

SURGICAL CORRECTION OF HYPEROPLA

Essay
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قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا، إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

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Noha Gamal Gomaa AbdelGawad

LIST OF ABBREVIATIONS

AC	Anterior Chamber
AC-IOL	Anterior Chamber Intraocular Lens
ArF	Argon Fluoride
BAB	Blood-Aqueous Barrier
BCVA	Best Corrected Visual Acuity
BSCVA	Best Spectacles Corrected Visual Acuity
BSS	Balanced Salt Solution
CCI	Clear Cornea Incisions
CK	Conductive Keratoplasty
CME	Cystoid Macular Oedema
CSI	Corneal Scleral Incisions
CTK	Central Toxic Keratopathy
D	Diopter
DLK	Diffuse Lamellar Keratitis
EPI-LASIK	Epipolis Laser Assisted In-Situ Keratomileusis
FDA	Food And Drug Administration
H-LASIK	Hyperopic Laser Assisted In-Situ Keratomileusis
Ho:YAG	Holmium Yttrium Aluminum Garnet
H-PRK	Hyperopic Photorefractive Keratectomy
HSV	Herpes Simplex Virus
ICG	Indocyanine Green
ICL	Implantable Collamer Lens
IOL	Intraocular Lens
IOP	Intraocular Pressure

K	Keratometry
LASEK	Laser Assisted Sub-Epithelium Keratomileusis
LASIK	Laser Assisted In-Situ Keratomileusis
LED	Light Emitting Diode
LTK	Laser Thermal Keratoplasty
LVC	Laser Vision Correction
MMC	Mitomycin-C
Nd:YAG	Neodymium-doped Yttrium Aluminum Garnet
NSAID	Non Steroidal Anti-Inflammatory Drugs
OVD	Ophthalmic Viscosurgical Devices
PC	Posterior Chamber
PC-IOL	Posterior Chamber Intraocular Lens
PCO	Posterior Capsule Opacification
pIOL	Phakic Intraocular Lens
PMMA	Polymethyl methacrylate
PRK	Photorefractive Keratectomy
PRL	Phakic Refractive Lens
PTK	Phototherapeutic Keratectomy
PVD	Posterior Vitreous Detachment
RD	Retinal Detachment
RLE	Refractive Lens Exchange
RMS	Root-Mean-Square
SE	Spherical Equivalent
SPK	Superficial Punctuate Keratitis
UCVA	Uncorrected Visual Acuity
VA	Visual Acuity

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INTRODUCTION

Hyperopia (**Fig 1.1**) is a refractive error in which parallel rays of light entering the eye reach a focal point behind the plane of the retina, while accommodation is maintained in a state of relaxation.

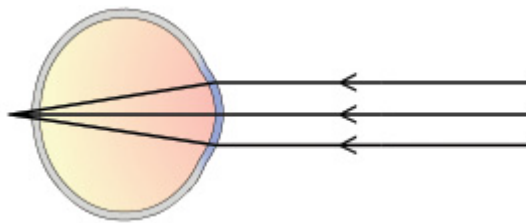


Fig 1.1 - Refraction in a hypermetropic eye.

❖ Etiology:

Hypermetropia may be axial, curvatural, index, positional and due to absence of lens.

- Axial hypermetropia is by far the commonest form. In this condition the total refractive power of eye is normal but there is an axial shortening of eyeball. About 1-mm shortening of the anteroposterior diameter of the eye results in 3 dioptres of hypermetropia.

- Curvatural hypermetropia is the condition in which the curvature of cornea, lens or both is flatter than the normal resulting in a decrease in the refractive power of eye. About 1 mm increase in radius of curvature results in 6 dioptres of hypermetropia.
- Index hypermetropia occurs due to decrease in refractive index of the lens in old age. It may also occur in diabetics under treatment.
- Positional hypermetropia results from posteriorly placed crystalline lens.
- Absence of crystalline lens either congenitally or acquired (following surgical removal or posterior dislocation) leads to aphakia - a condition of high hypermetropia. (**Keirl & Christie, 2007**)

❖ **Classifications:**

Clinically, hyperopia may be divided into three categories:

- Simple hyperopia, due to normal biological variation, can be of axial or refractive etiology.
- Pathological hyperopia is caused by abnormal ocular anatomy due to mal-development, ocular disease, or trauma.

- Functional hyperopia results from paralysis of accommodation. (**Rosenfield, 2006**)

Hyperopia may also be categorized by degree of refractive error:

- Low hyperopia consists of an error of + 2.00 diopters (D) or less.
- Moderate hyperopia includes a range from + 2.25 to + 5.00 D.
- High hyperopia consists of an error over +5. (**Augsburger, 1987**)

A hyperopia classification scheme that relates the role of accommodation to visual functioning adds an important dimension to structure-based classifications:

- Facultative hyperopia is that which can be overcome by accommodation.
- Absolute hyperopia cannot be compensated with accommodation.
- The total magnitude of hyperopia is the sum of absolute and facultative hyperopia. (**Morgan, 1947**)

The classification of hyperopia can also be based upon the outcome of noncycloplegic and cycloplegic refractions:

- Manifest hyperopia, determined by noncycloplegic refraction, may be either facultative or absolute.
- Latent hyperopia, detected only by cycloplegia, can be overcome by accommodation.
- The sum of latent and manifest hyperopia is equal to the magnitude of hyperopia. (*Elkington et al, 1999*)

PATIENT SELECTION AND PRE-OPERATIVE ASSESSMENT

Refractive surgical treatment for hyperopia may be classified into flap, surface and other procedures. Flap procedures include: laser assisted in-situ keratomileusis (LASIK). Surface procedures include: photorefractive keratectomy (PRK), laser assisted sub-epithelium keratomileusis (LASEK) and EPI-LASIK. Others are conductive keratoplasty (CK) and intraocular lens (IOLs) implantation. (*Scholasticus, 2011*)

The pre-operative examination consists of:

A. History:

➤ Systemic:

The medical history interview must include questions about:

- Pregnancy: It is considered a contraindication as there may be subtle changes in refraction, and possible changes occur in the tear layer during pregnancy. Also many patients may be wary if drug treatment is indicated after refractive surgery. (*Naroo, 2004*)

- Abnormal wound healing (keloid formation): It may lead to postoperative corneal haze in patients undergoing PRK.
- Thyroid diseases: It has an effect on the tear layer.
- Autoimmune diseases.
- Allergies.
- Diabetes mellitus.
- Collagen vascular disorders. (*Young and Kornmehl, 2008*)

➤ **Ophthalmic:**

- Refractive instability:

Patients are often asked to produce past refraction details, for up to the previous 2 years, to show that they have some level of stability with spectacle prescription (i.e. no change greater than 0.50 D for two years). (*Allan, 2008*)

A patient with a large recent change in refraction is probably advised to wait until two or three consecutive prescriptions are similar. Patients under the age of 21 years who present for refractive surgery are often advised to wait until they reach 21, or until their prescription is stabilized. (*Naroo, 2004*)

- Contact lenses:

It must be removed prior to the preoperative examination 3 weeks for hard or rigid gas-permeable lenses

and 7-14 days for soft contact lenses. (*Young and Kornmehl, 2008*)

- Infections:

Herpetic reactivation is a reasonable concern because ultraviolet radiation used in excimer laser may initiate dendritic eruption. (*Young and Kornmehl, 2008*)

Patients with known current viral infections are not suitable for treatment while they have an active disease process. (*Naroo, 2004*)

Patients with only one ‘seeing’ eye are considered a contraindication to refractive surgery, as infection in the good eye would seriously compromise the patient’s visual function, although the risk of sight threatening infection is extremely rare after refractive surgery. (*Holland et al, 2000*)

- Glaucomatous patients:

Glaucomatous patients may be thought unsuitable for PRK, as they might require the use of corticosteroid drops post-operatively. (*Naroo, 2004*)

Patients with a family history of glaucoma should be made aware that after corneal surgery the measurement of intraocular pressure (IOP) can be affected. (*Naroo, 2004*)