جامعة المستقبل
كلية التقنيات الصحية والطبية
قسم تقنيات البصريات

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REFRACTIVE ERRORS

Lecture Title

Hypermetropia

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Hypermetropia

Hypermetropia, commonly known as farsightedness, is a refractive error where distant objects can be seen clearly, but close objects appear blurry.

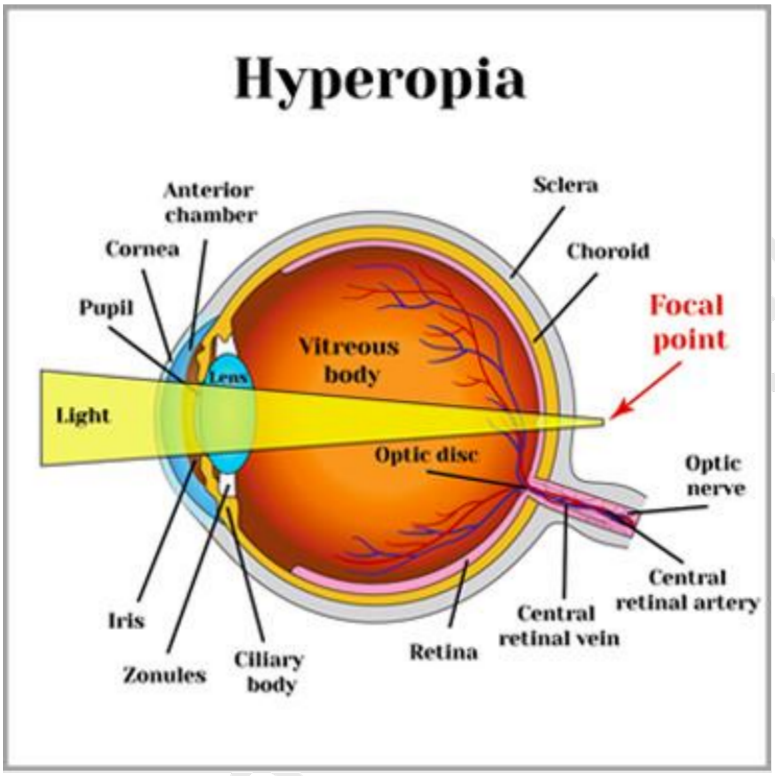

Figure*: A hyperopic eye - light rays from a distant object focus behind of the retina*

Causes of Hypermetropia

❖ Based on Anatomical Features

1- Axial Hypermetropia

- **It is due to relatively short axial length.**
- **1 mm axial length shortening will cause +3.00D of hypermetropia.**
- **Physiologically majority of all infants are axial hypermetropic due to small size of the globe at birth.**
- **Pathologically, axial hypermetropia will develop when the retina is pushed forward in ocular tumour, central serous retinopathy, etc.**

2- Curvature Hypermetropia

- It is due to the increased radius of curvature of the refractive surfaces, i.e. cornea and lens.
- 1 mm increase in radius of curvature, i.e. flattening will cause +6.00D of hypermetropia.
- It is seen in cornea plana. تسطح القرنية

3- Index Hypermetropia

- It is due to increase in refractive index of the lens cortex relative to the nucleus, which is often seen in elderly.

4- Absence of Refractive Element

- It is due to removal of the lens, i.e. aphakia.

5- Displacement of Refractive Element

- It is due to backward displacement of lens.

❖ Based on Accommodation

1- Latent hypermetropia

which is physiologically masked by accommodation, i.e. by the tone of the ciliary muscle. It is not detected by noncycloplegic refraction and is revealed only after complete cycloplegia.

2- Manifest hypermetropia

which is corrected by strongest convex (plus) lens required for optimum clear distance visual acuity and is composed of:

a. **Facultative hypermetropia:** It is that part of manifest hypermetropia which is masked by accommodation but can be estimated by noncycloplegic refraction.

This type of hyperopia is common in younger individuals because they have a stronger accommodative power.

Symptoms:

Often, people with facultative hyperopia may not notice blurry vision since they can see clearly by accommodating. However, the constant effort required for near tasks (like reading or using a phone)

b. **Absolute hypermetropia:** It is that part of manifest hypermetropia which cannot be corrected by accommodation.

Absolute hyperopia is common in people with moderate to high levels of hyperopia or in older individuals whose accommodative power has declined (often due to presbyopia).

Symptoms:

- Persistent blurred vision for near tasks, even when trying to focus.
- Increased reliance on corrective lenses, as natural focusing is no longer sufficient.
- More significant vision difficulties as accommodative ability diminishes with age.

Total hypermetropia = latent hypermetropia + manifest hypermetropia (facultative + absolute).

- In young children, the hypermetropia represents latent hypermetropia.
- Age advances, the lens become less elastic and it changes towards manifest hypermetropia.
- Older the subject, the more the manifest hypermetropia.

❖ Classification by Degree of Hypermetropia

- **Low Hypermetropia:** +2.00 diopters or less; usually mild symptoms.
- **Moderate Hypermetropia:** Between +2.00 and +5.00 diopters; more noticeable vision issues for close tasks.
- **High Hypermetropia:** Greater than +5.00 diopters; significant difficulty with near vision and possibly distant vision, often requiring strong corrective lenses.

Symptoms of Hypermetropia

- **Difficulty in reading, writing, or using devices.**
- **Eye Strain**
- **Fatigue**
- **Headaches,** frontal headache and occasional neckache
- **Convergent squint in children.**
- **Latent convergent squint (esophoria) in children.**
- **Pseudomyopia**

Signs of Hypermetropia

- **Shallow anterior chamber depth and a very small eyeball.**
- **Amblyopia is more common with high hypermetropia.**
- **Apparent divergent squint in children.**
- **Ophthalmoscopy (or Fundoscopy): bright reflex simulating watered silk is common. Size of the optic disc may be small. Sometimes, the small hypermetropic disc with blurred margins simulates papillitis (pseudopapillitis).**

Risks Inherent to Hypermetropia

- **Amblyopia**
- **Primary Angle Closure Glaucoma (PACG)–It is common amongst Chinese people due to smaller size of the eyeball.**
- **Accommodative convergent squint.**

Diagnosis of Hypermetropia

- **Visual acuity test to measure the clarity of distance and near vision.**
- **Using a phoropter or autorefractor to determine the correct prescription.**
- **Ophthalmoscopy and Retinoscopy:**

✓ **Tools to evaluate the retina, optic nerve, and measure refractive error.**

- **Cycloplegic Refraction:**

✓ **Use of eye drops to temporarily paralyze the eye's focusing mechanism for accurate diagnosis in children.**

Correction of Hypermetropia

- **Eyeglasses:** Convex lenses (positive lenses) correct focus, helping light rays converge on the retina.
  - ✓ ***children***–convex glasses are prescribed preferably after full cycloplegic refraction particularly in children with convergent squint.
  - ✓ ***Young*** individual with low hypermetropia and without any symptom or divergent squint or latent squint–glasses usually not required.
  - ✓ ***Older*** patient with hypermetropia–The strongest convex lens with which the subject maintains 6/6 (or 20/20) distant vision indicates manifest

hypermetropia. The weakest convex lens which allows 6/6 (or 20/20) distant vision indicates absolute hypermetropia. So, facultative hypermetropia can be deduced by deducting absolute hypermetropia from the manifest hypermetropia. The appropriate presbyopic addition, if required, must be added to the hypermetropic correction.

- **Contact Lenses:** Thin, convex lenses placed on the eye surface to adjust focus, and also in aphakia.
- **Laser Refractive Surgery (LASIK/LASEK):** Reshapes the cornea to correct the focal point.
- **Intraocular Lenses:** Implantable lenses for high hypermetropia cases, especially in adults.