Eye in Danger of ENT: Role of External Ethmoidectomy in Orbital Decompression due to Ethmoiditis

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Abstract

Background: To high-light the role of External Ethmoidectomy in decompressing the orbit to relieve proptosis and prevent loss of vision due to any pathology extending from ethmoids into the orbit.

Methods: Ten patients who presented in the OPD of Holy Family Hospital Rawalpindi with proptosis and change in vision of eye due to infective ethmoiditis were included in this study. Two(20%) had change in colour vision indicating that their vision was at stake. These two patients had emergency external ethmoidectomy performed to save the eye while the rest of the patients were electively prepared for this operation. All patients had pre operative CT scan of Nose, PNS, Orbit and Brain and all gave informed consent regarding the eye. All underwent external ethmoidectomy operation via Lynch Howarth approach which not only addressed the Ethmoids but also the orbit and provided a direct deep in depth view of both the structures.

Results: Colour vision, vision acuity all returned to normal in 100% patients within 7 days. Proptosis also disappeared in all the patients. There were no major post operative complications and the minor complications like external scar, lacrimation and anterior nasal discharge resolved completely.

Conclusion: Orbital complications due to ethmoiditis should be timely diagnosed to prevent blindness. They should be treated with such an approach which offers not only access and illumination to this area but also a good perception of depth in ethmoids and orbit to prevent complications like external scar, hemorrhage and blindness.

Key words: Ethmoidectomy, Orbital compression, ethmoiditis

Introduction

The eye is in danger of ENT as there is a chance and danger of losing vision in cases of ethmoid sinusitis. The pathologic processes within the ethmoid sinuses have potential for intraorbital extension leading to blindness.

Only a paper-thin bone, lamina papyracea separates the medial wall of the orbit from the lateral wall of the ethmoids. This bone gives in to any infective pathology easily and is sometimes found absent in advanced cases of infection.

The first sign of losing vision in these patients is that the colour vision deteriorates before visual acuity is permanently damaged. The patient cannot distinguish blue from black or red from brown colour. These patients sometimes only have some hours or days before they lose their vision permanently. They require urgent decompression of orbit. There are various approaches to deal with this condition but external ethmoidectomy via Lynch Howarth approach provides a direct access and illumination of both ethmoids and orbit.

Patients and Methods

This study was conducted at Department of Otolaryngology Head and Neck Surgery in Holy Family Hospital Rawalpindi from June 2003 to August 2006. Ten consecutive cases of orbital complications due to ethmoiditis were surgically treated. Patients who had infective aetiology, proptosis on clinical examination, and who were found refractory to conservative treatment like antibiotics, decongestants and analgesics, were included in the study.

Patients who had history of allergy, asthma or thyroid disease, patients with deflected septum, nasal polyps, or any other nasal mass and disease extending into the brain were excluded from the study.

Baseline laboratory investigations for the purpose of surgery and anaesthesia included complete blood picture, bleeding profile and urine examination. Plain X-ray of nose, CT Scan of nose...
para-nasal sinuses, orbit and brain with contrast 5mm axial and coronal cuts were done to see the extent of disease, involvement of orbit and extension into the brain.

Pre-operatively all patients were admitted in the ward and started on systemic antibiotics and steroids for the control of exacerbation of disease. After base line assessments and preparations the patients were scheduled for surgery. A provisional diagnosis of infective ethmoiditis with orbital complications was made for all which later was changed according to the operative finding.

A pre-operative informed consent regarding the eye was taken and the patients were prepared for external ethmoidectomy of the orbit to save the eye from the extending ethmoidal disease by using Lynch Howarth approach which directly addressed the prime area of pathology while showing the orbit also in view to relieve the pressure on the eye and optic nerve. The colour vision, visual acuity and fundi were checked post operatively on first day and continued weekly. CT scan was repeated after one month to see the eradication of disease from ethmoids and was again done six monthly. The clinical examination included ear, nose and throat along with general physical and eye examination.

**Results**

The age of patients ranged from five to twenty five years with a male predominance of 2:1. The most common symptoms were proptosis and headache. Proptosis was clinically noted by standing behind the sitting patient, by slightly extending the head on neck and visualizing the upper lid margin protruding between eyebrow and eyelashes.

Most patients had headache or facial pain at the root of nose adjacent to medial canthus, which was non radiating. Six of our patients (60%) also complained of bilateral anterior nasal discharge which was more on the side of proptosis. This was associated with subjective sensation of decreased vision in one eye.

On clinical examination, seven (70%) had fever on presentation which settled with antibiotics. The fever was 100-101°F.

Six (60%) of our patients had redness around one eye and out of these, two presented with colour vision changes as they could not distinguish between blue from black. Four patients (40%) presented with recent one eye visual acuity changes while the rest had no vision change.

The two patients who had colour vision changes had to be operated early as they were in danger of losing vision.

Per operatively we found six of our patients had orbital cellulitis with muco-purulent discharge extending into the orbit. Four patients had subperiosteal abscess eroding portion of lamina papyracea.

All patients had uneventful recovery. On first post-op day when colour vision, visual acuity and finger counting were checked, the colour vision remarkably returned to normal on the first day. Visual acuity also improved in all 4 patients in a weeks time with resolution of redness of the eye.

Within 2 months, 5 out of 6 patients who were complaining of nasal discharge were also relieved of this problem. The rest of the patients also were relieved of their symptoms.

**Table: 2 Post operative status after two weeks.**

<table>
<thead>
<tr>
<th>Symptoms and Signs</th>
<th>No. of Patients</th>
<th>Pre-operative %</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redness around eye</td>
<td>6</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Nasal discharge</td>
<td>6</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Visual acuity changes</td>
<td>4</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Headache, facial pain</td>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Proptosis</td>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>7</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Colour vision changes</td>
<td>2</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>10</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>Redness</td>
<td>6</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>Nasal Discharge</td>
<td>6</td>
<td>60</td>
<td>2</td>
</tr>
<tr>
<td>Proptosis</td>
<td>10</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Vision</td>
<td>6</td>
<td>60</td>
<td>0</td>
</tr>
</tbody>
</table>
Changes

CT scan of all patients was repeated after a months time to see the extent of pathology and effect on proptosis on the ipsilateral eye. All patients were relieved of proptosis and the ethmoids on the ipsilateral side were also cleared of disease.

Fig 3 Pre and post operative scan in a patient who underwent left external ethmoidectomy showing clearance of ethmoids and disappearance of proptosis post operatively.

Pre -Operative                         Post Operative Scan

Post-operatively, none of patients had episodes of bleeding, vision loss or CSF rhinorrhea. All our patients had external scar which disappeared in most of the patients (80%) within one week.

Nasal discharge and epiphora were two other post operative complications. Flushing of the lacrimal punctum postoperatively relieved our patients of increased lacrimation. Nasal discharge also subsided with time in all patients.

Table 3 Post operative complications and their resolution in two weeks time.

<table>
<thead>
<tr>
<th>Complications</th>
<th>Preoperative</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of patients</td>
<td>%</td>
</tr>
<tr>
<td>External scar</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Nasal discharge</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>Lacrimation</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Bleeding</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vision loss</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CSF Rhinorrhea</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Discussion

There are two ethmoid labyrinths. Each ethmoid labyrinth is mechanically a disadvantageous structure between the eye, brain and nose.

The labyrinth is pyramidal in shape. Its apex points forward and the base faces the sphenoid. It is 4 cm long, 2.5 cm in height, 0.5 cm in width anteriorly expanding to 2 cm posteriorly. The posterior part contains larger sinuses because the ethmoid are wider in posterior part as described by Mosher.

The first ethmoidectomy was performed by Hippocrates by using sponge attached with strings (370-460 BC). Lynch and Howarth in 1921 described the procedure of external ethmoidectomy which was further substantiated and the whole procedure was described by Ferris Smith in 1933,5.

Sewell (1936) demonstrated the prolapse of orbital contents into ethmoid after removal of lamina papyracea and described his incision in performing external ethmoidectomy.

The major complications of this procedure are blindness, CSF rhinorrhea and haemorrhage. The minor complications are orbital haematoma, subcutaneous emphysema, damage to lacrimal sac and external scar formation7,8.

The classification of orbital complications of sinusitis was originally proposed by Hubert in 1937. He divided orbital infections into eyelid edema, orbital cellulitis, orbital abscess, subperiosteal abscess and cavernous sinus thrombosis based on anatomic location of the inflammation. Later on this classification was further substantiated by Smith and Spencer who also described the involvement of superior orbital fissure neurovascular structures leading to orbital apex syndrome9,10.

The eyelid oedema or preseptal cellulitis usually resolves with antibiotic course for 2-3 weeks but once there is intra orbital or subperiosteal inflammation or abscess, it has to be drained. The subperiosteal abscess may penetrate the periosteum to cause orbital cellulitis11,12.

Orbital complications due to ethmoiditis show a predilection for the paediatric age group. A series of 114 cases reported by Hubert from the Manhattan Eye, Ear and Throat Hospital, showed that the age range was from 2 to 78 years.

Fearon et al considered the frequent upper respiratory infections and increased incidence of sinusitis in children, coupled with diploic nature of
immature facial bones and the increased vascular and lymphatic channels, as facilitating the spread of infection to the orbit. 7,9,13

The ENT surgeons have different approaches, in their surgical armamentarium to address the problem of ethmoditis 14 – 17. Polypectomy or partial resection of ethmoid labyrinth are known to be associated with high rates of recurrences. Incomplete removal of disease, scarring in the presence of residual ethmoid partitions and failure to excise diseased osteitic bone can lead to a worsening of sinus disease rather than an improvement. In external ethmoidectomy, increased visualization, primarily by the use of monocular, coaxial head lights has enabled the surgeons to achieve excellent control of polyg recurrence and elimination of inspissated disease without excessive complications. In intranasal ethmoidectomy, the use of microscopic and endoscopic techniques have added magnification. Intranasal ethmoidectomy is a blind procedure which carries risk of major complications like blindness and CSF rhinorrhea. James A et al (1987) emphasized in their study of 90 patients who underwent endoscopic intranasal ethmoidectomy that with endoscopic help intranasal ethmoidectomy in experienced hands, becomes a safe procedure with less complications. However Fruidman et al, in a series of 374 ethmoidectomies proposed that conservative surgical approaches to ethmoid labyrinth were preferable to endoscopic techniques in massive disease because of discontinuous hyperplasia and infected areas in anterior and posterior ethmoids. Clearing of ethmoids infundibulum would affect or address the posterior ethmoidal disease. 18

**Conclusion**

Orbital complications due to ethmoditis are not uncommon. Diagnosis of orbital complications should be made in time and adequately addressed with a good approach to save the eye.

External ethmoidectomy not only provides a direct approach to the orbit and ethmoid but also is a safe procedure if the surgeon observes and follows the anatomical land marks while decompressing the orbit.

**References**

5. Lynch RC. The technique of a radical frontal sinus operation which has given the best results . Laryngoscope 1921; 31: 1 – 5