THINGS TO BE DONE FROM JOGI IF YOU HAVE DONE JATOI

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TOPICS

1) THE ORBIT

2) REFRACTIVE ERRORS

THE ORBIT

THROMBOSIS OF CAVERNOUS SINUS

It is due to the extension of thrombosis from various sources which communicate with the cavernous Sinus.

Anatomy of Communication of Cavernous Sinus

It is of great clinical importance as infection may travel from face, lips orbit, mouth, pharynx, ear, Nose, accessory sinuses or as a metastasis in infectious diseases or septicemia.
i. The superior and inferior ophthalmic veins enter the sinus anteriorly.
ii. The superior and inferior petrosal sinus leaves the sinus posteriorly.
iii. It communicates directly and indirectly with the pterygoid plexus, cerebrum and middle ear. *Therefore the swelling behind the ear is diagnostic of cavernous sinus thrombosis.*
iv. The sinus of one side communicates with the other by two or three transverse sinuses which Surround the pituitary body.

**Symptoms**
They are same as for orbital cellulitis.
1. There is severe supraorbital pain due to involvement of ophthalmic division of the 5th nerve which Is situated on the lateral side of cavernous sinus.
2. High-grade fever, rigor and vomiting are present usually.

**Signs**
1. Oedema over the mastoid process of the temporal bone of the affected side, i.e. behind the ear is The most important early diagnostic sign.
2. Transference of symptoms to opposite eye in 50% cases is seen. Paralysis of opposite lateral rectus muscle is suspicious of bilateral involvement.
3. Paralysis of extra ocular muscles may be present.
4. Corneal anesthesia and dilated pupil are seen in later stages due to involvement of 5th nerve.
5. Proptosis occurs in almost all cases but is of late onset.
6. Fundus examination
   - Retinal veins are dilated and engorged
   - There may be pronounced papillitis
   - Papilloedema may be present.

**Complication**
Meningitis and cerebral abscess may occur which may lead to death.

**Treatment**
1. Modern potent third generation broad-spectrum antibiotic should be started immediately by Intravenous route in massive doses.
2. Anticoagulant therapy may be helpful in dissolving the clot.
PROPTOSIS OR EXOPHTHALMOS

Proptosis
It is defined as the passive or mechanical protrusion of the eyeball.

Exophthalmus
It is defined as the active protrusion of the eyeball forwards.

Classification
It may be classified as follows:

1. **Unilateral Proptosis**
   i. *Inflammatory lesions*—Orbital cellulitis, abscess, etc.
   ii. *Vascular disturbances*—Haemorrhage, varicose orbital veins, hemangioma, etc.
iii. *Cysts and tumors*—Dermoid cyst, osteoma, lymphoma, lymphosarcoma, glioma, meningioma of optic nerve, retinoblastoma and metastatic deposits in orbit.

iv. *Systemic diseases*—Leukemias and endocrine disturbances such as Graves’ disease and Thyrotrophic Exophthalmus in initial stages.

v. *Paralysis of extra ocular muscles* as in complete Ophthalmoplegia.

2. **Bilateral Proptosis**
   i. *Developmental anomalies of the skull*—Oxycephaly (tower skull).
   ii. *Endocrine Exophthalmus*, both thyrotoxic and thyrotrophic.
   iii. *Inflammatory lesions*—Cavernous sinus thrombosis.
   iv. *Tumors*—lymphosarcoma, lymphoma, pseudotumour, etc.

Common causes

3. **Intermittent Proptosis**
   It is usually caused by the orbital varicose veins particularly on looking down.

4. **Pulsating Proptosis**
It is caused by the arteriovenous aneurysm as a result of communication between the internal Carotid artery and the cavernous sinus.

**Clinical Evaluation**

Clinical evaluation of the patient is done by taking a careful history, clinical examination, radiological And laboratory investigations.

1. **History**—Mode of onset—whether sudden, gradual or chronic?
   - Presence and duration of pain is important.
   - Past history of thyroid dysfunction, orbital trauma, sinus disease and malignancy.

2. **Clinical examination**
   a. *It is important to rule out the possibility of pseudoproptosis*. Pseudoproptosis is a condition in which the eyeball appears to be proptosed but actually there is no forward displacement.
   The important causes of pseudoproptosis are:
   i. Buphthalmos
   ii. High axial myopia
   iii. Retraction of the upper eyelid
   iv. Shallow orbit as in craniofacial dysostosis.

   b. **Measurement of proptosis**
      i. *By clinical observation*—the patient is made to sit in front of the surgeon. His head is
Tilted slightly backwards and the position of the apex of each cornea is compared on both sides.

ii. *Exophthalmometer*—it consists of a transparent plastic ruler with a groove which fits into the outer bony margin of the orbit. The scale is engraved on both sides. The level of the apex of the cornea is measured on both sides.

• Normally the distance between the apex of the cornea and the lateral orbital margin is less than 20 mm. A reading of 21 mm or more is regarded as abnormal.
• A difference of more than 2 mm between the two eyes is abnormal.

iii. *Hertel exophthalmometer*—It is a more sophisticated instrument.

c. **There are limitations of ocular movements** due to oedema, infiltration and fibrosis.

d. **Visual acuity** may be reduced as a result of exposure keratitis and optic nerve involvement due to infiltration, pressure by swollen muscle and reduced blood supply.

e. **Pupillary reactions are affected** due to optic nerve involvement.

f. *Fundus examination*—The disc may be normal or show features of optic atrophy, papillitis.
or papilloedema.
g. **Transillumination and auscultation** are done for tumor and pulsating proptosis.

3. **Radiological investigation**
   a. **Plain X-rays**
      i. *The Caldwell view (PA view)*—this view is taken with the patient’s nose and forehead touching the film. It is useful in the diagnosis of orbital lesions. The enlargement of the orbit bone density, calcification, enlargement of the superior orbital fissure and optic canal is noted.
      ii. *The lateral view*—It is useful in studying the nasopharynx.
   b. **Computerized tomography scanning (CT scan)**—Axial and coronal scanning are done. CT scan is the most useful single technique for orbital evaluation.
   c. **Ultrasonography**—Both A and B scans are complementary to CT scanning.
   d. **Magnetic resonance imaging**—The tissues are exposed to a short electromagnetic pulse, and the sensitive receivers pick up this electromagnetic echo. It has the advantage of not being hampered by bone and there is no effect of ionizing irradiation on the patient.
4. **Laboratory investigation**

i. Routine blood picture, hemoglobin, WBC total and differential count, ESR, blood sugar and Cholesterol, urine examination are useful investigations.

ii. Special tests like T3, T4, TSH level of blood, orbital venography may be done.

**Treatment**

1. Exploratory operation and biopsy are done.
2. Surgical excision—It is done in case of benign tumors and dermoid cysts. There are 3 routes of Approach with retention of the eye:
   i. Anterior orbitotomy,
   ii. Lateral orbitotomy,
   iii. Transfrontal (intracranial).
3. Exenteration—Removal of all the structures of the orbit including the eye and periosteum is done in case of extra ocular extension of malignancy as in retinoblastoma.
4. Radiation—it is recommended in cases of recurrence and metastasis of tumor
ENOPHTHALMOS

Common causes of exophthalmos:
- Lacrimal gland tumours
- Dermoid cysts
- Endocrine-thyroid
- Orbital tumour
- Optic nerve glioma meningioma

Sagittal section of cavernous sinus and adjacent structures:
- Optic chiasma
- Internal carotid artery
- 3rd nerve
- Ophthalmic division of 5th nerve
- 4th nerve
- Maxillary division of 5th nerve
- 6th nerve

Apex of the cornea
Exophthalmometer
It is a rare condition in which the eyeball is displaced inwards.

**Etiology**

1. *Structural abnormality:* It is seen in blow-out fracture of the orbital floor, phthisis bulbi and microphthalmos and other congenital defects.
2. *Atrophy of orbital content:* It is seen in orbital varicose veins, in old age and after irradiation for Malignant tumor.
3. *Traction:* It occurs due to post-inflammatory cicatriziation of extra ocular muscles as in pseudotumour Syndrome and after excessive shortening of extra ocular muscles.

**ERRORS OF REFRACTION**

The average power of a normal emmetropic eye is + 58 To + 60D.
Most emmetropic eyes are approximately 24 mm in length

**ERRORS OF REFRACTION [AMETROPIA]**

The optical condition of the eye in which the incident parallel rays of light do not come to a focus upon the light sensitive layer of the retina, with accommodation
at rest is known as ametropia.

**Etiology**

1. **Axial ametropia**—There is abnormal length of the eyeball.
   - Too long—In myopia
   - Too short—In hypermetropia.
2. **Curvature ametropia**—There is abnormal curvature of the refracting surfaces of the cornea or lens.
   - Too strong—In myopia
   - Too weak—In hypermetropia.
3. **Index ametropia**—There is abnormal refractive index of the media.
   - Too high—In myopia
   - Too low—In hypermetropia.
4. **Abnormal position of the lens**
   - Forward displacement—In myopia
   - Backward displacement—In hypermetropia

**MYOPIA**

Indistinct distant vision is the most common symptom. Usually the young children are unable to see the blackboard clearly

**Optic Disc**
• **Temporal crescent**—The retinal pigment epithelium fails to extend up to the temporal border of the disc. This leads to exposure of choroidal pigment.

**Increase in axial length**

**Supertractional nasal crescent**—The retina extends over the nasal disc margin causing blurring of nasal margin due to traction.

• **Posterior staphyloma**—The sclera may bulge out at the posterior pole due to thinning

**Peripheral Fundus**

• Cystoid degeneration of or a serrata and tesselated (tigroid) fundus may be present.
• Weiss reflex streak is seen due to detachment of vitreous at the posterior pole.
• Holes and tears in the retina may be present peripherally

**HYPERMETROPIA**

A bright reflex, i.e. watered silk appearance may be seen.

**ASTIGMATISM**

Regular astigmatism is present when the two principal meridians are at right angles. It can be corrected by lenses.
i. *According to the rule*—The vertical meridian is more curved, e.g. as in normal cornea.

ii. *Against the rule*—the horizontal meridian is more curved, e.g. as after cataract surgery.

**APHAKIA**

1. The eye is hypermetropic. Parallel rays of light reach a focus about 31 mm behind the cornea.
2. There is loss of accommodation.
3. The retinal image is about 25% larger.
4. Astigmatism [against the rule]—the surgical scar at the corneoscleral junction in the upper part Of the cornea flattens the vertical meridian of the cornea.

. The iris shows peripheral buttonhole iridectomy at or near 12 o’clock position.

In pseudophakia, i.e. where intraocular lens (IOL) has been placed in the posterior chamber, a peculiar shining reflex is seen through the pupil.

**DISADVANTAGES OF USING SPECTACLES AS TREATMENT FOR APHAKIA**

Spherical aberration causes ‘pin cushion effect’. There is greater refraction at the periphery of
spherical lens than near the centre. Thus, the incoming rays of light do not come to a point focus.
3. Chromatic aberration may be present.
4. “Jack in the box” ring scotoma is seen due to total internal reflection of light.

**Intraocular Lens [IOL] Implantation**

This is also known as *pseudophakia*. Posterior chamber IOL implantation is best as they are placed in the normal physiological position of lens.
1. Intraocular lens is made up of hard material PMMA (polymethyl methacrylate) or soft material HEMA (hydroxyethyl methacrylate).
2. Lenses are biconvex or planoconvex measuring 4-6 mm in diameter.

Lens power is calculated by:
1. Ultrasonography (A-scan) (axial length)
2. Keratometry

The standard power of +19.5 D of posterior chamber IOL = +11 D spherical lens

**ANISOMETROPIA**

**Types**
1. *Congenital*
i. One eye is emmetropic and the other eye is ametropic.

ii. Both eyes are ametropic (either myopic or hypermetropic) but differ in degree, e.g. one eye has refractive power of –2D and the other eye has –6D.

iii. Both eyes are ametropic but differ in variety, e.g. one eye is hypermetropic and the other eye is myopic.

2. Acquired
It is seen after unilateral cataract extraction. One eye is emmetropic and the operated eye is hypermetropic.

PRESBIOPIA

<table>
<thead>
<tr>
<th>The average eye glass adds for various age group</th>
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<tbody>
<tr>
<td>40 years</td>
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<tr>
<td>45 years</td>
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<td>50 years</td>
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<tr>
<td>55 years</td>
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<td>60 years</td>
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DETERMINATION OF REFRACTION
Determination of refraction is the term applied to the various testing procedures used to measure the refractive errors of the eye and to provide proper correction.
Determination of refraction is done by the following methods:

1. **Objective Methods**
   i. **Retinoscopy**—It is done after dilatation of the pupil.
   ii. **Auto-refractometer**—Refraction is tested automatically using electronic and computer technology.
   iii. **Keratometer**—It is useful for testing corneal astigmatism particularly.

2. **Subjective Methods**
   *Postmydriatic test (PMT).*

**RETINOSCOPY [Skiascopy or Shadow Test]**
A retinoscope is an instrument that the examiner uses to shine light through the patient’s pupil. He observes the reflex formed by the light rays reflected from the patient’s retina.

**Optical Principle**
When light is reflected from a mirror into the observer’s eye, the direction in which the light moves across the pupil varies with the refraction of the eye.

**Mydriatics in Refraction**
The pupil is dilated by a suitable mydriatic depending on the age of patient.

*In children*—Atropine ointment application three times a day for 3 days is preferred up to 8 years of
age as it paralyses the ciliary muscle. Children have great power of accommodation. 

In adults—Phenylephrine, homatropine cyclopentolate, tropicamide may be used.

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<thead>
<tr>
<th>COMMONLY USED TOPICAL MYDRIATICS AND CYCLOPLEGICS</th>
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<tr>
<td><strong>MYDRIASIS</strong></td>
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<tr>
<td><em>Drugs</em></td>
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<tr>
<td>Atropine 1%</td>
</tr>
<tr>
<td>Homatropine 2%</td>
</tr>
<tr>
<td>Cyclopentolate</td>
</tr>
<tr>
<td>Tropicamide 0.5%</td>
</tr>
<tr>
<td>Phenylephrine 10%</td>
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</table>

**Method**

Retinoscopy is done in a dark room.

- The examiner sits at 1 m distance from the patient

The patient wears a trial frame and fixes a spot at the far end of the room so that the light rays entering the eye are parallel.

- A light is placed behind and above the patient’s head.
- The examiner looks through a central hole in the plane mirror in the patient’s eye.
- The mirror is moved slowly from one side to the other. The direction in which the shadow moves is noted.
- The horizontal meridian is observed first, and then the vertical.
Observations and Inferences
1. *In hypermetropia*: The shadow moves in the same direction as the mirror.
2. *In myopia (above \(-1 \text{D}\))*: The shadow moves in the opposite direction.
3. *In myopia of \(-1 \text{D}\)*: There is no shadow.
4. *In emmetropia and myopia of less than \(-1 \text{D}\)*: There is a very faint shadow moving in the same direction.
5. *In astigmatism*: The shadow appears to swirl around (scissor-shaped).

Neutralisation
When the shadow moves with the mirror, progressively stronger convex lenses are put in the trial frame until,
1. *No shadow is seen*
2. *The shadow moves in the opposite direction.*
This is known as ‘the point of reversal’. Similarly, when the shadow moves against the mirror, progressively stronger concave lenses are put in the trial frame until *the point of reversal* is reached.

**POSTMYDRIATIC TEST (PMT)**
In postmydriatic test appropriate lenses as found by the retinoscopy are inserted in the trial frame. Each eye is tested separately. Then the two eyes are finally tested and corrected together for distant
vision.
The correction for near vision by convex spherical lenses is made over 40 years of age usually. It is always undercorrected. It is added to the correction for distant vision.

CORRECTION OF AMETROPIA WITH LENSES

1. Spectacles
   • In children spectacles with large round or oval lenses should be ordered as they may look over them.
   • In adults and with astigmatism, rigid spectacles must be ordered.
   • For distant vision, the lenses are centred properly so that the optical centres are opposite the pupil.
   • For near vision, the lenses are decentered inwards and tilted at an angle of 15°.
   • Bifocal, trifocal or multifocal lenses are used.
   • Tinted glasses are used in high myopia, albinism or in tropical countries.
   • Photochromatic lenses become dark automatically in bright light and remain white in dim light.

1. LENSES

   Types

1. Spherical lens—Convex, concave
2. Cylindrical lens—Convex, concave
1. Spherical Lens
It has equal curvature in all meridians.
1. Convex lens—It is a transparent medium bounded by two spherical surfaces.
Identification
i. When the lens is moved in front of the eye, the objects move in the opposite direction.
ii. If an object is held close to the lens, it appears to be magnified.
Uses
It is used in the treatment of:
• Hypermetropia
• Presbyopia
• Aphakia
• Magnifying lens.
2. Concave lens—It is transparent medium bounded by concave surfaces.
Identification
i. When the lens is moved in front of the eye, the objects move in the same direction
ii. An object seen through the lens appears to be diminished in size.
Uses
It is used in the treatment of:
• Myopia
• Hruby’s lens (−58.6 D)
2. **Cylindrical Lens**
It is a segment of a cylinder of glass cut parallel to its axis.
The axis of a cylindrical lens is parallel to that of the cylinder
of which it is a part.

*Identification*

i. Two marks are seen on the lens indicating the axis of the lens.

ii. When the lens is moved in the direction of the axis, there is no movement of the objects.

iii. When the lens is moved in a direction at right angles to the axis

Convex cylinder—The objects move in the opposite direction.

Concave cylinder—The objects move in the same direction.

*Use* Regular astigmatism can be treated by suitable cylindrical lenses.

2. **PRISM**
It is a medium bounded by two plain refractive surfaces at an angle to each other. This angle is called, “the angle of the prism”. The “base of the prism” is situated opposite this angle.

*Uses*
It is used in the treatment of:
• Heterophoria
• Convergence insufficiency
• It is used in various optical instruments.

2. Contact Lenses

Principle
Contact lens alters the vergence power of the anterior surface of the eye.
• Contact lenses rest on the corneal surface.

Types
1. **Hard lens**—It consists of PMMA (Polymethyl methacrylate) a plastic, non-toxic material.
   *Advantage*—It is durable, firm and inert.
   *Disadvantage*—The corneal hypoxia leads to corneal oedema.
   • It may cause foreign body sensation.
2. **Soft lens**—It consists of HEMA (hydroxyethyl methacrylate) or related polymer and is hydrophilic in nature.
   *Advantage*—It is comfortable and stable.
   *Disadvantage*—It is delicate and has a short lifespan.
3. **Gas permeable lens**—It consists of mixture of hard and soft material, e.g. CAB (cellulose acetate butyrate), silicone, silicone with PMMA.
   *Advantage*—It causes minimum corneal hypoxia.
   *Disadvantage*—It tends to scratch and break.
Method of Calculating the Power
It is done by keratometry and refraction.

Indications
They are mainly refractive, therapeutic, occupational and cosmetic.

1. Refractive
   i. Unilateral aphakia—It prevents diplopia as there is no refinal image magnification.
   ii. Irregular astigmatism—Soft contact lenses are useful.
   iii. High myopia with macular degeneration.
   iv. Keratoconus or conical cornea—It provides regular corneal surface and mechanical support.

2. Therapeutic
   i. It has epithelial healing effect, e.g. as in corneal ulcers, filamentary keratitis.
   ii. It is used as a vehicle for drug delivery, e.g. soft hydrophilic lens.
   iii. It prevents symblepharon formation, e.g. as in chemical burn.
   iv. It encourages natural healing process, e.g. as in descemetocele and wound leaks.

3. Occupational
   In athletes—There is less chances of serious injury, better optics and wider field.

4. Cosmetic
It improves the cosmetic appearance specially in young marriageable girls.

**Disadvantages**
1. Contact lenses are expensive, difficult to handle and manoeuvrable.
2. It is easily lost or destroyed by mucoproteins, fungus and calcium deposits.
3. Hard contact lenses are initially uncomfortable to wear. They cause corneal hypoxia resulting in corneal oedema, superficial punctate keratitis (SPK) and opacity.

**Complications**
1. *Conjunctiva*—Allergic or infective conjunctivitis may occur occasionally.
2. *Cornea*—Corneal epithelial oedema results due to corneal hypoxia.
   - Vascularization results due to hypoxia, infection and foreign body sensation.
   - Ulcer may occur due to improper hygiene and infection.

**REFRACTIVE CORNEAL SURGERY**
In the recent times the following procedures have been accepted by the refractive surgeons

Each surgeon may have a preference for a particular procedure depending on economic reasons,
availability factor or his own personal satisfaction with the end results

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<th>CLINICAL PROCEDURES</th>
<th>CORRECTION OF MYOPIA</th>
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<td>1. Radial keratotomy (RK)</td>
<td>–1.0 to –6.0 D</td>
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<tr>
<td>2. Photorefractive keratectomy (PRK)</td>
<td>–1.0 to –8.0 D</td>
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<tr>
<td>3. Laser-assisted <em>in situ</em> keratomileusis (LASIK)</td>
<td>–8.0 to –16.0 D</td>
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<tr>
<td>4. Clear lens extraction (Fuecal’s operation) with posterior chamber IOL.</td>
<td>–16 to –26 D</td>
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1. **RADIAL KERATOTOMY (RK)**

It is still an excellent procedure for low myopias, i.e. from –1.0 to –6.0 D in young adults. Ideally 4 to 8 cut incisions are given with a calibrated diamond knife up to the level of Descemet’s membrane.

**Principle**

It decreases myopia by flattening the corneal curvature.

**Method**

The central optical zone measuring 3-4 mm in diameter is marked out. With a specially calibrated diamond knife 4-8 deep radial incisions (depending on the degree of myopia) are made up to the Descemet’s membrane in between the limbus and the optical zone.
**Indication**

It is suitable for young adults with stable myopia of –1 to –6 D with minimum astigmatism.

**Advantages**

1. The main advantage of RK is that the optical centre of 3 mm is spared unlike PRK where the optical zone of 6 to 7 mm is reshaped by laser with the fear of residual corneal haze.
2. Cost factor—It is comparatively cheap and almost 1/4 of the cost of PRK.

![Radial Keratotomy Diagram]

**Disadvantages**

1. Uneven healing may lead to irregular astigmatism which is difficult to correct. The person may feel that he is looking through the waves.
2. Weakening of eyeball may rarely lead to globe rupture on minimum trauma.
3. There may be glare at night.
4. Intrastromal inclusion cyst may occur due to radial incisions.

**ASTIGMATIC KERATOTOMY**
It is an extension of the principles of radial keratotomy. The aim of astigmatic keratotomy is to flatten the more curved meridian by asymmetrical incisional surgery. To achieve this various considerations are kept in mind such as the number and position of the transverse incisions. The main indication is in the management of postkeratoplasty patients. The results are often unpredictable.

2. PHOTOREFRACTIVE KERATECTOMY (PRK) BY EXCIMER LASER

PRK is the treatment of choice for myopia of $-1.0$ to $-8.0$ D. The central part of the cornea (optical zone) is reshaped by the laser after corneal epithelial debridement. PRK uses the computer-controlled accuracy and precision of the excimer laser to sculpt the surface of the cornea, correcting myopia, hypermetropia and astigmatism. As very thin layers of the cornea is removed, PRK does not weaken the eye.

**Method**

Excimer lasers (excited dimer) act by tissue modelling (Photoablation). It is a source of far ultraviolet radiation which allows removal of corneal tissue with the accuracy of a fraction of a micron. It modifies and flattens the optical zone of cornea. Laser energy has been used to perform radial
keratotomy as the laser incision is more accurate and predictable than a diamond knife incision.

**Indications**
1. Photorefractive keratectomy (PRK) for correction of refractive errors.
2. Phototherapeutic keratectomy (PTK) for corneal diseases such as band-shaped keratopathy may be done.

**Advantages**
1. The results are excellent with an accuracy of 95% in achieving a +/- 0.5D correction with nil to negligible corneal haze.
2. There are no cuts or weakening of the globe as may rarely occur with RK.

**Disadvantages**
There may be residual corneal haze in the centre affecting clear vision.
LASER-ASSISTED *IN SITU* KERATOMILEUSIS (LASIK)

**Method**
LASIK is a modification of PRK. In this procedure a 160 micron hinged corneal flap is lifted from the central 8 to 9 mm of cornea with the help of a microkeratome. This flap is folded to the side and the excimer laser is then used to remove tissue from the exposed surface, correcting myopia and astigmatism. The corneal flap is replaced back.

**Advantages**
1. Patient has good vision at the end of the same day.
2. There is no pain, watering (RK) or corneal haze (PRK) as compared to RK and PRK respectively.

**Disadvantages**
1. It is an expensive procedure and requires greater surgical skill for correction of myopia from –8 to –16 D.
2. Complications of LASIK are related to the corneal flap
   • Too thin a flap can cause wrinkling of the flap on repositioning.
   • Too thick a flap will leave very little of the corneal stromal tissue to work on.

4. CLEAR LENS EXTRACTION (FUCALA’S OPERATION) AND PC IOL
This procedure can be done for correcting myopia of –16 to –26 D. It is now accepted that a zero power posterior chamber IOL is better than no IOL at all.
   i. It retards posterior capsular opacification.
   ii. It reinforces the posterior capsule to hold the vitreous phase thus minimising incidence of retinal detachment.

Advantage
There is a clear untouched cornea after surgery which is amendable to further treatment by PRK if need be at a later date.

EPIKERATOPHAKIA

Principle
It is a procedure in which a lenticule of donor tissue is used to alter the surface topography of the cornea.

Method
The donor lenticule of the desired power is sutured into the keratectomy with 10-0 nylon sutures. It is a surgical procedure whereby unilateral high myopia up to –18 D can be corrected.

Indications
In myopia—Minus lenticule is used.
In aphakia in children—Plus lenticule is used.
In keratoconus—Planolenticule is used.

Complications
1. Intolerable glare may be present
2. Chronic epithelial defects may occur.
KERATOMILEUSIS
It is a surgical procedure whereby unilateral high myopia up to –18 D can be corrected. A disc of 8 mm × 0.35 mm is removed from the patients cornea using a microtome. This disc is placed on a lathe machine equipped with freezing apparatus and keratomileusis (grinding) is performed. Thus, the surface of cornea is flattened. Recently Coherent Schwind laser and fourth generation fractile mask spiral lasers are under trial which will further decrease the corneal ablation time.