Recent advances in pediatric refractive surgery

Essay submitted for partial fulfillment of master degree in ophthalmology

By

Mohamed Abd El Motaal Koura

M.B.B.ch

Supervised by

Prof. Dr. Abdallah Kamel Hassouna

Professor of Ophthalmology

Faculty of medicine

Ain Shams University

Dr. Mona Mohamed El Feky

Assistant Professor of Ophthalmology

Faculty of medicine

Ain Shams University

Ain Shams University

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List of abbreviations

LASIK: Laser insitu keratomileusis

PRK: Photorefractive keratectomy

ICL: Implantable contact lens

D: Diopeter

IOP: Intraocular pressure

BCVA: Best corrected visual acuity

BSCVA: Best spectacle corrected visual acuity

DLK: diffuse lamellar keratitis

SOS: Sands of Sahara

UCVA: Uncorrected visual acuity

SE: spherical equivalent

NSAID: Non steroidal anti inflammatory drug

BV: Binocular vision

IOL: Intraocular lens

VA: Visual acuity

CL: Contact lens

PTK: Phototherapeutic keratectomy

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Introduction

Introduction

Pediatric refractive surgery has expanded over the past two decades to include new surgeries as photorefractive keratectomy (PRK), laser insitu keratomileusis (LASIK) and phakic Implantable contact lens (ICL). The recent advances and the varieties of these techniques have expanded the range of treatment of pediatric refractive errors (Gimble, 1999).

There is a direct relationship between anisometropic refractive amblyopia that appears at a very young age and anisometropia in which there difference in the refractive power of the two eyes more than two diopeters (Shend et al, 1993). Corneal refractive surgery has augmented the treatment of anisometropic amblyopia (Alio et al, 1997).

Pediatric patients under seven years of age with anisometropic amblyopia should be considered for refractive surgery if contact lenses intolerance develops (Davidorf, 2000). General anesthesia is effective and efficient in children who are unable to cooperate for the procedure using local anesthesia. It can be adapted for LASIK and other refractive surgical procedures in children (Paysse t al, 2003). However, LASIK and PRK can

be performed safely and effectively in children who are cooperative enough to undergo the procedures with topical anesthesia (Nucci and Drack, 2001).

PRK is safe and effective in correcting high myopic anisometropia in children with contact lens intolerance. It provides good visual results and preserves or improves binocular vision (BV) (Autrata and Rehurek, 2003).

Phakic ICL appears to be an effective method to treat high myopia in children with amblyopia; good results with high satisfaction were noted (Lesueur and Arne, 2002).

Visual acuity (VA) and BV outcomes are better in children who received permanent surgical correction of anisometropia than in those who were treated conventionally by contact lenses (CL) (Autrata and Rehurek, 2004).

Aim of study

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To evaluate the efficacy and safety of different refractive procedures for correction of ametropia in children, especially in cases of anisometropic amblyopia.

Anisometropia

Anisometropia

Anisometropia refers to a difference in the refractive status of the two eyes. This condition is commonly present if the diopeteric difference between the two eyes is two diopeters (D) or more, which may be either spherical or astigmatic, but differences smaller than 2 D may also be significant. Anisometropia if uncorrected in children may lead to amblyopia, especially if one eye is hyperopic (Michaels DD, 1985). Anisometropia at one year of age that is larger or equal to three diopeters will in 90% of the cases still be there at ten years of age. There is a substantial risk of this group developing amblyopia (60%) (Abrahamsson and Sjostrand, 1996).

Fortunately, anisometropia in children can usually be corrected fully without symptomatic effects (Michaels DD, 1985). The amount of refractive error and degree of anisometropia at presentation do correlate strongly with final VA. This would suggest, firstly, that children with poorer VA at presentation and higher degrees of anisometropia should be treated more aggressively , secondly, children with anisometropic amblyopia should be treated regardless of age (Cobb et al, 2002). Although adults may be annoyed by uncorrected anisometropia, they may be totally intolerant to initial spectacle

correction. There may be unequal image size, or aniseikonia, and the prismatic effect the glasses will vary in different directions of gaze, inducing anisophoria (Michaels DD, 1985).

Aniseikonia is a difference in the size or shape of the images formed in the two eyes and according to Knapp's law, there should be no difference in the retinal image size in the correction of anisometropia. The most common cause is the difference in the magnification between the two eyes in the spectacle correction of anisometropia. Unilateral aphakia typically is an extreme example of hyperopic anisometropia arising from refractive ametropia. Spectacle correction produces intolerable aniseikonia of about 25%, contact lens correction produces aniseikonia of about 7% that is usually tolerated (Michaels DD, 1985).