Clinical profile and management outcome of orbital cellulitis in a tertiary care centre

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Abstract

Aim: To identify the etiology, clinical profile, management and outcome of cases of orbital cellulitis admitted to a tertiary care hospital during a period of 2.5 years.

Methods: A retrospective review of medical records of 24 patients with orbital cellulitis from January 2015 to July 2017 was conducted. The age, sex, duration of symptoms, predisposing factors, clinical findings, laboratory and radiological investigations, treatment provided and complications were recorded. Results were analysed with SPSS software.

Results: Sinusitis was the source of infection in 41.7% patients, dacryocystitis, mucormycosis and unknown source in 12.5% each. Diabetes mellitus was the major comorbidity including 41.7% of patients. Cavernous sinus thrombosis developed in 25% of cases, 41.67% of patients recovered without any complications whereas 8.3% patients died.

Conclusion: Orbital cellulitis is a potentially dangerous condition causing morbidity as well as mortality. Cavernous sinus thrombosis is a frequent complication. Early diagnosis and prompt treatment with proper antibiotics and / or timely surgical intervention can achieve good prognosis.

Keyword: Orbital septum, cavernous sinus thrombosis, sinusitis, blood culture, CT scan (computerised tomography), FESS (functional endoscopic sinus surgery).

Introduction

Infections of the orbit have myriad of clinical presentations and is one of the common causes of inflammatory proptosis. Orbital cellulitis is an infection of the tissues posterior to the orbital septum, including the fat and muscle within the bony orbit. Orbital septum prevents the spread of the infection from eyelid into the orbit.(1) Orbital cellulitis needs to be differentiated from preseptal cellulitis which is the infection of eye lids limited by orbital septum.

This condition is sight threatening because of complications like exposure keratopathy with corneal ulcer/opacity and optic atrophy from optic nerve compression. Deaths can also occur as a result of life-threatening complications such as cavernous sinus thrombosis, meningitis and brain abscess.(1,2,3) Bacteria and fungi are the predominant causative microorganisms responsible for the disease. Prompt treatment with appropriate antimicrobial cover prevents or reduces the complications that may arise. Appropriate antibiotic therapy results in dramatic reduction of the complications of orbital cellulitis.(1)

Chandler classification system is widely used and places Orbital Cellulitis patients into five groups[4]:

1. Inflammatory edema (preseptal cellulitis)
2. Orbital Cellulitis
3. Sub periosteal abscess
4. Orbital abscess
5. Cavernous sinus thrombosis

Management traditionally includes intravenous (IV) antibiotics, nasal decongestants and surgical drainage of abscess.

The purpose of this study was to review the causes and clinical features of patients with orbital cellulitis in a tertiary care center and to assess the effectiveness of treatment and the complications in our centre.

Materials and Methods

A retrospective review of the medical records of patients admitted to SDM College of Medical Sciences & Hospital, Dharwad, with a diagnosis of preseptal or orbital cellulitis during the period from January 2015 to July 2017 was made. SDM medical college Hospital Institutional Ethics Board approval was obtained before the evaluating data (case files), which adhered to the tenets of the Declaration of Helsinki.

We have reviewed the case sheets of patients with clinical signs of periorbital oedema, proptosis, external ophthalmoplegia, relative afferent pupillary defect (RAPD) or radiologic evidence involving orbital soft tissue posterior to the orbital septum and were diagnosed as cases of orbital cellulitis. All the patients underwent careful ENT and dental examinations. Visual acuity at presentation, visual acuity at discharge, etiology, blood and conjunctival culture, duration of stay and co-morbidities of all these patients were recorded and analysed. All the patients were treated medically and surgical intervention was done when essential. The outcomes and complications of these interventions were also analyzed.

All patients with facial cellulitis, preseptal cellulitis and the patients who did not have radiological or clinical evidence of orbital cellulitis were excluded from the study.

Results

We identified 24 cases of orbital cellulitis admitted in our hospital during the period from January 2015 to July 2017. There were 14 male patients and 10 female patients. The youngest case was 7 months old baby whereas the eldest was a 70 years old male. The mean age was 42.5 years. Left eye was involved in 14 cases, right eye in 6 and four patients had bilateral disease. Clinically all the patients presented with proptosis, periorbital edema, tenderness, restricted ocular movements and RAPD.

Predisposing factors and co-morbidities:

Etiology of orbital cellulitis was found to be paranasal sinusitis in 10/24(41.7%) cases and mucormycosis and dacryocystitis in 3(12.5%) cases each. Other causes were one case each of chronic suppurative otitis media, vestibulitis and panophthalmitis. One patient presented with cavernous sinus thrombosis. Four cases did not show any definite source. Diabetes mellitus was present in 10/24(41.7%) cases, one had chronic kidney disease, one was post cataract surgery, one case was HIV reactive and 11 were healthy without apparent immunological impairment (Table 1).

The most commonly requested investigations were complete blood counts, blood sugar levels, conjunctival swab for culture and sensitivity, blood culture and CT scan orbit.

Table 1: Etiology

Sinusitis	10	41.6%
cavernous sinus thrombosis	1	4.1%
Dacryocystitis	3	12.5%
Mucormycosis	3	12.5%
Csom	1	4.1%
Vestibulitis	1	4.1%
panophthalmitis	1	4.1%
Unknown	4	16.6%

Microbiological results:

The conjunctival swabs were collected on sterile cotton swabs with wooden applicators and sent to Microbiology laboratory for culture and sensitivity. The samples were examined by Gram stain and processed for culture. In 13 cases no bacterial isolates could be grown form the samples and no records were found in four cases. All the remaining seven cases yielded staphylococci; five giving coagulase negative staphylococci, one grew Staphylococcus aureus while one gave methicillin resistant Staphylococcus aureus. Blood culture was sent in all the patients of which, 17 did not show any growth. For one patient no record could be traced and the remaining six samples were positive for bacterial growth (Table 2).

Table 2: Blood culture

Negative	18	75%
Gnfb*	1	4.1%
MRCONS*	1	4.1%
Staph A	1	4.1%
Acetobacter	1	4.1%
E Coli	1	4.1%
Aspergillus	1	4.1%

***Gnfb-**Gram negative fermenting bacteria,
*MRCONS-Methicilin resistant coagulase negative staphlococci

Radiological findings:

Computerized tomography scans were advised in 23 patients, except one case having panophthalmitis. Para nasal sinus (PNS) involvement was seen in 10(41.7%) cases. One case showed orbital abscess. Five patients had cavernous sinus thrombosis over the course of the disease which was also managed medically (Table 3).

All the patients underwent dental and ENT checkup. Dental checkup did not show any positive finding but ENT examination revealed gross involvement of structure in almost 15 cases.

Table 3: CT scan

Maxillary sinusitis	6	25%
Sphenoidal sinusitis	1	4.1%
pansinusitis	5	20.8%
CSOM*	1	4.1%
Vestibulitis	1	4.1%
Cavernous sinus thrombosis	5	20.8%
Orbital abcess	1	4.1%

***CSOM-**chronic suppurative otitis media,
*3 dacryocystitis and one was panophthalmitis.

Management:

All the patients received medical treatment and 8 patients needed surgical intervention. Medical management involved empirical intravenous (I.V.) course of broad spectrum antibiotics covering gram positive as well as gram negative organisms. Intravenous vancomycin and ceftazidime along with I.V. metronidazole for anaerobic coverage for seven days had been started in all the patients, followed by oral antibiotics for 5-10 days. The antibiotic therapy was changed whenever indicated by the sensitivity report. Additionally nasal decongestants and non-steroidal anti-inflammatory drugs were started to reduce the inflammation. I.V. amphotericin B (liposomal) was started in cases of mucormycosis after ENT consultation.

Topical fluoroquinolone like moxifloxacin was started in cases of chronic dacryocystitis and panophthalmitis. Topical lubricant eye drops, ointment and taping of eyelids was started in severely proptosed eyes to protect the cornea from exposure keratopathy.

Six patients who were not showing improvement within 48 hours with medical management and had radiological evidence of sinusitis (sinus enlarged and filled with pus) were taken up for functional endoscopic sinus surgery (FESS), one needed incision and drainage of orbital abscess. One patient underwent evisceration for panophthalmitis who presented as postoperative case of cataract surgery with orbital cellulitis (Table 4).

Table 4: Management

Medical	14	62.5%
Fess	6	25%
Incision and drainage	1	4.16%
Evisceration	1	4.16%
Lama*	2	8.3%

* left against medical advice

Outcome:

Table 4 shows visual acuity in the affected eye of patients. Visual acuity improved in 9 patients, whose presenting vision was 6/12 to 6/18. Two patients who presented very late with vision status 'no perception of light', did not show improvement, one underwent evisceration and the other presented very late with cavernous sinus thrombosis. In 3 patients visual acuity records were not found – one was preverbal child (<1year old) and the other two could not be examined as they were unconscious since the day of admission.

Duration of stay in hospital

Duration of stay in hospital was minimum 1 day while the maximum was 25 days. Average duration of stay in the hospital was around 8 days (Table 5).

Table 5: Visual Acuity improvement

	VA at Presentation	%	VA at discharge	%
6/12-Better	4	16.6%	9	37.5%
6/60-6/18	6	25%	2	8.3%
<6/60-CF	5	20.8%	5	20.8%
HM +	2	8.3%	1	4.1%
PL+	2	8.3%	2	8.3%
No PL	2	8.3%	2	8.3%
No record Found	3	12.5%	3	12.5%
	24		24	

*CF-Counting fingers,HM-hand movements,PL-perception of light

Of the 24 cases, 11 recovered completely, six progressed to cavernous sinus thrombosis the outcome of other cases is shown in (Table 6).

Table 6: Duration of hospital stay

<5DAYS	1
6-10DAYS	13
11-15 DAYS	3
>15DAYS	3
	20*

*Two expired and two left against medical advice.

Table 7: Complications

Nil	10	41.67%
Cavernous sinus thrombosis	6	25%
Death	2	8.3%
Panophthalmitis	1	4.1%
Lama	2	8.3%
Subperiosteal abscess	1	4.1%
Orbital apex syndrome	1	4.1%
Septicemia	1	4.1%

Discussion

The results of this study confirm, previous observations of sinus etiology as the commonest cause of orbital cellulitis.[3,4,5] Sinusitis as the predisposing factor was found in 10% to 70% of the cases. Sinusitis is reported as a predisposing factor in a study done at Egypt in 64.7% of the patients, chaudhary et al reported 39.4% whereas a study of 23 cases from Saudi Arabia reported 30.4% cases predisposed due to trauma.[5,6,7] In our study 41.67% cases had sinusitis, maxillary sinusitis in four cases (16.6%), one case of sphenoidal sinusitis (4.1%) and pansinusitis in five cases (20.8%). Trauma is second commonly seen predisposing factor for orbital cellulitis reported by Chaudhary et al (19.7%), Pandian et al (24%) and a study from Nigeria (47%) have reported trauma.[5,8,9] We did not find any case of trauma leading to orbital cellulitis. Other reported etiologies are mucormycosis, dacryocystitis, endophthalmitis or dental infection.[5,10,11,12] We found one case of panophthalmitis and 3 cases each of dacryocystitis and mucormycosis of maxillary sinus leading to orbital cellulitis.

CT scan helps to classify the orbital cellulitis according to Chandler's classification[4] and it also useful to confirm etiology like ENT cause or to reveal any orbital or intracranial complication. CT scan orbit and paranasal sinus (axial and coronal) was the imaging of choice for identification of sinusitis and orbital cellulitis in our cases. It also helped us to confirm a case of orbital abscess.[5,10]

FESS was required in 6 of the 24 (25%) of cases of sinusitis to drain purulent material and to relieve intracranial pressure as well as to obtain culture material for identification of causative organisms.[13] Combined endoscopic sinus surgery with transnasal approach for abscess drainage was proven to be an effective method after failed medical management in these cases. One of our case had to undergo incision and drainage of orbital abscess (4.1%). Other series from Egypt, Saudi and Middle East reported orbital abscess formation in 16%, 57% and 53.4% of cases.[5,6,7]

In the present study, blood culture has been sent for all the patients and was found positive in 25% of cases and 75% of samples were not showing any growth. This is comparable with Australian study where they didn't find positive blood culture in there series of 52 patients[11] and Chaudhari et al (5%). In a study by Harris GJ partial antibiotic treatment in some of these patients caused prevention of growth on culture media.[11]

Hospital admission and intravenous (IV) antibiotics are essential in management of orbital cellulitis and after confirmation of diagnosis on CT scan. Different combination of antibiotics have been used in different studies. Pandian et al used a combination of IV Penicillin and Gentamicin in all the patients.[8] Pushker et al initiated combination of Vancomycin and ceftriaxone.[14] We used IV Vancomycin and ceftazidime and metronidazole covering gram negative, gram positive and anaerobic organisms respectively. In case of fungal infection IV Amphotericin B (liposomal) was the choice. Other studies have used Posaconazole and Voriconazole with Amphotericin B.[15] Treatment was modified on our cases if there was lack of clinical improvement or sensitivity reports in surgically treated patients.

Some authors recommend use of oral corticosteroids in combination with antibiotics in order to reduce swelling and inflammation faster.[14] No steroid were used in our patients.

A total of 17 patients showed improvement with only with medical treatment. Indication for surgical intervention was lack of clinical improvement or worsening of clinical signs like proptosis and visual acuity, after 48 hours of initiation of medical treatment, abscess formation on CT orbit or collection of pus in sinuses on CT PNS. Urgent surgical drainage of pus is indicated in case of optic neuropathy.[11] However life threatening complications like meningitis, cerebral abscess and more commonly cavernous sinus thrombosis should be taken into consideration before intervention.[11] In our series, radiological evidence of pus in sinus was seen in 6 cases who underwent FESS, whereas one case of panophthalmitis needed to be eviscerated. One patient had orbital abscess which was drained surgically and pus was sent for culture and sensitivity.

Most commonly done surgical intervention was endoscopic sinus surgery (25%) in our series. Other studies done in Saudi Arabia (60%)[7] and Nigeria (7.1%)[9] had reported orbital abscess drainage was the commonest procedure done by them.

Comorbidities like diabetes mellitus with uncontrolled blood sugar levels which suppresses immunity and causes growth of the organisms[16] were associated in 41.67% of our patients. One patients had chronic kidney disease (8.5%), one was post cataract surgery. 11 patients were immunocompetent without any comorbidities.

Two patients died in the course of disease, one had bilateral orbital cellulitis with septic encephalopathy and other one had septicemia and cerebrovascular accident and both of them had uncontrolled blood sugar levels.

The duration of hospital stay was average eight days having a minimum of one day to a maximum of 25 days. The period was longer in patients who were subjected to surgical intervention as well as not responding to the treatment. The final visual outcome improved in 37.5% cases. Patients presenting with no perception of light did not improve. The patients presenting with very advanced disease (25%) vision remained unchanged. Poor final visual acuity was associated with late presentation, corneal perforation, mucormycosis, progression of disease to cavernous thrombosis (in only one case) and bilateral disease. According to Chaudhary et al, diagnostic delay and late surgical intervention are responsible for poor visual prognosis.[5]

Diagnostic and therapeutic delay might lead to progression of the disease to form orbital abscess.[5] orbital abscess among the orbital cellulitis cases was reported to be 57 % in Saudi,[7] Chaudhary et al 53.7%.[5] A study by Glasser of 46 cases of Orbital cellulitis included 7 (15%) cases of orbital abscess leading to visual loss.[17] However, we found only one case of orbital abscess. Because of active and logical investigations without any delay, the development into orbital abscess might be low in our cases.

Conclusion

Good clinical evaluation, logical use of investigations and commencement of empirical antibiotics in the treatment of orbital cellulitis followed by prompt management of complications significantly improves the outcome and prognosis of orbital cellulitis.

Limitations

There is a possibility of missing data because of retrospective nature of study.

Conflicts of interest

There were no conflicts of interest.

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