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Medical Management as First Line Therapy for Orbital Complications due to acute Rhinosinusitis

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ABSTRACT

Orbital cellulitis is the most common acute complication of ethmoidal sinusitis. A study of 4 cases, presented to ENT OPD with orbital swelling since 3-5 days and ipsilateral nasal discharge. History, CT findings, vitals with ophthalmic evaluation were noted. All the patients received systemic antibiotics with topical decongestant nasal drops and topical eye ointment and drops. Complications of rhinosinusitis result from progression of acute or chronic infection beyond the paranasal sinuses. In children it is more likely that there will be no prior history of sinusitis, the complication often being the first presentation. Early administration of broad- spectrum IV antibiotics can reduce the risk of further life- threatening complications and even abate the need for surgery.

KEYWORDS: Acute Rhinosinusitis, complications of sinusitis, medical management, Orbital abscess, Orbital cellulitis, Topical decongestant.

CITATION OF THE ARTICLE



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I. INTRODUCTION

Rhinosinusitis is an inflammation of the paranasal and nasal sinus mucosae. It is a more accurate term than “sinusitis” since it is almost always preceded by or associated with symptoms of rhinitis. It is classified according to the duration of signs: acute (up to one month), subacute(one to three months) or chronic (more than three months).Orbital infections can result from multiple different causes such as initial sinusitis, trauma, dental abscess, peribulbar operations, closed fractures, dacryocystitis, immunosuppression, and so forth. [16] Orbital cellulitis is by far the most common acute complication of ethmoidal sinusitis.3% of all sinusitis cases will progress to orbital cellulitis with 60-85% of orbital cellulitis cases being secondary to sinusitis.[1][7] The objective of this study was to review those cases where orbital complications had developed due to rhinosinusitis, and to compare them with the current state of knowledge, as reflected in the literature on this topic. Here is a case series of patients diagnosed with orbital involvement due to acute infective rhino sinusitis, who presented to ENT OPD between September2021 to November 2021. The emphasis was on clinical presentation, management and outcome.

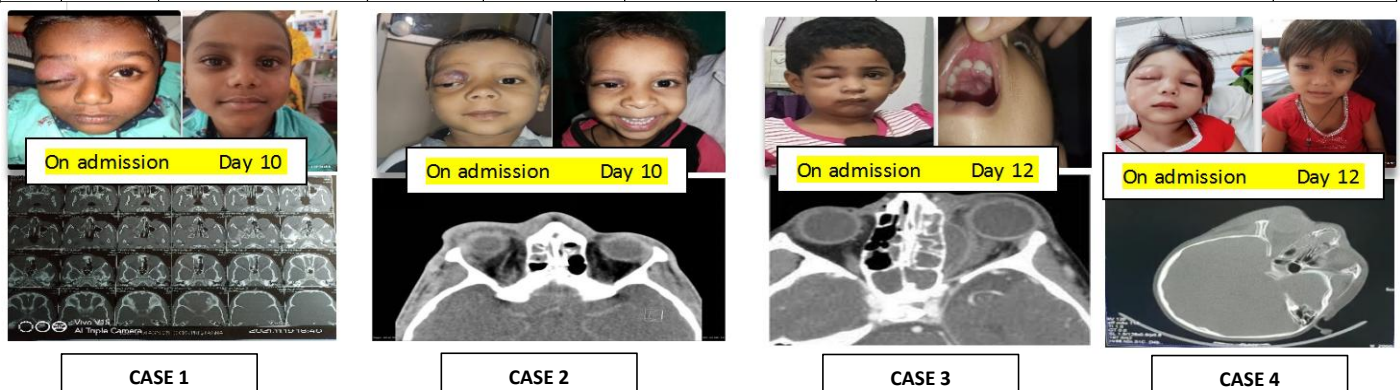
II. MATERIALS AND METHODS

A study of 4 cases, presented to ENT OPD with orbital swelling since 3-5 days and ipsilateral nasal discharge. These patients were hospitalised, diagnosed and had undergone treatment for the same. Relevant history, predisposing factors, CT scan were noted. General physical examination, vitals with ophthalmic evaluation including visual acuity, pupillary responses and ophthalmoscopy were noted. IV antibiotics were started promptly for all cases. Treatment regimens were based on empirical coverage of the most common causative organisms. Paediatric references were made whenever required. All the patients received systemic antibiotics with topical decongestant nasal drops and topical eye ointment and drops.

Treatment Regimen-An initial regimen of IV cephalosporins and metronidazole is the appropriate first drug of choice. [2] The third case presented with palatal ulcer and fourth case was drowsy therefore they were started on higher antibiotics.[8]

III. STATISTICAL ANALYSIS AND GRAPHICAL PRESENTATION

SR NO	AGE/SEX	SYMPTOMATOLOGY	DURATION	ORBITAL COMPLAINS	CT FINDINGS	TREATMENT	OUTCOME
1	6yrs/ M	RT orbital swelling, nasal discharge	5 days	Periorbital edema, chemosis V/A - FC at 5m	Maxillary, ethmoid, sphenoid sinusitis with pre, post septal cellulitis and orbital abscess of 29x25x17mm	Inj ampicillin 100mg/kg Inj taxim 100mg/kg Inj metronidazole 10mg/kg/dose x 10 days Xylometazoline nasal drops qid	Recovered
2	9yrs/ M	Swelling over rt eye and nasal discharge	5 days	Chemosis, lid edema, V/A - Fc at 5m	Maxillary, ethmoid, sphenoid sinusitis with preseptal cellulitis	Inj ampicillin 100mg/kg Inj taxim 100mg/kg Inj metronidazole 10mg/kg/dose x 10 days Xylometazoline nasal drops qid	Recovered
3	4yrs/F	Swelling over left eye and nasal discharge, fever, palatal ulcer 2x1cm	3 days	Periorbital edema, V/A - FC at 5m	Maxillary, ethmoid sinusitis with preseptal cellulitis	Inj vancomycin 40mg/kg Inj taxim 100mg/kg Inj metronidazole 10mg/kg/dose x 12 days Xylometazoline nasal drops qid	Recovered
4	3yrs/F	Swelling over rt eye, nasal discharge, high grade fever, drowsy, responding to painful stimuli	3 days	Periorbital edema, V/A - FC at 5m	Maxillary, ethmoid sinusitis	Inj vancomycin 40mg/kg Inj taxim 100mg/kg Inj metronidazole 10mg/kg/dose x 12 days Xylometazoline nasal drops qid	Recovered



CASE 1: 6 yr old male patient presented with right orbital swelling with nasal discharge since 5 days.

ON EXAMINATION : Gc - fair , febrile right eye has periorbital edema with chemosis , visual acuity was finger counting at 5 m , tenderness over ethmoid and maxillary sinuses .

IMAGING: Maxillary, ethmoid, sphenoid sinusitis with pre, post septal cellulitis and orbital abscess of 29x25x17mm

TREATMENT : Inj ampicillin 100mg/kg , Inj taxim 100mg/kg ,Inj metronidazole 10mg/kg/dose, topical decongestants x 10 days

CASE 2: 9 yr old male child presented with right eye swelling and ipsilateral nasal discharge since 5 days

ON EXAMINATION : gc - fair, febrile, right eye periorbital edema with chemosis, visual acuity was finger counting at 5 m , tenderness over ethmoid and maxillary sinuses .

IMAGING: Maxillary, ethmoid, sphenoid sinusitis with preseptal cellulitis.

TREATMENT: Inj ampicillin 100mg/kg, Inj taxim 100mg/kg, Inj metronidazole 10mg/kg/dose and topical decongestants x 10 days.

CASE3 : 4 yr old female child came with left eye swelling since 3 days .

ON EXAMINATION : gc - fair, febrile, left eye periorbital edema, visual acuity was finger counting at 5 m , tenderness over ethmoid and maxillary sinuses . patient also had a palatal ulcer of 2x1cm .

IMAGING: Maxillary, ethmoid sinusitis with preseptal cellulitis.

TREATMENT: As the patient had palatal ulcer therefore was started on higher antibiotics.

Inj vancomycin 40mg/kg , Inj taxim 100mg/kg , Inj metronidazole 10mg/kg/dose and topical decongestants x 12 days.

CASE 4 : 3 yr old female child came with swelling over right eye , nasal discharge , high grade fever since 3 days.

ON EXAMINATION : patient was drowsy , responded to painful stimuli , febrile, periorbital edema, visual acuity was finger counting at 5 m , tenderness over ethmoid and maxillary sinuses.

IMAGING: Maxillary, ethmoid sinusitis.

TREATMENT: As the patient was drowsy and has high grade fever therefore was started on higher antibiotics.

Inj vancomycin 40mg/kg, Inj taxim 100mg/kg, Inj metronidazole 10mg/kg/dose and topical decongestants x 12 days.

All the cases had symptomatic improvement with IV antibiotics within 48 hours therefore were continued on medical management.

IV. RESULTS

1. Orbital cellulitis is more common in children 50% under the age of 6 years.
2. In children it is more likely that there will be no prior history of sinusitis, the complication often being the first presentation.
3. Vision involvement is late.
4. Recovery was complete in all patients suggesting an early initiation leads to better outcome.
5. Maxillary and ethmoid sinuses were involved in all cases and sphenoid sinus involved in 2 cases.

V. DISCUSSION

Development of Sinuses [18]

Maxillary sinus is the first sinus to appear between 7th to 10th week of gestation. It is present at birth and gradually grows to reach the adult size at 17-18 years. Ethmoid sinus develops during 9th and 10th week of gestation. All the permanent structures are present at birth. As a result acute sinusitis in children often involves ethmoid sinuses and extend laterally through lamina papyracea resulting in orbital complications. Sphenoid sinus begins to develop by 12th week of gestation. A small sphenoid sinus is present at birth and progressively enlarges by the age of 3. The frontal sinus most variable in terms of size and shape . Appears by 16th week of gestation. Radiologically it appears by 8 years. Significant pneumatization doesn't occur until early adolescence.

Anatomy and Pathogenesis :

There is an intimate relationship between the orbit and its contents and the paranasal sinuses. Bony orbit is a pyramidal cavity formed by seven separate bones. Superior wall related to floor of frontal sinus and floor is related to the roof of maxillary sinus. [13] Medial wall is vertical and is formed from anterior to posterior by frontal process of maxilla, lacrimal bone , lamina papyracea and small part of body of sphenoid.

It presents 3 fissures lacrimomaxillary, lacrimoethmoidal and sphenoid ethmoidal. There may be congenital dehiscences in the medial and superior walls of the orbit. [14] The ophthalmic venous system is completely devoid of valves, a situation which results in extensive 2 way communication between the nose, face, pterygoid region and sinuses. The superior ophthalmic vein is continuous with the nasofrontal vein which in turn communicates with the angular vein of the face. The inferior ophthalmic vein communicates with the pterygoid plexus and through superior orbital fissure communicates with the cavernous sinus. Batson demonstrated a plexus of veins around the nasolacrimal duct and their communication with the plexuses of the turbinates, lining of the sinuses and veins of the orbit. The outer wall of the ethmoid labyrinth consists of lamina papyracea which is papery thin and may be dehiscent in areas. The most common method of spread of infection is due to the interference of the venous communications. With the additional bacterial phlebitis and direct entry of bacteria in the perivascular structures, a continuum of orbital inflammatory and infectious changes is likely to result. [15]. Direct regional spread occurs via osteitis in compact bones and osteomyelitis in diploic bones. [17] Complications of rhinosinusitis can be grouped into - orbital (m/c), osseous, intracranial and chronic.

Orbital cellulitis is primarily diagnosed clinically by objective findings on physical examination combined with presenting signs and symptoms. Orbital cellulitis also typically cause eyelid swelling with or without erythema; however, these findings are also seen in another less serious condition called preseptal cellulitis. The diagnosis of orbital cellulitis can be confirmed by imaging modalities such as Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). The incidence of orbital cellulitis resembles a seasonal distribution similar to that with upper respiratory tract infection with peak incidence in the winter months also observed by Ferguson and McNab.[5] Nwaorgu et al. in a retrospective review of 90 patients with orbital cellulitis, found sinogenic origin in 57 % patients. Similarly, Choudhary et al. in a study of 218 patients of orbital cellulitis, found sinusitis as the most common predisposing factor. [9,10] Complications of rhinosinusitis result from progression of acute or chronic infection beyond the paranasal sinuses, potentially causing significant morbidity from either local or distant spread. Local spread occurs through areas where the surrounding bone is thin ie lamina papyracea. Distant spread occurs through blood stream via the valveless diploic veins of Bruschet of frontal, ethmoid and sphenoid sinuses. They communicate directly with dural venous plexuses and facilitate retrograde spread. Complications are more accentuated in children because of thinner and more

porous bony septa and sinus walls.[2] Orbital cellulitis is the most common acute complication of ethmoid sinusitis. Chandler classified orbital cellulitis as [3]

- Stage 1 – preseptal cellulitis does not extend beyond orbital septum
- Stage 2 – Orbital/post septal cellulitis without abscess
- Stage 3 – Subperiosteal abscess
- Stage 4 – Orbital abscess
- Stage 5 – Cavernous sinus thrombosis/ abscess.

Microbiology- A key concept in understanding the pathogenesis of acute bacterial sinusitis is that the nasal and nasopharyngeal mucosae are continuous with the paranasal sinus mucosa. Any process that affects the nasal mucosa may also affect the sinus mucosa; moreover, the nasal mucosa is heavily colonized with bacteria and investigations of the sinus microbiome have shown diverse colonization of healthy paranasal sinuses by Firmicutes, Proteobacteria, and Actinobacteria in all subjects, Bacteroides spp. in 83 % of subjects and S. aureus in 68 % of subjects. [19, 20, 21] Streptococcus anginosus - m/c cultured organism from orbital and intracranial complications. Other organisms involved are Streptococcus pneumoniae, H. influenzae, Staph aureus, Moraxella catarrhalis. Anaerobic bacteria cultured are Prevotella, Porphyromonas, Fusobacterium, Peptostreptococcus. [4] Most cases resolve with a course of IV antibiotics and decongestant nasal drops. A study by Erickson and Leer states that if an abscess has formed, further anaerobic coverage is needed. Surgical drainage is indicated in cases of pansinusitis, large abscesses, intracranial extension, slow or poor response to medical treatment.[6] In a study conducted by Michael S Todman, to investigate indications for the surgical management of pediatric orbital cellulitis with subperiosteal abscess (SPA) and to create an SPA volume criterion that would favour nonsurgical management. Twenty-nine patients were included 8 were managed surgically and 21 were managed medically. The mean volume of abscesses which required surgery were larger (3,446.3 mm) than abscesses which did not require surgery (420.5 mm). Volumes of <1,250 mm did not require surgical management. The volume of SPA seemed to be the most important criterion in determining medical versus surgical management. [11]

Study conducted by I D Singh et al stated Indications for surgery in orbital complication of orbital cellulitis. [12]

1. Evidence of sub periosteal or intraorbital abscess in CT or MRI.
2. Reduced visual acuity/reduced colour vision/affected afferent pupillary reflex or inability to assess vision.
3. Progressive or worsening orbital signs (diplopia, ophthalmoplegia, proptosis, swelling, and chemosis) after 48 hours of intravenous antibiotics.
4. Progressive or worsening of general condition (fever, infection parameters) after 48 hours of intravenous antibiotics.

There have been a number of recent studies showing good outcomes with intravenous antibiotics in small children with subperiosteal abscesses. In such cases there can be an argument for withholding surgical drainage, provided there is:

1. Clear clinical improvement within 24-48 hours
2. No decrease in visual acuity,
3. Small (<0.5-1 ml in volume) medially located subperiosteal abscess,
4. No significant systemic involvement,
5. Patient's age is less than 2-4 years

VI. CONCLUSION

Due to the high incidence of orbital complications of rhinosinusitis in the paediatric population and the progression to deteriorating vision and life threatening complications within a short period of time, each and every case of pre and post septal infection and inflammation should be looked upon with utmost care. Identification of the signs and symptoms and initiating an appropriate management adhering to the guidelines for improved outcomes must be followed. Early administration of broad spectrum IV antibiotics can reduce the risk of further life threatening complications and even abate the need for surgery.

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