxolol eye drop 12 hourly. She was scheduled to return for checkup in 1 week. She was, however, lost to follow-up.

DISCUSSION

Infections of the orbit and periorbital tissues are important because they are life-threatening and therefore demand prompt, specific therapeutic management. These infections may spread through the dehiscence of the orbital bony wall or via the venous drainage of the orbit.^[10] These veins, which characteristically have no valves, drain into the pterygoid plexus or the cavernous sinus.^[10,11] The spread to the cavernous sinus may result in septic thrombosis and bilateral cavernous sinus infection, meningitis, or brain abscess.^[3] The bilateral involvement of the cavernous sinus most frequently results in a contiguous spread to the

contralateral orbit. This is the postulated pathway for the development of bilateral orbital cellulitis and it may be associated with altered consciousness if an intracranial abscess develops.^[3]

The index child in the report presented 3 days after onset of symptoms and was well oriented in time, place, and person. It did not appear that there was a posterior spread to the cavernous sinus. She, however, had rhinorrhea, nasal congestion, and malar swelling prior to presentation prompting a working diagnosis of orbital cellulitis secondary to rhinosinusitis. The most common complication of rhinosinusitis in children is orbital cellulitis.^[6,12] Others with increasing severity include subperiosteal abscess, intraorbital abscess, and cavernous sinus thrombosis.^[6,12]

The ethmoidal sinus is the most common source of infection in children, as the frontal and sphenoidal sinuses do not develop until age 7. The index child is an adolescent but her age is consistent with the findings in other reports with bilateral orbital cellulitis.^[13]

Radiological investigations, particularly CT scan and MRI, are keys to the diagnosis of orbital disorders and would have shown clearly the changes occurring within the orbit.^[4] But due to the financial constraints, the radiological investigations ordered were not done and the patient was managed empirically. However, it was assumed that the source of the infection may have been through the ethmoidal sinus. This assumption was based on the increased tenderness noted over the ethmoidal area which was more marked in the right and the fact that anatomically, there are dehiscences in the orbital wall, particularly through the thin wall of the lamina papyracea, neurovascular foramina, and valveless veins which increases the risk of infection of the orbit via the ethmoidal sinus.^[13,14]

Clinically, orbital cellulitis presents with pain, proptosis, globe displacement, double vision and/or vision loss, chemosis, and extraocular motility deficit (ophthalmoplegia). Patients will often have accompanying headache and malaise. In children, fever occurs with equal incidence as in preseptal cellulitis (62%)^[15] while it may be absent in adults 66% of the time.^[16]

Antecedent and significant past medical history may include a history of headache, rhinitis, sinusitis, nasal discharge, and recent upper respiratory tract infection. Decreased visual acuity, pupillary signs, and vision loss may occur rapidly. Optic neuropathy and optic disc edema may be observed.

In bilateral cases as noted in orbital cellulitis classifications, all the above features become more marked and bilateral due to the involvement of the cavernous sinus.^[6,7]

The index child presented with most of the clinical features listed above but had no altered sensorium. The features were less marked in the left eye with axial proptosis but no

ophthalmoplegia. A retrospective review of orbital cellulitis complicating sinusitis showed a preferential involvement of the left orbit in 55% of the cases.^[17]

The authors believe that the left eye involvement was as a result of a direct spread to the left orbit through the ipsilateral ethmoidal sinus. Unfortunately, this could not be confirmed radiologically due to the challenges encountered in the management.

The relatively early presentation of the patient with the timely institution of empirical treatment based on the organisms usually implicated in childhood orbital cellulitis may have limited the effects in the left eye. In children, *Haemophilus influenzae*, *Staphylococcus aureus*, *Streptococcus* species, and anaerobic organisms were implicated as the commonest causes of orbital cellulitis in descending order of frequency of bacteria organisms.^[18] However, recent studies have shown that *S. aureus* and *Streptococcus* species have been implicated in most cases of preseptal or orbital cellulitis.^[17,19-22] It is important to note that sino-orbital infections do not always respect the guidelines, and orbital cellulitis with a potpourri of organisms has been reported in case reports and series.^[16]

The investigations performed on this patient were also limited due to the financial constraints. There was neutrophilia, and the swab culture was sterile similar to other studies.^[13,23]

However, it has been reported that blood and skin microscopy, culture, and sensitivity, though important, usually yields no growth; rather, the swabs taken endoscopically from the paranasal sinus yield better results.^[24,25] Twenty milliliters of frank pus was drained from the maxillary sinus by the ENT surgeon but this unfortunately could not be cultured.

The management of this patient was greatly affected by their financial constraints and the red-tapism associated with seeking hospital waivers even though there was no CT scan machine in the hospital or in its environs at the time of her admission. Financial challenges encountered in the management of orbital cellulitis have been reported by other authors in Nigeria.^[23]

A CT scan or MRI, if available, could have shown if the patient had subperiosteal abscess, orbital abscess, or any sign of intracranial involvement.

The parent (mother) could only afford to purchase 1 g of ceftriaxone injection daily even though the child was meant to receive 1 g 12 hourly.

Generally, the duration of treatment depends on the patient's response. Patients should be treated parenterally until they show evidence of clinical improvement. The patient improved on the instituted therapy and was discharged after 8 days in the hospital on oral drugs. Other studies have reported an average hospital stay of 15 days with a range of 10–25 days.^[5,15]

CONCLUSION

To the authors' best knowledge, bilateral orbital cellulitis at presentation in a conscious child has not been previously reported in Nigeria. Bilateral orbital complication of rhinosinusitis appears uncommon but requires prompt and timely intervention with or without the necessary investigation tools. This is especially important in developing countries with high level of poverty and very limited healthcare management resources so as to avoid preventable morbidities and mortalities.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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