Reversal of Myopic Anisometropic Amblyopia With Phakic Intraocular Lens Implantation

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ABSTRACT

PURPOSE: To report a case of reversal of myopic anisometropic amblyopia with phakic intraocular lens implantation.

METHODS: A 6-year-old boy with anisometropic amblyopia with spherical equivalent refraction of right eye: -14.00 -3.00 x 100°, left eye: -0.50 -3.25 x 90°, was treated for 2 years with occlusion to the left eye, with poor results. Refractive surgery was planned because of contact lens intolerance at age 8 years. A -15.00-D iris claw Artisan intraocular lens (IOL) was implanted.

RESULTS: Following surgery, treatment of the amblyopia and spectacle correction of -4.00 D cylinder at 85° in the right eye and -3.50 D cylinder at 90° in the left eye was necessary. Visual acuity 6 months after surgery was 20/25 in the right eye and 20/20 in the left eye, and has remained stable 18 months after surgery.

CONCLUSION: Myopic anisometropic amblyopia in an 8-year-old boy was treated successfully with implantation of an Artisan iris claw phakic anterior chamber IOL, combined with occlusion therapy, and resulted in reversal of amblyopia. [*J Refract Surg* 2001;17:460-462]

Anisometropia in children is a major causative factor of both amblyopia and strabismus, and an important cause of monocular blindness. The treatment for amblyopia is based fundamentally on patching the sound eye, and correcting refractive errors of the amblyopic eye. Traditionally, spectacles or contact lenses are used for optical correction but when severe myopia of the amblyopic eye is present, the results of the treatment may be poor. The difficulty of wearing spectacles with different magnifications for each eye, and sometimes when the sound eye is emetropic, the lack of compliance with the prescribed treatment, makes the treatment difficult for parents and children, and ultimately unsuccessful. High ametropic corrections cause a limited quality of vision that also limits reversal of amblyopia. Contact lenses are difficult to fit, and parents need to constantly monitor contact lens wear for children under 3 years of age; for older children, careful monitoring of the contact lens is needed from both the parents and the child, which is not always possible.

Over the last few years, corneal refractive surgery has augmented the treatment of anisometropic amblyopia.[1-3] Studies on the treatment of unilateral high myopia have yielded encouraging preliminary results.[2] In a previous report, we evaluated the role of excimer laser photorefractive keratectomy (PRK) to treat six pediatric patients who had amblyopic myopic anisometropia in which surgery resulted in a postoperative increased best spectacle-corrected visual acuity in all patients.[3]

A new alternative, when corneal refractive surgery is not indicated, is the use of phakic intraocular lenses in the anterior chamber. We present a case in which the lack of success in the treatment of amblyopia after contact lens adaptation and patching was followed by full reversal of amblyopia with implantation of a phakic anterior chamber IOL in the anisometropic eye and programmed patching of the sound eye.

CASE REPORT

A 6-year-old boy was first examined at our center in July 1995. A family history of myopia was present. The patient had been treated with occlusion therapy and spectacle correction for 4 years in another center. Myopia was detected at age 2 years, and -10.00-diopter (D) spherical spectacles were prescribed initially, although his parents thought he was initially undercorrected.

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In the first ocular examination, uncorrected Snellen visual acuity was 20/200 in right eye and 20/35 in the left eye. Refraction under cyclopegia was in the right eye, -14.00 -3.00 x 100° and in the left eye, -0.50 -3.25 x 90°, with a visual acuity of 20/40 OD and 20/25 OS. Examination of the ocular anexa was normal in both eyes. Pupils were of equal size and reacted normally to light and accommodation. Slit-lamp biomicroscopy of the anterior segment was normal in both eyes. Ocular motility revealed a heterophoria. Fundus examination was normal in both eyes.

Severe myopic anisometropic amblyopia and strabismus were diagnosed and a rigid contact lens in the right eye plus scheduled occlusion, including whole day patching in the left eye were prescribed. During follow-up, compliance with the use of the contact lens and occlusion therapy was considered satisfactory, and best corrected visual acuity in the right eye with a rigid contact lens plus spectacles reached a maximum level of 20/40.

After 2 years, refractive surgery was planned because of contact lens intolerance, characterized by conjunctival vascular reaction and subjective symptoms of itching and foreign body sensation after the lens was fitted, at which time his best corrected visual acuity was 20/40 in the right eye and 20/20 in the left eye. Refraction under cycloplegia was -14.00 -3.00 x 95° in the right eye and -3.25 cylinder at 90° in the left eye. Corneal thickness in the right eye was 456 μm in the central cornea, endothelial cell count was 3.493 cells/mm^2, and axial length centrally by ultrasonic biometry was 27.23 mm. Anterior chamber depth was 3.78 mm by ultrasonic biometry.

In September 1998 at the age of 8 years, the patient underwent intraocular refractive surgery with implantation of an iris claw Artisan Worst intraocular lens (Oculaid, Ophthec, The Netherlands) in the anterior chamber. The lens power was calculated using the Van der Heyde formula[4], which required a -15-D Artisan IOL model. Surgery was performed under general anesthesia using techniques described for the implantation of this IOL.[5] Postoperative treatment consisted of a subtenon injection of triamcinolone (Trigon Depot. Lab. Squibb, Barcelona, Spain), and topical instillation of Maxitrol (Alcon Cusí S.A., El Masnou, Barcelona, Spain) and Voltaren (Ciba Vision, S.A., Barcelona, Spain) every 6 hours for 1 month. The pupil was dilated for the first week with 1% cyclopentolate (Ciclopégico, Alcon Cusí, Barcelona, Spain).

The immediate postoperative period showed no complications and at 48 hours, the patient had an uncorrected visual acuity of 0.3 and a refraction under cycloplegia of -3.50 cyl at 85° in the right eye. Biomicroscopy of the anterior segment showed minimal IOL decentration toward the nasal side without pupillary ovalization, flare (1+) of the Uveitis Scoring System[6], and intraocular pressure in the right eye of 18 mmHg.

During follow-up examinations, a decrease and disappearance in flare was observed, with complete resolution 20 days after surgery. At the second week after surgery, treatment of the amblyopia was begun by occlusion of the left eye, optical correction of -4.00 D cylinder at 85° in the right eye and -3.50 D cylinder at 90° in the left eye. Visual acuity at 6 months was 20/25 in the right eye and 20/20 in the left eye. Patching was discontinued and best spectacle-corrected visual acuity has remained stable to date. Refraction at 18 months after surgery was -0.75 -4.00 x 85° in the right eye and -3.50 D cylinder at 90° in the left eye.

Binocular function after 18 months of follow-up revealed gross stereopsis of 100 seconds of arc and the ability to fuse Worth 4-dot at 6 meters. We have no data regarding preoperative binocularity, and although an improvement after surgery can be suspected, no objective data are presented.

DISCUSSION

Refractive surgery in children has always been controversial due to the lack of knowledge of the postoperative behavior of myopia and its possible complications. Nevertheless, some authors point out that excimer laser refractive surgery may be indicated in certain situations unique to the pediatric population.[7] However, phakic IOLs may be an option for children in which corneal refractive surgery, which is less invasive, is not possible.

Our case shows the efficacy of a combination of intraocular lens refractive surgery and a schedule of patching to reverse the amblyopia caused by high myopic anisometropia in a child with previous partial failure of contact lens adaptation and amblyopia treatment.

The decision to opt for refractive surgery in this patient was because of intolerance to contact lenses and spectacles. We initially considered laser in situ keratomileusis (LASIK), taking into account the good results obtained after PRK in patients with similar characteristics.[3] However, the refractive error to be corrected was considered too high for the

thickness of the cornea and this ruled out corneal refractive surgery, hence we opted for implantation of a phakic anterior chamber lens.

The Artisan IOL was chosen because of the favorable results reported for children with congenital cataracts.[8] Initially, the angle-supported IOL was excluded because of its possible future implications in an infantile eye still in refractive evolution, and the unknown impact of previously reported side effects in an infantile eye.[9] Implantation of a supracapsular IOL in the posterior chamber was not considered because of potential cataract formation.[10] The Artisan IOL allows implantation without altering the iridocorneal angle structures.[5]

Possibly, the increase of visual acuity to 20/25 following refractive surgery combined with the use of occlusion—a result that was not achieved before surgery in this case—may be due to a decrease in aniseikonia, and, in the corresponding magnification effect in the size of the retinal image in the right eye. This improves the quality of the image and thus provides more rapid and efficient improvement in the visual acuity of the myopic eye, as described in a previous publication.[11]

The actual follow-up (1.5 years) reveals no complications associated with the IOL, and the visual acuity of the amblyopic eye has been maintained in the absence of further treatment for amblyopia. Nevertheless, visual acuity, endothelial cell count, pupil alteration, inflammation, or any other sign must be checked constantly. Another item to be considered is the progression of myopia in this child. As we know, the myopic shift in refraction from age 6 years to adulthood is accounted for by continued increases in axial length without compensatory changes in the refractive power of the cornea or lens.[12] For children between the ages of 6 and 15 years with myopia, increased progression in younger children and in those with greater myopia at the baseline examination has been a consistent finding.[13] Regular monitoring of refraction is mandatory, but changes in refraction will probably not decrease visual acuity achieved in childhood.

As in our case, implantation of an iris claw anterior chamber IOL may constitute a new and valid option in the treatment of anisometropic myopic amblyopia in cases where optical correction with contact lenses has not been successful and where corneal refractive surgery is not possible or indicated. These results represent a short follow-up period of only one eye, hence we cannot recommend implantation of a phakic IOL as a standard in children.

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