Ophthalmological Manifestations of ENT Diseases: An Overview

Debangshu Ghosh · Swagata Khanna ·
D. K. Baruah

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Abstract A total number of 62 cases of ophthalmological manifestations caused by various ENT diseases, mostly paranasal tumour extensions, nasopharyngeal tumour and furunculosis of nose were analysed in a retrospective study in relation to their age, sex, clinical, radiological and HP profile. CT scan was considered as the most dependable investigating tool. Different modalities of medical and surgical treatment have been adopted according to location and nature of the disease. A close cooperation is needed between otolaryngologist and ophthalmologist to overcome this challenge.

Keywords Ophthalmological manifestations · ENT disease · Paranasal tumour · Orbital cellulitis

Introduction

Being an adjacent structure of the ENT region, involvement of the orbit and thereof ophthalmological manifestations are fairly common in the practice of Otorhinolaryngology. Orbital complications may arise from infections of “Dangerous area” of face, direct extension of the pathology of nose, paranasal sinuses and nasopharynx into the orbit, involvement of the nerves supplying the orbit and adnexa or deposition of retro orbital fat as in exophthalmic goiter. Although the incidence of orbital complications of inflammatory sinonasal diseases have decreased in recent times due to advent of potent wide spectrum antibiotics, infection of nasal vestibule causing preseptal orbital cellulitis still

remains a very prevalent problem. Orbital cellulitis, on the other hand is an emergency condition. It is important to diagnose the condition early and to manage aggressively. It is often difficult to cure orbital cellulitis due to late treatment and may cause blindness if left untreated because of optic nerve compression. Both orbital abscess and cavernous sinus thrombosis may lead to intracranial spread of infection, such as meningitis or cerebral abscess with high morbidity and possible mortality. The serious risk of complications in such cases was observed by Hodges et al. who studied the outcome of orbital cellulitis in a developing country. They found a high rate of complications, 52% blind on admission, with no improvement after treatment and a mortality of 4% because of cavernous sinus thrombosis. These results indicated the delay in receiving treatment in this population. Orbital infliction due to sinonasal and nasopharyngeal masses are also on the rise.

Few anatomical implications are noteworthy in this respect (Fig. 1, Fig. 2). Firstly due to close proximity of ethmoidal labyrinth to the orbit separated only by paper-thin lamina papyracea which acts as a poor barrier to the spread of sinus diseases to the orbit. Secondly veins from the orbit, nose and paranasal sinuses and adjoining facial regions drain to cavernous sinus either directly or indirectly through valveless communications. Thirdly the orbital septum is a thin membrane that originates from the orbital periosteum and inserts into the anterior surfaces of the tarsal plates of the eyelids. The septum separates the superficial eyelid from the deeper orbital structures, and it forms a barrier that prevents infection in the eyelid from extending into the orbit. Preseptal cellulitis differs from orbital cellulitis in that it is confined to the soft tissues that are anterior to the orbital septum. Fissures and foramina of the bony orbit are also natural pathways for spread of pathology of nose, PNS and nasopharynx to orbit.

D. Ghosh · S. Khanna (✉) · D. K. Baruah
Gauhati Medical College, ‘SWAGAT’, J. P. Agarwala Road,
Bharalumukh, Guwahati 781009, India
e-mail: swagatakhanna@sify.com

Fig. 1 Close relationship of the orbit to the ethmoidal labyrinth

Fig. 2 The ostiomeatal complex and its relation to the orbit

So, anatomical relationship of nose and paranasal sinuses to the orbit is of importance not only in understanding the symptoms and spread of diseases but also in planning management (Jones) [1].

Aim of the Study

Aim of our study is to evaluate the primary causes of various ophthalmological presentations in relation to ENT and head and neck pathology and their management. A total no. of 62 cases admitted in ENT ward of Gauhati

Medical College during the period from July 2008 to June 2010 were taken up for our study.

Materials and Methods

A hospital based retrospective study was carried out in the ENT department of Gauhati medical college and hospital for a period of 2 years (July 2008–June 2010). The patients with some clinical ophthalmological manifestations due to any ENT & head-neck disease were taken up for the study. A total of 62 patients studied during the period of which 45 were male and 17 were female (male: female ratio being 2.64:1). Patients were in between 4 and 84 years of age (mean age of presentation 32.3 years). All the eye conditions were diagnosed by Ophthalmologists of Gauhati Medical College and Hospital. Detailed history, thorough clinical examinations of ENT and head-neck regions were done and recorded in a proforma. Diagnostic nasal endoscopy with proper local anaesthesia and vasoconstriction was done in all cases. Necessary investigations like X-rays of nose and paranasal sinuses, high resolution ultrasound with Doppler study, CT scans and MRI with or without angiography, fine needle aspiration cytology, biopsy and histopathological examination of the suspected mass wherever necessary were ensured in every case (Fig. 3). Pure tone audiometry with or without impedance audiometry (including reflexometry) were done in suspected Bell's palsy and unsafe CSOM cases. Schirmer's test was done in Bell's palsy cases. Electrophysiological tests of facial nerve were not done routinely. Data were tabulated to find

Fig. 3 Maxillary sinus carcinoma with intraorbital extension causing proptosis

out incidence of different ENT diseases as well as incidence of various ocular manifestations (Table 1). Orbital complications of sinusitis were classified according to standard CHANDLER'S classification (1970), which includes pre-septal cellulitis, orbital cellulitis without abscess, orbital cellulitis with abscess, subperiosteal abscess, orbital cellulitis with intraperiosteal abscess and cavernous sinus thrombosis.

Exclusion Criteria

Maxillofacial trauma cases presenting with secondary orbital involvement and epiphora cases admitted for endoscopic dacryocystorhinostomy operation for chronic dacryocystitis were excluded from the study. Neither postoperative facial nerve palsy (transient facial paresis due to local anaesthesia infiltration or arising after mastoid, parotid or stapes surgeries) causing inadequate eye closure (lagophthalmos) nor ophthalmologic complications of FESS were included in our study. Allergic rhinitis cases

presenting with red eyes and lacrimation were also not included as they were mostly managed on OPD basis.

Bell's palsy cases were diagnosed only after excluding other causes and steroids along with antiviral medication (i.e. acyclovir) were administered after excluding common contraindications. In some cases we took expert opinion from Neurology Department.

Patients with facial palsy due to cholesteatoma underwent complete canal wall down tympanomastoidectomy by standard methods using operating microscope. Nerve decompression was done whenever necessary along with it. Nerve grafting using great auricular nerve was performed in such one case (Gr.III House-Brackman) as a primary procedure along with cholesteatoma surgery.

Orbital cellulitis cases were mostly managed conservatively with antibiotics. Neoplastic conditions of nose and paranasal sinuses were managed surgically.

Patients' age, sex, clinical presentation, diagnosis, grading of facial nerve paralysis according to conventional House-Brackman staging system and management have been analysed.

Table 1 The following table showing various ocular manifestations due to ENT and head-neck diseases

Clinical presentation	Number (n)	Percentage (%)
Proptosis due to orbital extension of sinonasal masses	13	20.96
Preseptal cellulitis (furunculosis/facial cellulitis)	12	19.35
Lagophthalmos (inadequate eye closure):	19	30.64
Unsafe CSOM	6	31.57
Bell's palsy	4	21.05
Mucoepidermoid carcinoma of parotid	4	21.05
Acute otitis media	1	5.26
Glomus jugulotympanicum	1	5.26
Embryonal rhabdomyosarcoma (middle ear & mastoid)	1	5.26
Trauma	1	5.26
Parapharyngeal mass	1	5.26
Cavernous sinus thrombosis (from furuncle)	7	11.29
Orbital cellulitis (furunculosis/rhinosinusitis)	4	6.45
Ptosis d/t cranial neuropathy in c/o neurogenic dysphagia	1	1.61
Orbital apex syndrome	1	1.61
Orbital fungation due to PNS malignancy (ethmoid sinus)	1	1.61
Exophthalmos due to thyroid ophthalmopathy	2	3.22
Periorbital swelling due to nasal myiasis	2	3.22
Total	62	100 (99.9)

Results and Observations

Among 62 patients of our series, most common clinical manifestation was proptosis ($n = 13$), caused most commonly by orbital extension of squamous cell carcinoma of maxillary sinus (4). Others like sinonasal hemangioma, nasopharyngeal angiofibroma, nasopharyngeal rhabdomyosarcoma, frontal sinus cyst, frontoethmoidal mucocoele, nasopharyngeal carcinoma, adenoid cystic carcinoma, infected giant Haller cell extending into orbit and fibrous dysplasia of ethmoid involving the orbit comprised one case each (Fig. 4).

Sinonasal neoplasms causing proptosis were treated surgically and surgical approach was chosen depending on

Fig. 4 Coronal CT scan of a case of Juvenile angiofibroma with intraorbital spread

the location and extension of the mass. Lateral rhinotomy incision with or without Caldwell-Luc approach was mostly applied to gain wide exposure of the mass excepting one ethmoidal mucocoele which was addressed through endoscope and frontal mucocoele which was excised through external approach. There was only pushing effect on the orbit by the mass was found on exploration without any invasion into orbit and eye swelling was reduced in immediate postoperative period.

Second most common clinical presentation was pre-septal orbital cellulitis ($n = 12$), of which seven cases were due to furunculosis of nasal vestibule, five cases were due to facial cellulitis.

Of the four cases ($n = 4$) of orbital cellulitis only one case was a sequelae of frontoethmoidal rhinosinusitis and the rest three resulted from furunculosis of nose.

Inadequate eye closure (Lagophthalmos) was another important clinical manifestation detected in 19 cases (30.64%) were due to facial nerve paralysis of which six cases were unsafe CSOM, four cases were Bell's palsy, four cases were mucoepidermoid carcinoma of parotid gland involving facial nerve and acute otitis media, glomus jugulotympanicum, embryonal rhabdomyosarcoma of middle ear and mastoid, old temporal bone trauma with secondary infection, parapharyngeal mass with facial palsy comprised one case each (Fig. 5a, b).

All unsafe CSOM with lagophthalmos cases were males and had Gr. IV facial paralysis. Preliminary tarsorrhaphy was done in 1 case to prevent corneal ulceration because of weak Bell's phenomenon. All underwent radical mastoidectomy and on surgical exploration cholesteatoma mass was found with erosion of facial canal.

All the parotid tumours with lagophthalmos cases were males and proved to be high grade mucoepidermoid carcinoma on HPE. One case presented with a fungating mass through preauricular skin. All had Gr. IV facial palsy. Preliminary tarsorrhaphy was done here in two cases for fear of damage to cornea. Total radical parotidectomy was done in all cases along with facial nerve grafting with great auricular nerve in two cases. Among this one was redo case due to recurrent disease after previous excision. Facial nerve was found to be totally entangled by the mass in all cases on surgery and could not be separated properly. Postoperative results of grafting was satisfactory in 2 months follow up, facial paralysis was improved but not totally recovered. Galvanic stimulation of the nerve was also tried in incomplete palsy cases resulted from parotid tumours or unsafe CSOM and results were satisfactory.

One child presented with acute otitis media with history of ear discharge for 2 months with inadequate eye closure due to facial palsy (Gr.III HB) which was subsided totally with antibiotics, nasal decongestants and antihistamines.

Fig. 5 a A case of Bell's palsy showing inadequate closure of left eye. b Mucoepidermoid carcinoma of parotid gland showing inadequate eye closure on left side

One case of neurogenic dysphagia with cranial neuropathy presented with ptosis. One case of carcinoma of ethmoid sinus presented with fungating orbital mass.

Seven cases (11.29%) of orbital cellulitis were found with cavernous sinus thrombosis, resulting from furunculosis of nose (Fig. 6). Another case (1.61%) of orbital apex syndrome due to cavernous venous thrombosis was found where there was no inflammatory signs and symptoms. Thyroid ophthalmopathy causing exophthalmos was found in two (3.22%) cases. These cases presented with proptosis with lid lag (lagophthalmos) along with goitre. Two cases (3.22%) of atrophic rhinitis with nasal myiasis presented with reactionary periorbital swelling.

Fig. 6 A case of orbital cellulitis resulting from furunculosis of nose

Discussion

Orbit may be frequently involved in diseases of the nose and paranasal sinuses. The main reason being that at least two-third of the osseous orbital wall is made up of sinus walls [2], [3]. Moreover, there are various valveless venous communications in the orbital wall and that may be partly responsible for such occurrence.

Altogether 62 patients presented with ophthalmological manifestations caused by various ENT diseases during the period from July 2008 to June 2010. All the clinical data and laboratory investigation findings were entered in the Investigation Proforma and the clinical diagnosis reached. The treatment strategy, both conservative and surgical, was also planned and undertaken. Since the study included a small number of patients who were chosen randomly, no attempt was made by us to reach statistically significant conclusions.

Among all the ear, nose and throat disorders, the neoplastic lesions of nose and paranasal sinuses were found to be the commonest cause of proptosis in our series. Sinha et al. [4] also found similar results and concluded that proptosis is the commonest clinical presentation in neoplastic lesions of nose and paranasal sinuses. Various studies on orbital involvement in sinonasal diseases reported that squamous cell carcinoma of maxillary sinus mostly involves the orbit [2], [5], [6]. Our findings are similar to the findings of most of the similar studies. In Henderson's series of 465 cases of orbital tumours, 7% originated from the paranasal sinuses and 60% of these were antral carcinomas [3].

In a study by Sabharwal et al. the reported incidence of maxillary sinus carcinoma and nasopharyngeal angiofibroma involving the orbit was 6 and 4% [5] while we found the incidence to be 23.1 and 7.7%, respectively. This may be due to the fact that they studied cases presenting with proptosis only whereas in our study the whole gamut of ophthalmic manifestations of ENT and head–neck diseases were included.

According to a study conducted by Sayed secondary tumours from the paranasal sinuses is the third most common cause of proptosis in adults after Grave's orbitopathy and pseudotumours of orbit [2]. In our study we observed two cases of exophthalmos caused by thyroid orbitopathy. Johnson et al. studied a series of paranasal sinus tumours where they found 59.49% of the cases had clinical, radiographic or operative evidence of orbital involvement and of which involvement of the orbit was initial presentation in 70% cases [6]. This is bound to differ from our study as our study included all cases where orbit was already involved and proptosis was the ocular presenting feature in 100% cases of sinus tumours.

We found two cases of mucocoele out of 62 cases (3.22%), one was ethmoidal mucocoele and another was frontal sinus mucocoele. Proptosis was the presenting feature of both the paranasal sinus mucocoeles in our study which is similar to the results obtained by Sayed where proptosis was seen in 98% patients with frontoethmoidal mucocoeles [2]. Ethmoidal mucocoele was excised through nasal endoscopic guidance and frontal cyst through external incision as the swelling was on the superolateral quadrant of orbit.

In our study all the cases of orbital cellulitis resulted from furunculosis of nose and facial cellulitis whereas Zeyad et al. [7] stated that orbital cellulitis following furunculosis of nose is a rare occurrence. They also stated that early diagnosis and prompt management of furunculosis of nose may reduce the incidence of orbital cellulitis.

Authors of various studies opined that 30% of suspected preseptal cellulitis has orbital involvement which can only be detected by CT scan [2]. On the other hand many of the ophthalmologists relied on clinical presentation of all cases of preseptal cellulitis and CT was advised when there was deterioration of vision or disease progressed in spite of treatment. A study conducted by Sayed (1995) states that 60% to 80% of orbital infection is secondary to paranasal sinusitis [2]. Another study by Elango S and K. Reddy TN (1990) on orbital complication due to sinusitis stated that incidence of orbital complications due to sinusitis was in the range of 0.5 to 3.9% [8]. They also found ethmoid sinus to be affected more often than maxillary sinus. Surprisingly all preseptal or frank orbital cellulitis cases in our series resolved on conservative management. It may be so that proper investigation including CT scan helped early

diagnosis of our cases and use of broad spectrum antibiotics may be an important factor in getting the lower incidence of orbital complications.

Seven cases of cavernous sinus thrombosis were encountered during the course of our study and all the cases had resulted either from furunculosis of nose or furunculosis of dangerous area of the face. There was associated superior ophthalmic venous thrombosis. The orbital manifestations were swelling of eyeball, diminished vision, chemosis, proptosis, redness, diplopia and ophthalmoplegia. Clinically all the cases started unilaterally and eventually the other eye was involved. CT scan of one patient in our series with unilateral cavernous sinus thrombosis reported as bilateral involvement of cavernous sinus. There was also unusual finding of unilateral, lower motor neuron type of facial palsy (Gr. IV HB) in that patient. Ramanand et al. mentioned that 7th nerve palsy in cavernous sinus thrombosis has not been reported in the literature [9]. According to Straub et al., facial nerve palsy in cavernous sinus thrombosis is very rare and little is known about its pathophysiology [10]. In our series the etiology of cavernous sinus thrombosis was skin infection where as various studies opined that cavernous sinus thrombosis is most often associated with sphenoid or ethmoid disease [11].

We had 14 cases of paranasal sinus tumours reporting to us with orbital involvement of which one was adenocarcinoma of ethmoid (7.14%). Neither it was asymptomatic nor there was low vision as depicted by Koukoulomatis et al. in their study [12]. Fungation of orbit through the antero superior quadrant was the only finding in our case and vision was normal till diagnosis.

Conclusion

Although orbital complications due to inflammatory sinonasal diseases have decreased a greater extent due to improved techniques of diagnosis and advent of newer generation of antibiotics, still early diagnosis remains very crucial to save sight of the patient. The keys to early diagnosis include a high index of suspicion of early orbital

involvement by thorough ENT check up, specially examination of middle meatus of nose, using preferably nasoendoscope (under proper vasoconstriction with 4% Xylocaine and 1:15,000 Adrenaline solution) and a team effort comprising otorhinolaryngologist, ophthalmologist and sometimes neurologist acting together. A proper coordination between otolaryngologist and ophthalmologist is much required in all ophthalmological manifestations of ENT origin to find out the actual disease process and to treat accordingly for prevention of morbidity and mortality associated with them.

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