CASE REPORT

Management of Bilateral Orbital Cellulitis in a 41-Year-Old Man

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ABSTRACT

Orbital cellulitis is the inflammation of the tissues of the eye behind the orbital septum. The disease is mainly caused by either bacteria or fungal organisms. Orbital cellulitis is an emergency condition that requires prompt hospitalization and appropriate antibiotic cover without which there will be visual loss and even death! It affects all ages but more common with the younger age groups and males are more prone to the disease. It is a unilateral disease commonly but in rare situations both eyes are affected. We report a case of a bilateral disease in a healthy middle-aged man who presented with fevers, diminished vision, eye pains, lid swellings, severe ptosis, axial proptosis and ophthalmoplegia in both eyes. Our impression was that of Class 5 orbital cellulitis according to Chandler's classification. His laboratory investigations revealed positive growths of *Staphylococcus* otherwise his laboratory investigations were all normal. He responded well to intravenous cefuroxime and oral oflaxacin and metronidazole with diclofenac and was discharged from hospital within 1 week. We conclude that prompt hospitalization and appropriate intravenous and oral antibiotics can successfully treat this orbital emergency.

Keywords: Appropriate antibiotics, bilateral orbital cellulitis, bilateral visual loss, orbital septum

INTRODUCTION

Inflammation of the eye behind or posterior to the orbital septum is called orbital cellulitis. This is different from the preseptal cellulitis which is the inflammation of the eye tissues in front of the orbital septum. The orbital septum is the fascia that extends vertically from the periosteum of the superior orbital rim to the aponeurosis of the levator muscle in the upper lid and from the inferior orbital rim to the inferior border of the tarsal plate of the lower lid. It effectively separates the eyelids from the contents of the orbital cavity. It therefore means any inflammatory process involving tissues of the eye behind or posterior to the orbital septum is referred to as orbital cellulitis and any inflammatory process involving the tissues in front or anterior to the orbital septum is called preseptal cellulitis [Figure 1].

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Depending on the level of the disease, the signs and symptoms of orbital cellulitis could include eye pain, blurring of vision, headaches, fever, generalized malaise, proptosis, lid edema, ophthalmoplegia and conjunctival chemosis, depending on the level of the disease.[1] For instance, for frank preseptal cellulitis there is generalized malaise, fever, gross lid edema but no pain, visual loss or limitation of extra-ocular motility. The condition carries danger with it of both loss of vision and even life. It must therefore be taken as an emergency. It is said that about 11% of cases of orbital cellulitis ends up with a visual loss.

CASE REPORT

A 41-year-old man presented to us with an inability to open both eyes, blurring of vision, swollen eyes, severe headache and sore throat all of 2 weeks duration.

He denied history of HIV or any other debilitating disease, but owned up to the fact that he had suffered from severe catarrh a week before the onset of the eye problems.

His ocular examination revealed a visual acuity of 6/60 in both eyes unaided. There was purulent discharge

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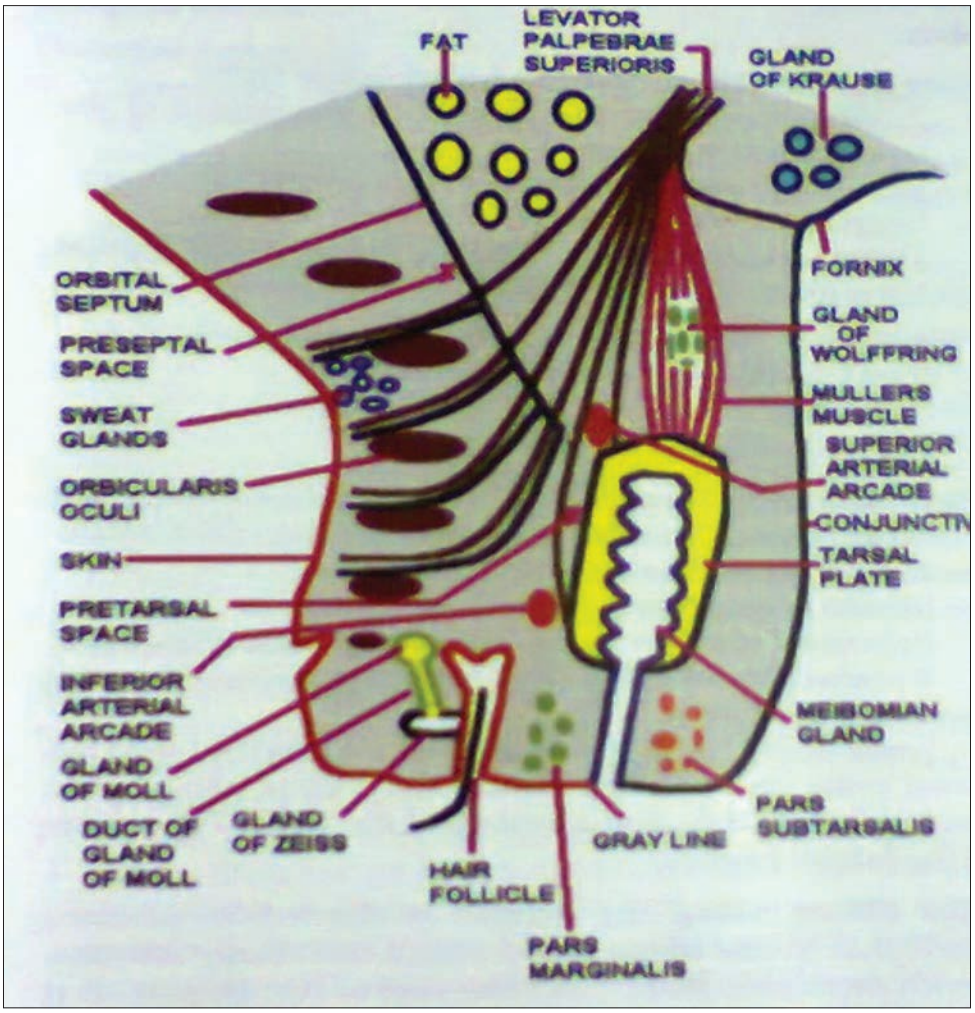

Figure 1: Anatomy of the upper lid showing the various structures including the orbital septum

in both eyes and axial proptosis of 22 mm in both eyes with limitation of extraocular motility in all directions of gaze. There was ptosis of margin reflex distance (MRD-1) of 0 mm and levator function of less than 4 mm. There were conjunctival injections in both eyes also with clear corneas and normal anterior chambers. The pupils were ill-sustained to direct and consensual lights and mild blurring of the disc margins in both eyes.

We made impression of bilateral severe orbital cellulitis type 5 Chandler's classification in view of the bilateral proptosis and extra ocular muscles restrictions. We immediately admitted him into the hospital for the treatment. His laboratory investigation including conjunctival swabs m/c/s revealed positive staphylococcal growth highly sensitive to ofloxacin.

He was commenced on I.V. zinacef 250 mg stat and followed twice daily for the following 3 days. He was also placed on 200 mg ofloxacin tablets twice a day for 7 days with metronidazole 200 mg three times a day for 7 days and diclofenac 50 mg three times a day for 7 days.

His headache disappeared after 48 h but the other symptoms persisted. On the 4th day there was marked improvement in both the symptoms and the signs. The extra-ocular motility improved significantly, but with only mild pain in both eyes on attempted extra-ocular motility. He was discharged from hospital on the fifth day much better with only mild ptosis and lid edema.

2 weeks later, he reported with F.B. sensation in both eyes and photophobia. His ocular examination revealed actively staining punctuate corneal ulcers only. All other findings were normal including better E.O.M. in all positions of gaze and visual acuities.

He was placed on tetracycline capsules 500 mg 4 times a day with subconjunctival injections of 20 mg gentamycin stat and tetracycline ointment 4 times a day in both eyes as we suspected syphilitic keratitis. He was

also placed on atropine eyedrops twice a day to report back after 1 week.

His follow-up examination after 1 week revealed complete cure of all pathologies [Figures 2-5].

DISCUSSIONS AND LITERATURE REVIEW

The pathogenicity of orbital cellulitis is not so straight. One school of thought has it that the acute spread of infection whether bacterial or fungal from the adjacent sinuses, facial skin infections or the blood is the main cause of the disease. The spread from adjacent sinuses to the orbit is facilitated by the valveless interconnecting venous system of the orbit.[2,3] In children, the most implicated sinus is the ethmoidal sinus in which childhood is not fully developed. Unlike the adult orbital cellulitis the childhood orbital cellulitis is due to a single offending organism like an aerobe while the adult orbital cellulitis is caused by multiple organisms.[2]

Another school of thought believes that the incidence of the disease should be sought for along the lines of upper respiratory tract infection, trauma to the eye with panophthalmitis, dental and other systemic illnesses.[1,2]

Both bacterial and fungal microorganisms have been implicated. The most common implicated bacterial microorganisms are the *S. pneumoniae*, other *Streptococcus Species*, *Staphylococcus aureus*, *Haemophilus influenza* and non-spore forming anaerobes. Of the fungal organisms the *Mucor* and *Aspergillus* species are the most common implicated.[4,5]

MANAGEMENT OF ORBITAL CELLULITIS

The management of orbital cellulitis requires a multi-disciplinary approach to ensure prompt and an effective treatment.[6] It also depends on the level or class of the disease and the cause of the disease. Good medical history of the disease and the general

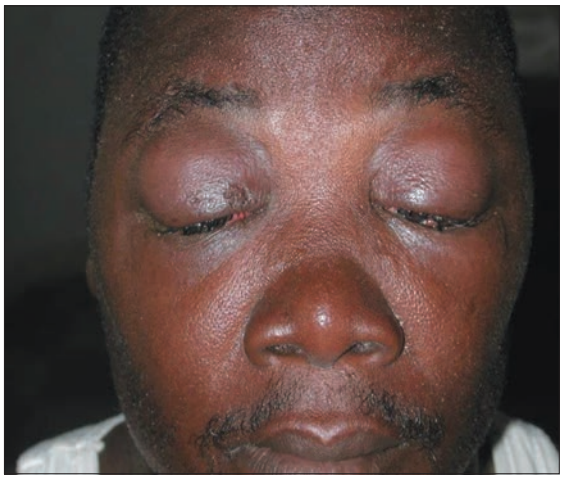

Figure 2: Before antibiotics and anti-inflammatories severe ptosis, proptosis and ophthalmoplegi

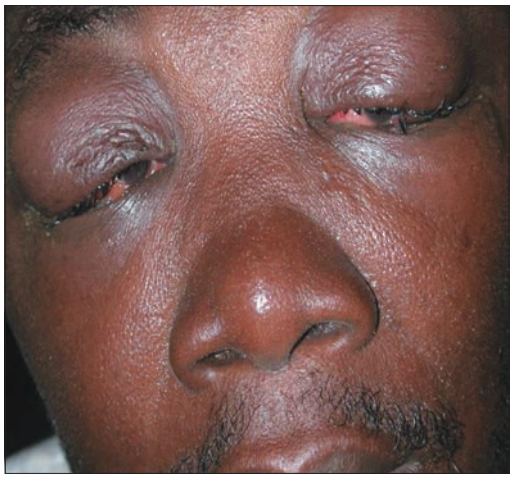

Figure 3: 4 days after commencement of antibiotics and anti-inflammatories decreased lid edema but still significant ophthalmoplegia

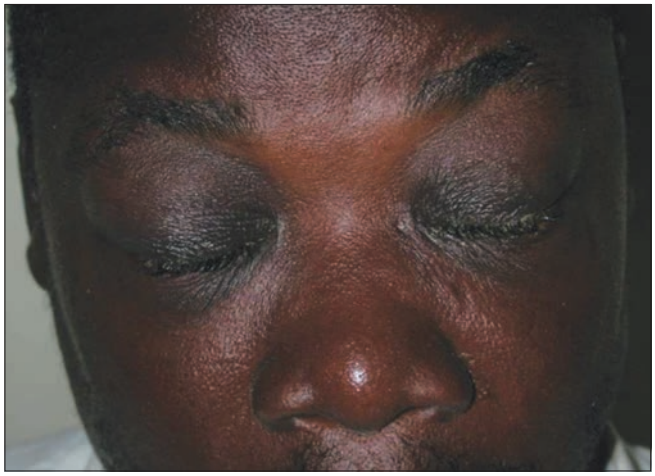

Figure 4: 5th day post commencement of antibiotics and anti-inflammatories- reduced lid edema, better levator function and better extra-ocular muscle activity

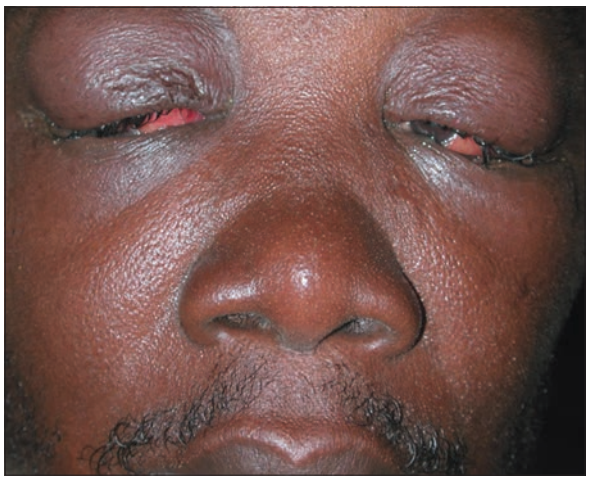

Figure 5: Markedly reduced lid edema as evidenced by marked lid skin wrinkles

medical history of the patient are mandatory. Blood investigations including HIV status, full blood count and differentials, blood cultures and sensitivities are very necessary to rule out blood borne infections. Radiologic investigations including; the plain radiographs of the paranasal sinuses (using the Rhese and the Water's views), the MRI and the CT-scanograms are a must in order to classify the disease and ascertain the level of spread with the source of the infection.[7]

CLASSIFICATION OF ORBITAL CELLULITIS

The classification of orbital cellulitis is based on the level or severity of the disease and it helps in the management of the condition. There are a number of classifications by a number of authorities[3,8] and any classification gives a guide towards the management of the condition. These classifications include:

The Chandler's classification

Chandler's classification of orbital cellulitis is into five classes[3,8] namely:

- Group 1: Preseptal cellulitis—characterized by swollen lids with edema of the orbital content from reduced drainage into the ethmoidal vessels
- Group 2: Orbital cellulitis—characterized by diffuse infiltration of inflammatory cells into the orbital tissue with conjunctival chemosis, mild proptosis, lid swellings and some degree of visual impairment
- Group 3: Subperiosteal abscess—characterized by collection of inflammatory materials under the space between the bones and the periorbital with proptosis, lid edema, chemosis, tenderness over the abscess site, limitation of ocular motility and reduced vision
- Group 4: Intraorbital abscess—characterized by infiltration of the intraorbital soft tissues by purulent materials with more severe pains, fevers, lid swellings and varying degrees of severe visual loss
- Group 5: Cavernous sinus thrombosis—characterized by more proptosis, extra-ocular motility loss in both eyes with severe loss of vision, lid swellings in both eyes and neurological deficit involving the 3th, 5th, 6th cranial nerve and optic neuritis. They have nausea and vomiting with fevers.

The Jain and Rubin classification[3]

Recently Jain and Rubin simplified the classification system into three major classes with 2 sub-classes of the 3rd class as follows:

- Group-1: Preseptal cellulitis
- Group-2: Orbital cellulitis (with or without intracranial complications)
- Group-3: Orbital abscess (with or without intracranial complications)
  - Intraorbital abscess, which may arise from collection of purulent material in an orbital cellulitis
  - Subperiosteal abscess, which may lead to true infection of orbital soft tissues.

The Hubert classification

Hubert classified[9] orbital cellulitis also like Chandler into 5 groups or classes namely:

- Group-1: Inflammatory edema of the lids with or without edema of the orbital contents
- Group-2: Subperiosteal abscess with edema of the lids or spread of pus to the lids
- Group-3: Abscess of orbital tissues
- Group-4: Mild to severe orbital cellulitis with phlebitis of ophthalmic veins
- Group-5: Cavernous sinus thrombosis.

The Smith and Spencer classification

Smith and Spencer classified[9] orbital celulitis also into five groups or classes as follows:

- Group-1: Preseptal cellulitis characterized by edema of the lids without tenderness, no visual loss and no limitation of the extra-ocular motility
- Group-2: Orbital cellulitis without abscess formation- characterized by diffuse edema of the adipose tissues of the orbit
- Group-3: Orbital cellulitis with subperiosteal abscess formation with displacement of the globe, ocular motility restriction with or without visual loss
- Group-4: Orbital cellulitis with intra-periosteal abscess, characterized by more severe globe displacement and restriction of ocular mobility
- Group-5: Cavernous thrombosis characterized by marked restriction of ocular motility out of proportion to the degree of proptosis. A patient also will have normal retropulsion of the globe, hypesthesia in the distribution of the first and second divisions of the trigeminal nerve, dilated retinal veins, orbital congestion, and possibly neurologic defects (e.g. altered sensorium).[10-12]

BLOOD INVESTIGATIONS

Blood and skin microscopy, culture and sensitivity tests- these are important but will usually produce no growths though done before antibiotics administration.[11]

White blood cell count

This is mandatory as it will help confirm the presence and the severity of the disease. In orbital cellulitis, there is usually a shift of the WBC count to the left with marked leukocytosis of over 15,000 and a neutrophil count of more than 10,000/µl suggests increased risk of the disease.[13]

HIV screening tests and fasting blod sugar tests

Immuno-depressive diseases like the HIV and diabetes can alter the course of even mild disease processes in the body. Mild sinusitis in the presence of such immuno-compromising diseases can easily end up in orbital cellulitis, particularly of the fungal type without much inflammation since these patients cannot mount a white blood cell response.[14]

PARANASAL SINUSES' SWABS

Swabs taken endoscopically from the paranasal sinuses particularly the ethmoid sinuses for M/C/S using both the aerobic and anaerobic culture media give better results.[15]

IMAGING STUDIES

Imaging studies like the axial CT scanning is necessary to assess the involvement of the intracranial structures like frontal lobe involvement with epidural and parenchymal brain abscesses, while the coronal view will help assess the presence of subperiosteal abscess. MRI helps in assessing the presence of orbital abscess in general and even the cavernous sinus thrombosis.[14]

MEDICAL TREATMENT

Immediate admission in the hospital in orbital cellulitis is mandatory! Use of antibiotics must take into cognizance the likely source of the disease, the possible implicated organisms from blood together with the local material culture and sensitivity tests results.

The infections of the paranasal sinuses and particularly the ethmoidal sinus are the most implicated source of orbital cellulitis. It is also an established fact that the bacterial organisms that are involved in this disease process are the *S. pneumonia*, *S. aureus*, *H. influenzae*, some non-spore forming anaerobes and other streptococci.[5]

Since the most implicated organisms are the Staph. and Strept. species, broad-spectrum antibiotics including the penicillin and the cephalosporins are used. Some other drugs that can also be used including vancomycin, cefotaxime, doxycycline and clindamycin. Metronidazole has been a drug found effective in the treatment of anaerobic bacterial infections. Its use in our patient is therefore justifiable.[5,12,16]

The antibiotics are initially administered intravenously for 3 days and the response assessed. If there is good response the intravenous route is changed to oral administration. The drugs are continued for the next 2-3 weeks.[17,18]

For fungal infections, antifungal drugs are used and the most commonly used drug is the amphotericin. Corticosteroids have been used particularly in instances where the optic nerve is been threatened as in orbital compartment syndrome. The steroids are however to be administered at least 3 days after the commencement of appropriate antibiotics.[16-18]

SURGICAL MANAGEMENT

A number of surgical procedures have been advocated in the management of orbital cellulitis. These include:

The lumbar puncture: This is required in the case of meningitis evidenced by the presence of neck stiffness and positive Kernig's sign. The cerebro spinal fluid (CSF) is taken for microscopy, culture and sensitivity (M/C/S).[4]

The orbital drainage: This is required in cases of intra and sub-periosteal abscesses. Endoscopically assisted orbital drainage with the aspiration needles is advocated particularly in the medially located abscesses.[19]

The canthotomy or cantholysis: These are indicated in the cases of vision-threatening orbital cellulitis as in tense proptotic eyeballs and the orbital compartment syndromes.

The exenteration: This is indicated in the case of severe fungal orbital cellulitis as in orbital mucormycosis.

The sinusotomy: This is indicated in severe sinusitis highlighted by the plain X-rays

The needle Aspiration: While some frown at needle aspiration of the abscess we advocate cautious use of same procedure in the presence of medially located subperiosteal or intraperiosteal abscess with the help of the endoscopes.[19]

INDICATIONS FOR SURGICAL PROCEDURES IN ORBITAL CELLULITIS

Subperiosteal abscess = Orbital drainage
Intraorbital abscess = Orbital drainage
Fungal orbital cellulitis = Orbital debridement or Exenteration
Severe sinusitis = Sinusotomy
Orbital compartment syndrome = Cantholysis or Canthotomy[7]
Poor response to antibiotics after 48-72 h
In the presence of CT-scan confirmed total sinus opacifications
In decreasing vision
For diagnostic biopsy in atypical cases[4]

COMPLICATIONS OF ORBITAL CELLULITIS

Exposure keratopathy secondary to severe proptosis and lagophthalmos is one of the complications of orbital cellulitis. It is avoidable with close watch on the corneal particularly during sleeps and applying the bandage contact lens or tarsorrhaphy during the lagophthalmos process. Blindness has also been found a complication of the disease process. Blindness most commonly arises from the orbital compartment syndrome with compression of the optic nerve and the central retinal artery. Death is a fatality that is not so common in this era of broad spectrum antibiotics. Gamble in the 1930's during the pre-antibiotics era documented 17% of cases resulted in death from intracranial spread and 20% of cases resulted to blindness.

PROGNOSIS

Although orbital cellulitis is considered an ophthalmic emergency the prognosis is good if prompt medical treatment is received.

SUMMARY AND CONCLUSION

Orbital cellulitis is an ophthalmic emergency with grave outcome for both vision and life and as such all cases should be hospitalized and treated immediately starting with appropriate intravenous antibiotics.[7]

The source of orbital cellulitis must be sought for along the lines of upper respiratory tract infections, trauma to the eye with panophthalmitis, trauma to the face generally, dental infections, and other systemic illnesses.[3]

The diagnosis of orbital cellulitis spans from good history taking of the disease, clinical signs, laboratory investigations including blood cultures, radiological investigations with other plain radiographs, the ultrasonographs, the CT-scanograms and the MRIs.[14]

The treatment of the disease is either conservatively with antibiotics and anti-inflammatories or surgically.

The prognosis of the disease is generally good if promptly attended to.

REFERENCES

1. Chatterjee BM. Hand Book of Ophthalmology. 4th ed. p. 285-7.
2. Nelson LB, Olitsky SE. Harley's Pediatric Ophthalmology. 5th ed. p. 390-6.
3. Gonzalez MD, Durairaj VD. Understanding paediatric bacterial preseptal and orbital cellulitis. Middle East Afr J Ophthalmol 2010;17:134-7.
4. Kanski, Clinical Ophthalmology-A Clinical Approach. 4th ed; Butterworth-Heinmann, Woburn, MA 01801-2041. p. 564-5.
5. Bareja U, Ghose S. Clinicobacteriological correlates of congenital dacryocystitis. Indian J Ophthalmol 1990;38:66-9.
6. Georgakopoulos CD, Eliopoulou MI, Stasinos S, Exarchou A, Pharmakakis N, Varvarigou A. Periorbital and orbital cellulitis: A 10-year review of hospitalized children. Eur J Ophthalmol. 2010 Nov-Dec;20:1066-72.
7. Cafasso J. Cellulitis of Eyelid (orbital cellulitis), Healthline, July 18, 2012.
8. Andres TM, Myers CM 3rd. The role of computed tomography in the diagnosis of subperiosteal abscess of the orbit. Clin Pediatr 1992;31:37-43.
9. Pereira FJ, Velasco e Cruz AA, Anselmo-Lima WT, Elias Júnior J. Computed tomographic patterns of orbital cellulitis due to sinusitis. Arq Bras Oftalmol 2006;69:513-8.
10. Nageswaran S, Woods CR, Benjamin DK Jr, Givner LB, Shetty AK. Orbital Cellulitis in Children. Pediatr Infect Dis J 2006;25:695-9.
11. Georgakopoulos CD, Eliopoulou MI, Stasinos S, Exarchou A, Pharmakakis N, Varvarigou A. Periorbital and orbital cellulitis: A 10-year review of hospitalized children. Eur J Ophthalmol 2010;20:1066-72.
12. Mithra D. Gonzalez and Vikram D Durairaj: Understanding paediatric bacterial preseptal and orbital cellulitis; MiddleEast African J.Ophthalmol. 2010 Apr-Jun;17:134-7.
13. Jacquelyn Cafasso: Cellulitis of Eyelid (orbital cellulitis), Healthline; July 18, 2012.
14. Harley's Pediatric Ophthalmology. 5th ed., chapter 20. Disorders of the Orbit; p. 389-98.
15. Kamath MP, Shenoy SV, Mittal N, Sharma N. Microbiological analysis of paranasal sinuses in chronic sinusitis – A south Indian coastal study. Egypt J Ear Nose Throat Allied Sci 2013;14:185-9.
16. Rybak M, Lomaestro B, Rotschafer JC, Moellering R Jr, Craig W, Billeter M, *et al*. Therapeutic monitoring of vancomycin in adult patients: A consensus review of the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, and the Society of Infectious Diseases Pharmacists. Am J Health Syst Pharm 2009;66:82-98.
17. Löfmark S, Edlund C, Nord CE. Metronidazole is still the drug of choice for treatment of anaerobic infections. Clin Infect Dis 2010;50 Suppl 1:S16.
18. Powell KR. Orbital and Periorbital Cellulitis, Pediatr Rev 2004;25:312-20.
19. Froelich P, Pransky SM, Stearns G, Morgon A. Minimal endoscopic approach to sub-periosteal orbital abscess. Arch Otolaryngol Head Neck Surg 1997;123:280-2.

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