Dissertation on

ENDOSCOPIC MEDIAL ORBITOTOMY

Submitted for

M.S.DEGREE EXAMINATION

BRANCH IV OTO-RHINO-LARYNGOLOGY
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CERTIFICATE

This is to certify that **Dr.VINOD FELIX** , Post graduate student (2005-2008) in the Upgraded Institute of Otorhinolaryngology, Madras Medical College, Chennai - 600 003, has done this dissertation on **"ENDOSCOPIC MEDIAL ORBITOTOMY"** under my guidance and supervision in partial fulfilment of the regulations laid down by the Tamil Nadu Dr.M.G.R.Medical University, Chennai, for M.S., (Otorhinolaryngology), degree examination to be held in March 2008.

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DECLARATION

I declare that this dissertation entitled **"ENDOSCOPIC MEDIAL ORBITOTOMY"** has been conducted by me at the upgraded Institute of Otorhinolaryngology under the Supervision of my **Prof.Dr.S.Ammamuthu, M.S. D.L.O., Prof.Dr.A.K.Sukumaran, M.S., D.L.O., and Prof.S.Kulasekaran, M.S.,D.L.O.,** . It is submitted in partial fulfilment of the award of the degree of M.S. (Otorhinolaryngology) for the March 2008 examination to be held under the Tamil Nadu Dr.M.G.R.Medical University, Chennai. This has not been submitted previously by me for the award of any degree or diploma from this or any other university.

Dr.VINOD FELIX

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CONTENTS

INTRODUCTION

Man's quest for excellence has found its origins since time immemorial. Surgeons have been striving to perfect the artistry of their science since then. Although condemned to be apothecaries in the early part they have pursued with absolute dedication to produce marvelous results. The evolution has gifted important improvement, conclusions and life to many patients.

Endoscopic sinus surgery was previously restricted only to tackling pathological conditions in the nose and paranasal sinuses like chronic sinusitis and nasal polyposis. Over the years the scope of Endoscopic sinus surgery has considerably widened with the nasal endoscope now being routinely used to access even the surrounding regions like the orbit, optic nerve, lacrimal sac and the pituitary gland to name a few. Similarly CSF leaks which previously required external craniotomy procedures can now be safely and effectively closed by the endoscopic trans-nasal approach. The chief advantages of the endoscopic route are decreased morbidity and better cosmesis wherein external scars are avoided.

Functional endoscopic sinus surgery was first described for the treatment of chronic sinusitis not amenable to conservative treatment. Since then, nasal endoscopy has come a long way, with the endoscope now being routinely used for a wide variety of indications for diseases in the paranasal sinuses and their surrounding regions.

The endoscopic sinus surgeon works in close proximity to the orbit on a routine basis, usually with the intention of avoiding it. Inadvertent transgression of the orbital walls was described in the early experience with endoscopic surgery, when many orbital complications of endoscopic sinus surgery were noted.

Because of the relative ease of entry from the sinuses into the orbit, it is logical to extend sinus techniques to procedures involving the medial and inferior orbital contents, as well as the optic canal. The endoscope provides a highly magnified panoramic view and, therefore can be quite useful within the orbit, where billowing of orbital fat may obscure the traditional anteroposterior view of the orbital surgeon. The fine punches, probes, dissectors and knives of the sinus surgeon are also well suited to deep orbital surgery.

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AIMS OF THE STUDY

To analyze the technique of endoscopic medial orbitotomy with regard to

1) Age and sex distribution of cases
2) Indications for endoscopic medial orbitotomy
3) Cases with no pathology in nose and paranasal sinuses.
4) Symptom analysis
5) CT scan findings, with regard to the orbital spaces involved and optic nerve involvement.
6) Necessity of middle turbinectomy
7) Necessity of an intraoperative image guidance
8) Requirement of packing after surgery
9) Complications and its management
10) Duration of hospital stay after surgery
11) Results.

THE OTORHINOLARYNGOLOGIST – OPHTHALMOLOGIST RELATIONSHIP: A HISTORIC PERSPECTIVE

There has been a long and close relationship between otorhinolaryngologist and ophthalmologist. One of the earliest recorded treatises concerning vision and hearing was by Hieronomi Fabricius of Aquapendente in the early 1600s. In England in 1805, the London Infirmary for Curing Disease of the Eye and Ear was established and later became Moorfield's Hospital, currently a famous hospital for care of the eye

In the United States, physicians practicing Eye, Ear, Nose and Throat were common between 1890 and 1930.

After 1910 specialization began to develop more rapidly with practitioners choosing either ophthalmology or otorhinolaryngology.

The most recent development in otorhinolaryngology is the use of endoscopes and image guidance techniques within the nose and paranasal sinuses, allowing an expanding expertise and precision in applications of the periorbital area.

There continues to be a close working relationship between specialties of otorhinolaryngology and ophthalmology with mutual respect between them.

As both specialties race to keep pace with technologic advances, more applications continue to evolve. This relationship is frequently helpful in areas of silent sinus syndrome, lacrimal duct problems, optic nerve decompression, orbital decompression, drainage of subperiosteal abscesses of orbit, orbital trauma and tumors, complications of endoscopic sinus surgery etc.

A QUICK OVERVIEW OF ANATOMY OF THE ORBIT, OPTIC NERVE & LATERAL NASAL WALL

Endoscopic approaches to the orbit take advantage of key anatomic relationships that arise from the fact that the sinonasal tract and orbit are contiguous structures.

The Orbit

The orbit is a quadrilateral pyramid with its base facing anteriorly and its apex forming the posterior aspect. The apex is formed by optic canal and superior orbital fissure. The average volume of adult Caucasian orbit is 30ml (cm^3), of which eye constitutes $7cm^3$. As it constitutes a fixed bony cavity, an increase of orbital volume of only 4ml produces 6mm of proptosis.

Medial Wall

Is of the most significance to the ENT Surgeon.

It is composed of following bones in an anteroposterior direction.

- Frontal process of the maxilla
- Lacrimal bone
- Lamina papyracea of the ethmoid
- Body of sphenoid.

Anteromedially lies the fossa of the lacrimal sac, demarcated by anterior and posterior lacrimal crests.

The anterior lacrimal crest is a part of frontal process of maxilla, and the posterior lacrimal crest a part of lacrimal bone.

The maxillary line corresponds to the suture line between frontal process of maxilla and lacrimal bone within the lacrimal fossa, intranasally the maxillary line marks the attachment of uncinate process to the maxilla.

The lamina papyracea as the name expresses, is exceedingly thin and forms the lateral wall of the ethmoid complex extending from the lacrimal bone to sphenoid. Through the fronto ethmoid suture, where the medial wall junctions with the roof, foramina for the anterior and posterior ethmoidal vessels and nerves are located, their position is variable, but roughly follows a rule of 24-12-6 based respectively on the average distance in millimeters from the anterior lacrimal crest to anterior ethmoidal foramen, from the anterior to posterior ethmoidal foramen and from posterior ethmoidal foramen to the optic canal.

Inferior Wall (Floor)

Composed of

- Large orbital plate of maxilla
- The zygomatic orbital plate
- The orbital process of the palatine bone

The infra orbital foramen is vertically in line with superior orbital notch, lying halfway along the inferior rim and is continuous with the infraorbital canal.

Superior Wall (Roof)

The roof is triangular and composed of

- Orbital plate of frontal bone
- Lesser wing of sphenoid

The superior margin has supraorbital notch.

Lateral Wall

Composed of

- The orbital surface of zygoma
- Zygomatic process of frontal bone
- The greater wing of sphenoid

Important Surgical Spaces within the Orbit

There are four surgical spaces within the orbit

- The subperiorbital or subperiosteal surgical space: Potential space between the bone and the periorbita
- The extraconal surgical space: (peripheral surgical space): lies between the periorbita and the muscle cone with its fascia.
- The intraconal surgical space (Central surgical space): lies within the muscle cone.
- Episcleral surgical space (Tenon's space): lies between Tenon's capsule and the globe.

OPTIC NERVE

Is 4.5 – 5cm long and about 4mm in diameter, extends from the globe to optic chiasm.

Four Portions

Intraocular (1mm),

Intraorbital (30mm),

Intracanalicular (9-10mm),

Intracranial (10mm).

Because the distance from the globe to the orbital apex is 20mm, the intraorbital portion (30mm) forms an S Shaped configuration, permitting full range of motion of globe and preventing injury from proptosis and surgical traction.

The subarachnoid space and meningeal linings surround the nerve.

The ophthalmic artery is encased by dura in the optic canal , where it lies inferolateral to the nerve.

Lateral Nasal Wall in relation to orbit

Several regions of the orbit and related structures may be accessed through the lateral nasal wall.

The lacrimal system is housed within the anterior lateral wall, the orbit and orbital apex are separated from nose by the lamina papyracea of the ethmoid, and the exposure of optic nerve is possible within the superolateral sphenoid.

It is useful to understand the anatomic relationship between sinus landmarks and orbital structures.

At the level of initial incision of uncinate process, the surgeon is already at the equator of the globe and medial to insertion of medial rectus muscle.

The location of the anterior ethmoid artery and nerve, adjacent to the frontal recess, is immediately medial to the optic nerve as it exits the globe.

The level of orbital apex is at a level just anterior to anterior face of sphenoid sinus.

The sphenoid sinus is also directly in contact with optic nerve as it passes through the optic canal, or at times when a sphenoethmoidal(onodi)cell is present the optic nerve lies within the onodi cell.

A bulge in the superolateral most portion of the sphenoid sinus corresponds to the medial aspect of optic nerve.

Often the bulge of the carotid artery is visible beneath the infra optic recess as it courses lateral to the optic nerve. Dehiscences of the bone covering carotid artery and optic nerve may occur in this area.

TRADITIONAL APPROACHES TO THE ORBIT

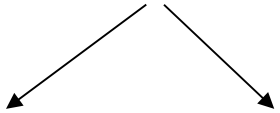
The term orbitotomy is derived from a Greek word, which means “to cut into the orbit”. The selection of the surgical approach to the orbit depends on the indication for surgery and the location, size and extent of the lesion. For the anterior half of the orbit, anterior orbitotomy provides adequate exposure. For the posterior half, more extensive procedures with osteotomy are necessary.

ANTERIOR ORBITOTOMY

Is defined as a transcutaneous or transconjunctival approach to the orbital or periorbital space that does not involve removal of the lateral orbital wall.

Based on the incision used

Transcutaneous approaches Transconjunctival approaches



Extraperiosteal Transseptal

a) Anterior Medial Approaches (Superomedial Orbitotomy)

The medial orbit including the roof and floor, the nasolacrimal sac and duct, the anterior and posterior ethmoid foramina, the ethmoid sinus for external ethmoidectomy, the sphenoid sinus via the posterior ethmoid air cells, and the optic nerve via the sphenoid sinus is easily accessed via this approach.

The transcutaneous approach uses the Lynch incision, which is a slightly curved vertical incision beginning along the inferior aspect of the medial brow, approximately midway between the inner canthus and the dorsum of the nose and extending 2 to 3cm inferiorly. For extensive lacrimal sac and duct lesions, the Lynch incision can be extended inferiorly to include a lateral rhinotomy. The subperiosteal space can be easily approached to drain a subperiosteal abscess. Disadvantages include limited access to the orbital floor and the residual scar, which can be unacceptable. Many modifications have been described, inclusion of the Z-plasty being the most commonly used to prevent webbing and scarring.

The transconjunctival approach can be used to access the medial orbital wall and both the medial extraconal space(via the transcaruncular) and the medial intraconal space (via the medial inferior fornix approach).

By using a transcaruncular approach, the medial wall and the inferomedial floor, trochlea, retrotrochlear space, medial rectus, as well as the superior oblique muscle can be accessed.

The medial inferior fornix approach gives access to the anterior intraconal space and is primarily used for optic nerve sheath fenestration. A medial 180° conjunctival incision near the corneal limbus is made using scissors, and if needed relaxing incisions in the superior and inferior fornices can be made. Medial rectus muscle is resected and medially retracted, Tenon's capsule is entered. Careful blunt dissection along the globe exposes the anterior nerve sheath which is covered with posterior ciliary vessels. These are end-arteries, and injury should be avoided. The central retinal artery enters the ventral surface of the optic nerve 8 to 15mm posterior to the globe, and its disruption can result in rapid and irreversible blindness. After hemostasis is achieved ,the medial rectus muscle is reattached and the conjunctiva is closed.

b) Anterior Lateral Approaches

Lacrimal gland tumors, lesions involving the intra – or extraconal spaces inferior to the lacrimal gland and the lateral canthal ligament, can be accessed using the anterior lateral approach.

The lateral rim approach uses a transcutaneous incision to expose the anterior lateral extraconal space.

Both the anterior lateral extraconal and intraconal spaces as well as the inferolateral orbit can be accessed via the transconjunctival approach.

c) Anterior Superior Approaches

The extra and intraconal anterosuperior and superonasal spaces can only be accessed transcutaneously using the extraperiosteal (brow and sub brow) or the trans septal (upper eyelid crease and vertical lid split) approaches. A trans conjunctival approach for the anterosuperior spaces has not been described.

d) Anterior Inferior Approaches

The inferior orbital rim, orbital floor, inferior intra or extraconal space, the lacrimal duct and the orbital apex can be accessed by this approach. The transcutaneous approach is mostly used in cases of severe conjunctival disease when a transconjunctival approach is unsuitable or in cases of extensive orbital floor or nasoethmoid fractures.

The transcutaneous approaches include the extraperiosteal(infraorbital) and the trans-septal(lower eyelid) approaches. The infraorbital incision also known as the inferior rim incision, provides the most direct access to the orbital rim and floor but results in a cosmetically objectionable scar. The lower eyelid approach uses two incisions:(1)the sub-ciliary or lower blepharoplasty incision(2)the sub-tarsal or mid-lid incision.

The transconjunctival approach, also known as the inferior fornix approach, has the advantage of a cosmetically hidden scar, but exposure may be limited using the transconjunctival approach alone. A lateral canthotomy or combining a transcaruncular incision can improve exposure.

II APPROACHES TO THE POSTERIOR ORBIT

Access to the posterior half of the orbit and orbital apex generally requires removal of one or more orbital walls or a more extensive procedure requiring a transcranial approach when there is intracranial extension.

A) Lateral orbitotomy with osteotomy

Removal of lateral orbital wall (to excise a large dermoid) was first described by Kronlein in 1888, also known as swift operation.

Various incisions:

1) Stallard Wright S shaped incision.
2) Hockey stick incision
3) Upper eyelid crease incision
4) Subciliary incision

This approach can be combined with anterior medial or inferior approaches to achieve improved exposure. Complications are rare, and include lateral rectus dysfunction, diplopia, injury to ciliary ganglion and injury to lacrimal gland.

B) Le Fort 1 orbitotomy

Incision is made in the maxillary gingivobuccal sulcus between the first molars. The anterior and lateral maxilla is exposed and a Le Fort I Osteotomy made . The maxilla is retracted inferiorly and a transantral ethmoidectomy performed. The inferomedial orbital wall is removed, the periorbita opened sharply and infra orbital dissection carried.

ORBITAL DECOMPRESSION – THE TRADITIONAL WAY

The indications for orbital decompression include compressive optic neuropathy, and more commonly, complications of severe proptosis from thyroid ophthalmopathy.

1) Lateral Decompression

First done by Dollinger in 1911 by Kronlein's lateral orbitotomy technique. Any of the lateral orbitotomy techniques may be used for removal of lateral orbital wall. The periorbita is incised and the orbital fat allowed to prolapse into temporal fossa. Isolated lateral orbitotomy is not suitable for compressive optic neuropathy. The potential complications of lateral decompression include an obvious scar, injury to the frontal branch of the facial nerve, cosmetic deformities, and injury to the lacrimal gland.

2) Inferior Decompression

First described by Hirsch in 1930. The Caldwell –Luc approach was used to enter the maxillary sinus, and its roof was removed from either side of infraorbital nerve canal. The periorbita was excised, fat allowed to prolapse into maxillary sinus. A transantral window was created in the nasoantral wall of the inferior meatus. This technique was considered safe, simple and did not result in an external scar.

3) Superior Decompression

The transcranial approach for removal of the orbital roof as far posterior as the optic foramen was first described by Naffziger in 1931. A frontal bone flap is created, the periorbita is opened widely and the orbital contents allowed to decompress superiorly being in contact with dura. The bone flaps are replaced and soft tissue closed. Disadvantages include prolonged postoperative healing time, higher morbidity, anosmia and transmission of cerebral pulsations to the eye.

4) Medial Decompression

In 1936, Sewall described orbital decompression by removing the ethmoid plate via an external approach. The transcutaneous or transconjunctival approaches for anterior medial orbitotomy may be used.

5) Combined Approaches

Transantral orbital decompression using a combination of the Hirsch and Sewell techniques was reported by Walsh and Ogura in 1957. A three wall decompression described by Tessier, Mc Cord and Moses.

Kennerdell and Maroon used the lateral orbitotomy combined with a transconjunctival incision to achieve four wall decompression.

On an average, single wall decompression results in approximately 4mm, two wall decompression in 6mm, three wall decompression in 10mm and four

wall decompression in 16mm reduction in proptosis.

ENDOSCOPIC MEDIAL ORBITOTOMY

Indications

1) Thyroid Eye Disease (Graves Disease)
2) Orbital hemorrhage
3) Orbital subperiosteal abscess
4) Tumors in medial & inferomedial aspect of orbit
5) Pseudotumor of orbit
6) Fungal sinusitis with orbital extension
7) Granulomatous disorders involving the medial and inferomedial orbit
8) Nontraumatic compressive optic neuropathy
9) Tumours of the optic canal
10) Traumatic optic neuropathy

} Endoscopic Optic Nerve Decompression

Advantages of this approach

1) Superior visualization of key anatomic land marks and orbital contents. The panoramic view offered by the endoscopes and , especially the angled view obtained with the angled endoscopes aid in better visualization of orbital contents.
2) Precise dissection is possible with the aid of the fine instruments used in endoscopic sinus surgery, this avoids injury to extraocular muscles, optic

nerve and ophthalmic artery.

3) External incision is avoided
4) Morbidity with this approach is much less compared to the conventional approach.
5) Attention towards preservation of normal sinus drainage.

Disadvantages

1) Can be only done by endoscopic sinus surgeons with significant experience and skill.
2) Potential risk of injury to skull base with resultant CSF leak and meningitis.
3) Risk of injury to optic nerve and internal carotid artery with poor surgical technique.
4) Risk of diplopia with injury to extraocular muscles.

Surgical technique of Endoscopic medial orbitotomy

- The patient is positioned in the supine position, the eyes are maintained within the surgical field.
- The patient is usually given a general anaesthesia, although it is feasible to operate under local anaesthesia. Local anaesthesia is preferred when operating on a monocular patient.
- Local injection of lidocaine 1% with 1:100,000 epinephrine is administered

along the lateral nasal wall. Uncinectomy is done. Do a wide middle meatal antrostomy, from just posterior to nasolacrimal duct to the posterior wall of maxillary antrum.

- An endoscopic sphenoethmoidectomy is performed in standard fashion.
- The lamina papyracea and the roof of ethmoid cavity are completely skeletonized.

The thin bone of lamina papyracea is elevated using a sickle knife or ball probe or cottle's elevator while preserving the underlying periorbita. Bone fragments are removed using Blakesly forceps. Bone removal proceeds superiorly towards the ethmoid roof, inferiorly to the orbital floor, and anteriorly to the maxillary line. Bone in the region of frontal recess is left intact,if possible, to prevent the herniated fat obstructing frontal sinus.

As dissection proceeds posteriorly, thick bone is encountered in the region of orbital apex within 2mm of sphenoid face. This bone corresponds to annulus of Zinn. This landmark represents the posterior limit of standard orbital decompression.

Now parallel incisions are made approximately 3 to 4mm apart in the periorbita from posterior to anterior using a sickle or Rosen knife. Ball probe is used to break up the connective tissue septa and to tease out the fat. The inferior

and medial rectus muscles are identified, the pathology is addressed adequately. The surgical technique may be modified adequately depending on the case and surgeon's expertise.

ENDOSCOPIC OPTIC NERVE DECOMPRESSION

Traditional surgical approaches for optic nerve decompression include transorbital, extranasal transethmoid, transantral, intranasal microscopic and craniotomy approaches.

Advantages of Endoscopic Decompression

1) Excellent visualization and a panoramic view not obtained by other methods.
2) Lack of external scars
3) Less operative stress in patients with multi system trauma
4) Decreased morbidity
5) Preservation of olfaction

Indications

1) The most common, and perhaps the most controversial indication for optic nerve decompression is Traumatic optic neuropathy,

   Surgical intervention is considered if

   a) Fracture of optic canal on CT Scan with vision <6/60
   b) Fracture of the optic canal with vision >6/60 but the patients vision

deteriorates on steroids

c) Vision is <6/60 (or there is a deterioration of vision) after 48 hours of steroids with probable canal injury.

2) Non traumatic causes of compressive optic neuropathy such as benign tumors and inflammatory or fibro osseous lesions.

It is in these patients with non traumatic, compressive optic neuropathy, endoscopic optic nerve decompression appears to be most successful.

Surgical Technique

- The patient is positioned in the supine position, the eyes are maintained within the surgical field.
- The patient is usually given a general anaesthesia. Local anaesthesia is preferred in a monocular patient.
- Local infiltration of lidocaine 1% with 1:100,000 epinephrine along the middle turbinate and uncinate process.
- An uncinectomy with middle meatal antrostomy is performed.
- Sphenoethmoidectomy is performed in a standard fashion .
- In the posterior ethmoids, the posterior lamina papyracea and fovea ethmoidalis should be identified.
- The anterior face of the sphenoid is widely opened, so that the roof of the sphenoid and the posterior ethmoids is continuous.

- The sphenoid should be inspected and the optic nerve, carotid artery and pituitary fossa is identified.
- The thick bone overlying the junction of the orbital apex and sphenoid sinus, known as the optic tubercle is too thick to flake off and an irrigated diamond burr is used to thin this bone down until it is almost transparent.
- A blunt Freer's elevator is pushed through the lamina papyracea approximately 1.5cm anterior to the junction of posterior ethmoid and the sphenoid, the bone of the posterior orbital apex is flaked off the underlying orbital periosteum.
- After the bone over the orbital apex is removed the bone of the optic canal is approached and it is flaked off the underlying nerve.
- When all the bone has been cleared off the optic canal and the underlying optic nerve sheath is clearly visible, the sheath may be incised.
- No packs are placed on the nerve or in the sinuses.

Complicaitons

There is a risk of CSF leak, meningitis and visual loss with poor surgical expertise. Sometimes transient loss of vision occurs after surgery due to neuropraxia.

MATERIALS AND METHODS

This is a prospective study of twenty five patients for whom endoscopic medial orbitotomy was done by the Professors and Asst. Professors of Govt. General Hospital, Chennai – 3 from September 2005 to November 2007.

Detailed history of each patient was taken and thorough clinical examination was done.

Diagnostic nasal endoscopy was done in all cases.

Ophthalmology opinion was obtained in all cases, neurosurgeon's opinion was obtained in those cases where we suspected an intracranial extension.

Following provisional diagnosis , all the cases were subjected to CT scanning. Selected cases also underwent MRI.

A proforma was prepared for the study and details of the patient was filled up in the proforma.

Informed written consent was obtained from all cases before surgery.

Inclusion criteria:

1. Pathology limited to medial subperiosteal space, medial extraconal space, intraconal space, or/and optic nerve involvement in orbital apex or in sphenoid sinus.
2. Pathology of the nose and paranasal sinuses extending into the medial aspect of orbit or with optic nerve involvement.

Exclusion criteria:

1.Pathology in lateral extraconal space and lateral subperiosteal space.

2.Pathology in superolateral and inferolateral aspect of orbit.

3.Cases were the medial orbit was opened for an endoscopic Dacryocystorhinostomy.

Study period:

September 2005 to November 2007(2years and 2 months)

Study design and sample size:

Prospective study of 25 cases for whom endoscopic medial orbitotomy was done by the Professors and Asst.Professors of UIORL, Madras Medical College.

Follow up: All cases were followed for a minimum of 2 months

PROFORMA

Name :

Age :

Sex :

Presenting complaints:

Nasal obstruction

Headache

Double vision

Protrusion of eye balls

Blurring of vision

History of previous surgery

Personal history

Family history

General examination Pulse rate Blood pressure

pallor Yes/no CVS/RS

ENT examination

NOSE

External contour

Anterior rhinoscopy:

Posterior rhinoscopy:

EAR Right Left

Pinna

External ear

Tympanic membrane

ORAL CAVITY AND THROAT

EYE

Proptosis

Vision

Ocular movement

Lacrimation

Lid closure

INVESTIGATIONS

- Blood grouping and typing
- Complete hemogram
- Diagnostic nasal endoscopy

- Radiological

1. CT scan paranasal sinuses - -Axial and coronal views with orbit cuts .
2. MRI

OPHTHALMOLOGIST OPINION

NEUROSURGEON OPINION

PROVISIONAL DIAGNOSIS

DURING SURGERY: Middle turbinectomy done or not

Necessity of an intraoperative image guidance(yes or no)

Nasal packing after surgery(done or not)

DURATION OF HOSPITAL STAY AFTER SURGERY

COMPLICATIONS AND ITS MANAGEMENT

POST OPERATIVE FOLLOW UP: Nasal obstruction

Headache

Diplopia

Blurring of vision

improved or not

The following data were analyzed:-

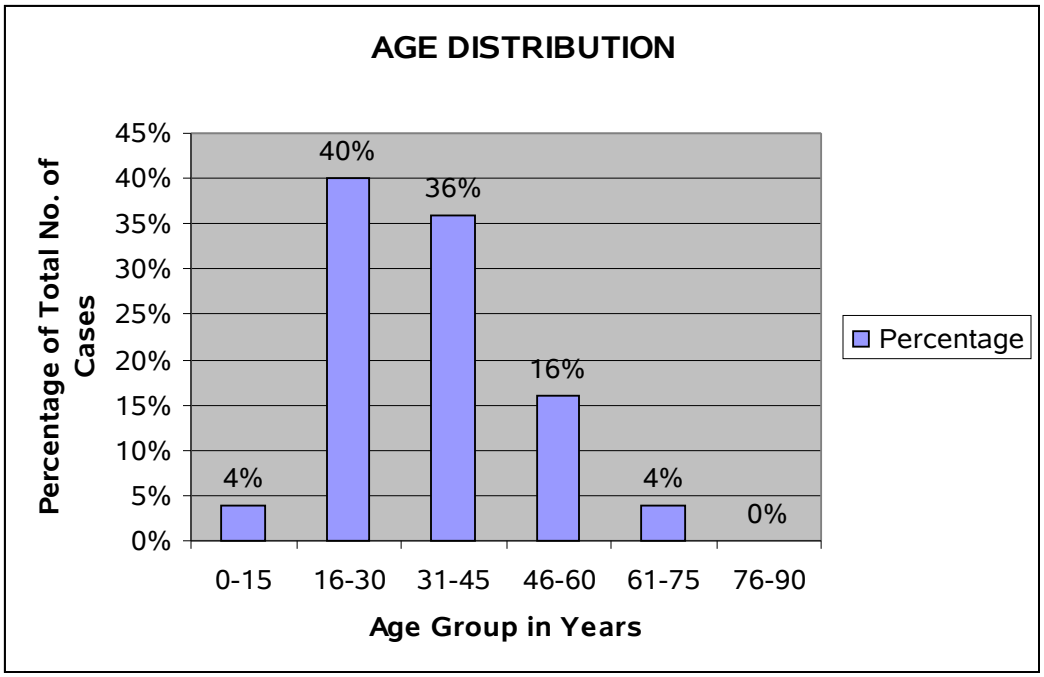
1) Age and Sex distribution of cases
2) Indications
3) Cases with no pathology in nose & PNS
4) Symptom analysis
5) CT Scan findings with regard to the orbital spaces involved and optic nerve involvement.
6) Necessity of middle turbinectomy
7) Necessity of intraoperative image guidance
8) Requirement of packing after surgery
9) Complications and its management
10) Duration of hospital stay after surgery
11) Results.

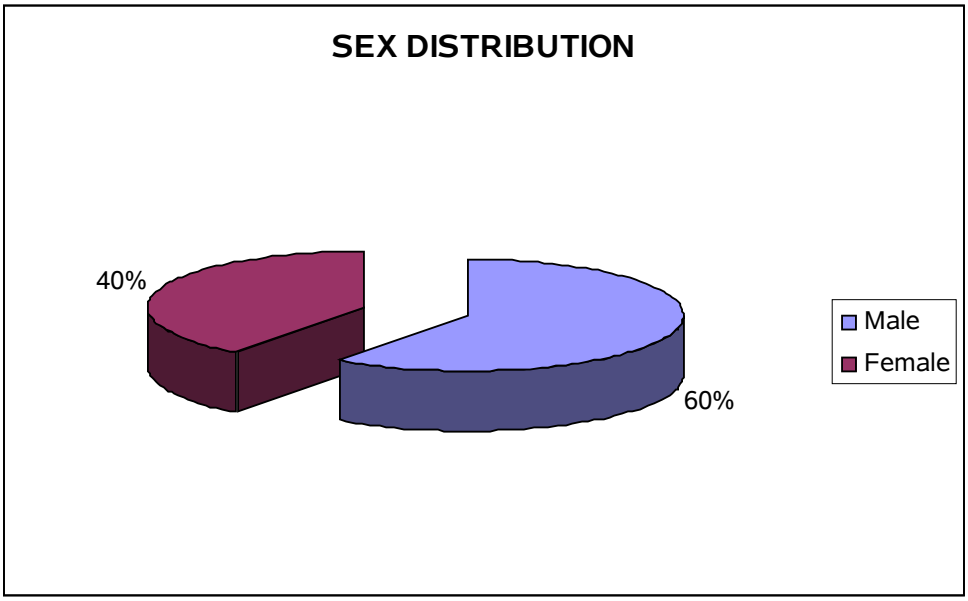
OBSERVATION

AGE AND SEX DISTRIBUTION OF CASES

AGE / SEX / DISTRIBUTION

Age	Sex		Sex in Percentage		Total in Percentage
	Male	Female	Male	Female	
0-15	1	0	4%	0%	4%
16-30	7	3	28%	12%	40%
31-45	3	6	12%	24%	36%
46-60	4	0	16%	0%	16%
61-75	0	1	0%	4%	4%
76-90	0	0			
	15	**10**	**60%**	**40%**	**100%**





INDICATIONS FOR ENDOSCOPIC MEDIAL ORBITOTOMY

INDICATION	NUMBER OF CASES			PERCENTAGE
	TOTAL	MALE	FEMALE	
Fungal sinusitis with orbital extension	7	4	3	28%
Fibrous dysplasia with orbital extension	4	0	4	16%
Frontoethmoidal mucocele with orbit involvement	3	1	2	12%
Orbital schwannoma	2	2	0	8%
Retroorbital tuberculoma	2	2	0	8%
Traumatic optic neuropathy	2	2	0	8%
Neuroblastoma of orbit	1	1	0	4%
Optic nerve glioma	1	1	0	4%
Orbital subperiosteal abscess	1	0	1	4%
Foreign body in optic nerve	1	1	0	4%
Compressive optic neuropathy due to idiopathic intracranial hypertension	1	0	1	4%
Total	25	14	11	100%

CASES WITHOUT SINUS PATHOLOGY

Traumatic Optic Neuropathy : 2

Retro orbital Tuberculoma : 2

Schwannoma of Optic Nerve : 2

Optic Nerve Glioma : 1

Neuroblastoma of Orbit : 1

Compressive Optic Neuropathy due to

Idiopathic Intracranial Hypertension : 1

Foreign Body in optic nerve : 1

Total 10/25(40% of total)

CASES WITH SINUS PATHOLOGY

Fungal Sinusitis with orbital extension	:	7
Orbital Subperiosteal Abscess	:	1
Fibrous Dyplasia	:	4
Fronto Ethmoidal Mucocele with Orbit involvement	:	3

Total 15 / 25(60% of total)

SYMPTOMS

Symptom	No. of Patients	%
Nasal Obstruciton, Headache, Diplopia, and Blurring of Vision	15 (All cases with associated sinus pathology)	60%
Diplopia and Blurring of Vision only	8 (All cases without sinus pathology except the 2 cases of traumatic optic neuropathy)	32%
Only Blurring of Vision	2 (2 cases of traumatic optic neuropathy)	8%
Total	25	100%

CT SCAN FINDINGS WITH REGARD TO THE ORBITAL SPACE AND OPTIC NERVE INVOLVEMENT

MEDIAL EXTRACONAL SPACE ONLY

	Diagnosis	Number	Percentage
1	Fungal Sinusitis	5	20%
2	Fronto Ethmoidal Mucocele	3	12%
3	Fibrous Dysplasia	1	4%
	Total	**9**	**36%**

INTRACONAL SPACE AND MEDIAL EXTRACONAL SPACE INVOLVEMENT

	Diagnosis	Number	Percentage
1	Orbital Schwannoma	2	8%
2	Fungal Sinusitis	2	8%
3	Fibrous Dysplasia	3	12%
4	Orbital Neuroblastoma	1	4%
5	Retroorbital Tuberculoma	2	8%
	Total	10	40%

INTRACONAL SPACE ONLY INVOLVED

	Diagnosis	Number	Percentage
1	Foreign body optic nerve	1	4%
2	Optic nerve glioma	1	4%
	Total	2	8%

ORBITAL SUBPERIOSTEAL SPACE ONLY INVOLVED

	Diagnosis	Number	Percentage
1	Orbital Subperiosteal Abscess	1	4%
	Total	1	4%

OPTIC NERVE INVOLVEMENT IN INTRACANALICULAR PORTION

	Diagnosis	Number	Percentage
1	Traumatic optic neuropathy	2	8%
	Total	2	8%

NO SIGNIFICANT FINDINGS IN CT SCAN

	Diagnosis	Number	Percentage
1	Compressive optic neuropathy due to idiopathic intracranial hypertension	1	4%
	Total	1	4%

NECESSITY OF MIDDLE TURBINECTOMY

	Diagnosis	Number	Percentage
1	Complete Middle Turbinectomy	0	
2	Partial Middle Turbinectomy	15	60%
3	No Turbinectomy	10	40%
	Total	25	100%

INTRAOPERATIVE IMAGE GUIDANCE

	Numbers	Type of Equipment Used
Image Guidance used intraoperatively	1 (Foreign Body in Optic Nerve)	C ARM
Image guidance not used	24	-

PACKING AFTER SURGERY

	Number of Cases	%
Nasal Packing Done	14	56%
Nasal Packing Not Done	11	44%
Total	25	100%

COMPLICAITONS AND ITS MANAGEMENT

Complications	Number of Cases	%
CSF Leak	0	0
Meningitis	0	0
New onset of Diplopia or Worsening of Diplopia	0	0
Decrease in Visual Acuity and Blindness	0	0

DURATION OF HOSPITAL STAY AFTER SURGERY

Days	Number of Patients	%
1-5 Days	23	92%
6-10 Days	2	8%
> 10 days	Nil	100%

RESULTS

Cases were followed up for a minimum of 2 months

Preoperative symptoms	Number of patients	Follow up after surgery
Nasal obstruction, Headache, Diplopia and Blurring of vision	15	13 cases were relieved of all their complains. 1 case of fungal sinusitis had persistent nasal obstruction and headache,but was relieved of diplopia and blurring of vision. 1 case of fungal sinusitis had persistent blurring of vision after surgery,but was relieved of other complains;since the patient had cataract,the case was referred to ophthalmologist.
Diplopia and blurring of vision alone	8	All cases improved.
Blurring of vision alone	2	All cases improved.

DISCUSSION

A prospective analysis of 25 cases of Endoscopic medial orbitotomy done for various indications by the Professors and Assistant professors of UIORL, was done.

On analysis of the age and sex distribution of the cases it was found that 60% of the cases were male patients and 40% were female patients.76% of the patients were in 16-45years age group, of which 40% belonged to 16-30years age group and 36% belonged to 31-45years age group.

On analyzing the various indications for which Endoscopic medial orbitotomy was done, it was found that the most common indication is Fungal sinusitis with orbital extension which constituted 28% of cases. The other indications included Fibrous dysplasia of the nose and paranasal sinuses extending into orbit(16%), Frontoethmoidal mucocele with orbit involvement(12%),Orbital schwannnoma(8%), Retro orbital tuberculoma(8%), Neuroblastoma of orbit(4%), Optic nerve glioma(4%), Orbital subperiosteal abscess(4%), Foreign body in optic nerve(4%),Compressive optic neuropathy due to idiopathic intracranial hypertension(4%).Of these cases 60% of cases had pathology in the paranasal

sinuses and orbit. Using the traditional nonendoscopic approaches of anterior and posterior orbitotomy addressing the sinus pathology is very difficult.

We didn't have any case of Thyroid eye disease for whom Endoscopic orbital decompression was done. On reviewing the literature it was found that Thyroid eye disease is the most common indication requiring Endoscopic orbital decompression in western countries. Probably in the near future, the horizons of Endoscopic medial orbitotomy in our institute will widen further to include Thyroid eye disease also.

When the symptoms of these patients were analyzed, it was found that 60% of the cases presented with nasal obstruction, headache, diplopia and blurring of vision,32% of the cases had diplopia and blurring of vision, and 8% of the cases had blurring of vision alone.

CT scan was taken for all cases and MRI was taken in selected cases. On analyzing the CT scan with regard to the orbital space and optic nerve involvement; it was found that in 40% of cases both intraconal and medial extraconal spaces were involved,36% of cases had involvement of medial extraconal space only, in 8% of cases only intraconal space was involved, medial subperiosteal space was involved

in 4% of cases, optic nerve was involved in its intracanalicular portion in 8% of cases. There was no significant finding in CT scan in 4% of cases(ie in one case of compressive optic neuropathy due to idiopathic intracranial hypertension).This case was diagnosed as having papillooedema and impending optic atrophy by the ophthalmologist and was referred to us for endoscopic optic nerve sheath fenestration.

On analyzing the necessity of middle turbinectomy during endoscopic medial orbitotomy, it was found that 60% of cases required partial middle turbinectomy and 40% cases required no turbinectomy. However no cases required complete turbinectomy. During surgery removal of middle turbinate is to be avoided, but if felt inevitable for better access and visualization it is advised to go for a partial middle turbinectomy rather than complete middle turbinectomy; because complete removal of middle turbinate is prone to cause iatrogenic complications like CSF leak, frontal sinusitis due to scarring in frontal recess, empty nose syndrome etc.

On analyzing the necessity of packing the nose after surgery it was found that nasal packing was required in 56% of cases and 44% of cases required no nasal packing after surgery. Nasal packing is to be avoided after endoscopic medial orbitotomy but at times the surgeon prefers light packing with surgical or gelfoam

for better hemostasis.

The main advantages of Endoscopic medial orbitotomy, in our experience, were found to be

1) . Superior visualization and the panoramic view offered by endoscope.

It is found from literature that during traditional nonendoscopic approach the anteroposterior view of the orbital surgeon performing anterior medial orbitotomy is often hampered by the prolapsing orbital fat. This problem is avoided by the endoscopic approach.

2). Avoidance of an external incision and a cosmetically unacceptable scar.

3). Morbidity was much less with the endoscopic approach. On analyzing the hospital stay after surgery it was found that 92% of the cases required only 1-5days of hospital stay after surgery, whereas in nonendoscopic traditional approaches the patients are required to stay in the hospital from 7-10days.

4). Results were good and complications were few.

Of the 25 cases operated 23 cases were relieved of all their symptoms, 1 case with nasal obstruction, headache, diplopia and blurring of vision was relieved of diplopia and blurring of vision; and another case with the same complaints was relieved of nasal obstruction, headache and diplopia; but had persistent blurring of vision. Since the patient also had cataract

the case was referred to ophthalmologist. There was no complication in any patients like CSF leak, meningitis, new onset of diplopia or worsening of diplopia, and decrease in visual acuity or blindness.

Regarding usage of intra operative image guidance it was found that 24/25 cases required no intraoperative image guidance. In 1 patient(a case of optic nerve foreign body) however image guidance was required for better surgical precision. Since the sophisticated and expensive navigation systems were not available in our set up, and the surgery required an image guidance for ease of removal of the metallic foreign body in intraconal portion of optic nerve, a C ARM usually used by the orthopaedic surgeons was used. This is an innovative approach which can be followed in a Government hospital where the expensive navigation systems are not available.

CONCLUSIONS

1) The most common indication requiring endoscopic medial orbitotomy in our set up is Fungal sinusitis with orbital extension.

2) Even though most common indication for Endoscopic orbital decompression is Thyroid eye disease in western countries; Endoscopic orbital decompression for Thyroid eye disease is yet to become popular here.

3) Cases with a sinus pathology extending into orbit is far better dealt by endoscopic approach than by nonendoscopic traditional methods of anterior and posterior orbitotomy.

4) Problems like the prolapsing orbital fat obscuring the anteroposterior view of the orbital surgeon when performing traditional nonendoscopic anteromedial orbitotomies are avoided by endoscopic approach which offers superior visualization and a panoramic view.

5) Preoperative CT scan is a must for all cases of endoscopic medial orbitotomy to identify the anatomic variations and the various orbital spaces and optic nerve involvement by the pathology.MRI is to be taken in selected cases.

6) Cases with no obvious CT scan findings like Compressive optic neuropathy due to idiopathic intracranial hypertension are also benefitted by endoscopic optic nerve sheath fenestration.

7) During surgery removal of middle turbinate is to be avoided and if removal of middle turbinate is felt inevitable for better access and visualization always go for a partial middle turbinectomy rather than a complete middle turbinectomy.

8) Packing of the nose after surgery is to be avoided for allowing better decompression of the orbital contents and optic nerve, but at times the surgeon prefers to pack the nose for better hemostasis.

9) Morbidity of the Endoscopic medial orbitotomy is much less compared to non endoscopic traditional approaches. Most of the cases can be discharged in 1-5 days after surgery.

10) Results are good and complications are rare with Endoscopic medial orbitotomy.

11) Most of the cases do not require Image guidance systems intraoperatively.

12) In certain cases like metallic foreign body of the orbit, where intraoperative image guidance is necessary. C ARM can be used rather than the sophisticated and expensive navigation systems which are not available in government hospitals.

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Serial number	Name	Age	Sex	Indication	sinus pathology	CT scan: orbital spaces & optic nerve involvement in intracanalicular portion
1	Alamelu	35	female	Fungal sinusitis	yes	Medial extraconal
2	Dharani	42	female	Fungal sinusitis	yes	Medial extraconal & intraconal
3	Akila	22	female	Fibrous dysplasia	yes	Medial extraconal & intraconal
4	Durai	48	male	Fungal sinusitis	yes	Medial extraconal
5	Mohan	30	male	Fungal sinusitis	yes	Medial extraconal
6	Kalpana	32	female	Fungal sinusitis	yes	Medial extraconal

7	Akbar	31	male	Fungal sinusitis	yes	Medial extraconal & intraconal
8	Chandran	30	male	Frontoethmoidal mucocele	yes	Medial extraconal
9	Pushpa rani	75	female	Fibrous dysplasia	yes	Medial extraconal & intraconal
1o	Kandasamy	52	male	Retro orbital tuberculoma	no	Medial extraconal & intraconal
11	Dr.Deepa	33	female	Fibrous dysplasia	yes	Medial extraconal
12	Riswan	23	male	Orbital schwannoma	no	Medial extraconal & intraconal
13	Sathyapriya	28	female	Frontoethmoidal mucocele	yes	Medial extraconal
14	Fathima	34	female	Orbital abscess	yes	Subperiosteal space
15	Munusamy	14	male	Neuroblastoma	no	Medial extraconal & intraconal
16	Subhangi	26	male	Traumatic optic neuropathy	no	Optic nerve at intracanalicular portion

Serial number	Name	Age	Sex	Indication	sinus pathology	CT scan orbital spaces & optic nerve involvement in intracanalicular portion
17	Rahmadulla	28	male	Orbital schwannoma	no	Medial extraconal & intraconal
18	Karthik raj	45	male	Traumatic optic neuropathy	no	Optic nerve at intracanalicular portion
19	kannan	24	male	Frontoethmoidal mucocele	yes	Medial extraconal
20	Radha	35	female	Fibrous dysplasia	yes	Medial extraconal & intraconal
21	Sundaramoorthy	25	male	Optic nerve foreign body	no	Intraconal only
22	Lakshmanan	40	male	Retroorbital tuberculoma	no	Medial extraconal & intraconal
23	Buhari	55	male	Fungal sinusitis	yes	Medial extraconal

24	Anjalai	30	female	Idiopathic ICT with compressive optic neuropathy	no	No relevant findings in CT
25	R.N Singh	52	male	Optic nerve glioma	no	Intraconal only