

# Refractive laser surgery in children with coexisting medical and ocular pathology

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**PURPOSE:** To report the visual, refractive, and functional outcomes of photorefractive keratectomy (PRK) and of laser-assisted subepithelial keratectomy in a group of children with significant refractive error and underlying medical conditions or ocular pathology who were noncompliant with traditional management.

**SETTING:** Nonhospital surgical facility and a hospital clinic.

**METHODS:** This case series comprised 5 individual cases of anisometropic amblyopia and/or high myopia. Underlying medical and ocular conditions were as follows: upper eyelid hemangioma with oblique myopic astigmatism, Pelizaeus-Merzbacher leukodystrophy with nystagmus, Klippel-Trenaunay-Weber syndrome with glaucoma, incontinentia pigmenti with unilateral optic nerve atrophy, and Goldenhar syndrome with unilateral optic nerve hypoplasia. Photorefractive keratectomy or LASEK was performed in 6 eyes of 5 patients. Age range at the time of surgery was 1.0 to 7.0 years. All procedures were performed under general anesthesia.

**RESULTS:** Best corrected visual acuity improved by 2 lines in 2 patients and 1 line in 2 patients by 6 months after surgery. Stereopsis and/or fusional status improved in 3 patients. Amblyopia treatment compliance improved in 1 patient. Alignment improved without strabismus surgery in 2 cases. A functional vision survey demonstrated a positive effect on the ability of all 5 children to function in their environment.

**CONCLUSION:** During the period of visual cortical plasticity, refractive surgery, by eliminating the refractive component of amblyopia and by promoting fusional ability, provides considerable improvement in children, even those with underlying medical conditions associated with ocular pathology.

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Refractive surgery can be performed safely and successfully in children.<sup>1–12</sup> According to the literature and our previous experience, photorefractive keratectomy (PRK) and laser-assisted subepithelial keratectomy (LASEK) in children represent potential methods for the long-term resolution of bilateral high myopia and myopic anisometropic amblyopia in selected pediatric patients.<sup>1–12</sup> However, the

effect refractive surgery will have on amblyopia is not well understood.

In this case series, we present 5 individual cases that represent end-stage amblyopia treatment failures in which traditional methods of optical correction had failed. All children had an underlying medical condition associated with ocular pathology that contributed to these treatment failures. The aim of this noncomparative case series was to observe whether elimination of the refractive component has a positive effect on overall functional outcome.

## PATIENTS AND METHODS

The study included 5 patients who had refractive surgery. Four patients had anisometropic amblyopia (unilateral high myopia or unilateral myopia with high astigmatism), and 1 patient had bilateral myopia of more than 5 diopters (D). All 5 patients had concurrent medical diagnoses and/or other ocular functional or structural disorders. Six eyes were treated; 5 eyes had LASEK and 1 eye had PRK. Age range at the time of surgery was 1.0 to

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**Table 1.** Estimation of best corrected visual acuity.<sup>13,14</sup>

| Fixation Pattern | Visual Acuity   |
|------------------|-----------------|
| CSM              | ≥ 20/30         |
| CSUM             | 20/30 to 20/100 |
| CUSUM            | ≤ 20/300        |
| UCUSUM           | ≤ 5/200         |

C = central; M = maintained; S = steady; UC = uncentral; UM = unmaintained; US = unsteady

7.0 years. The demographics and individual data are shown in Table 2.

The patients were examined before and after surgery, and all refractions recorded in this study are cycloplegic refractions. An estimation of best corrected visual acuity (BCVA) in the preverbal patients was determined using a previously described technique modified from Zipf<sup>13</sup> by Karr and Scott<sup>14</sup> (Table 1). When an acuity could be obtained, the test performed depended on age and the child's ability to respond. Snellen acuity, Allen picture cards, and the HOTV test were all used in obtaining an objective vision measurement. The test(s) used for each patient is noted in Table 2. Although Teller acuity would be very useful in these patients, this test is presently not available at our center.

Stereoacuity was tested at near (33 cm) using the Titmus (fly, animal, and circles) test (Stereo Optical) and/or the Frisby test (Clement Clarke) according to the manufacturers' instructions. Sensory fusion was assessed at near (33 cm) and at distance

**Table 2.** Preoperative data and postoperative results.

| Patient, Sex | Diagnosis  | Age at Surgery (Y) | Eye   | Procedure | Examination  |
|--------------|--|--------------------|-------|-----------|--|
| 1, female    | Hemangioma with oblique astigmatism                | 5                  | Right | LASEK     | Before surgery<br>2 months after surgery<br>6 months after surgery<br>1 year after surgery |
| 2, male      | Pelizaeus-Merzbacher leukodystrophy with nystagmus | 7                  | Right | LASEK     | Before surgery<br>2 months after surgery<br>6 months after surgery<br>1 year after surgery |
|              |  |                    | Left  | LASEK     | Before surgery<br>2 months after surgery<br>6 months after surgery<br>1 year after surgery |
| 3, female    | Klippel-Trenaunay-Weber syndrome with glaucoma     | 1                  | Right | PRK       | Before surgery<br>2 months after surgery<br>6 months after surgery<br>1 year after surgery |
| 4, female    | Incontinentia pigmenti with optic nerve atrophy    | 7                  | Right | LASEK     | Before surgery<br>2 months after surgery<br>6 months after surgery<br>1 year after surgery |
| 5, male      | Goldenhar syndrome with optic nerve hypoplasia     | 4                  | Right | LASEK     | Before surgery<br>2 months after surgery<br>6 months after surgery<br>1 year after surgery |

BCVA = best corrected visual acuity; CSUM = central, steady, unmaintained fixation; CUSUM = central, unsteady, unmaintained fixation; LASEK = laser-assisted subepithelial keratectomy; N = near; PRK = photorefractive keratectomy

(6 m) with the Worth 4-Dot test (Hansen Ophthalmic Development Laboratory).

Preoperative assessment and general anesthesia methods have been described.<sup>1,2</sup> The PRK and LASEK procedures were performed in a nonhospital surgical facility. The treatment of all patients under general anesthesia in this setting was approved by the College of Physicians and Surgeons of Alberta and by the Regional Surgical Executive Committee. Detailed descriptions of the PRK and LASEK procedures are available elsewhere.<sup>1,2</sup>

**CASE REPORTS**

**Case 1**

A 4-year-old girl with a small right upper eyelid hemangioma was referred because of blurred vision in the right eye. On evaluation, BCVA was 20/60 in the right eye and 20/20 in the left eye. Cycloplegic refraction was -1.25 +3.50 × 35 (spherical equivalent [SE] +0.25 D) in the right eye and +1.25 sphere in the left eye. There was no strabismus, but the patient had no stereopsis or fusion. There was no ptosis present, and the rest of the eye examination findings were normal. A diagnosis of anisometropic amblyopia was made, and aggressive treatment with glasses, patching, and atropine was initiated. The amblyopia was reversed and vision was restored to 20/20 over a period of 6 months. The patient gained excellent stereopsis and fusion (40 seconds of arc). However, the patient was unable to continue long-term with glasses because of secondary aniseikonia. The parents did not wish to proceed with contact lens fitting. In the meantime the

hemangioma shrunk without surgical or medical intervention, but the patient was left with a refractive error of  $-1.25 + 3.50 \times 35$  (SE  $+0.25$  D) in the right eye. Consequently, the patient had LASEK surgery in the right eye. Refraction changed to  $-2.50 + 2.50 \times 45$  (SE  $-1.25$  D) 2 months after the procedure. Six months after LASEK, refraction was  $+1.25 + 0.75 \times 45$  (SE  $+1.625$  D); by 1 year, it was  $+1.00 + 0.50 \times 45$  (SE  $+1.25$  D) in the right eye.

Visual acuity was maintained at 20/20 in the right eye without the need for optical correction. The patient was still orthophoric and did not lose the excellent stereopsis and fusion gained during the prelaser amblyopia treatment (Table 2).

**Case 2**

A 7-year-old boy with rotatory nystagmus secondary to Pelizaeus-Merzbacher leukodystrophy presented with gradual blurring of vision in both eyes. The BCVA in each eye was 20/200. Cycloplegic refraction was  $-5.25 + 2.50 \times 90$  (SE  $-4.00$  D) in the right eye and  $-5.25 + 2.00 \times 90$  (SE  $-4.25$  D) in the left eye. The patient also had an alternating exotropia of 60 prism diopters (PD) at near and 50 PD at distance. There was no documented stereopsis or fusion. The rest of the ocular examination findings were normal with no optic atrophy in either eye. With full myopic correction in place, BCVA improved to 20/100 in both eyes and the exodeviation was reduced to 40 PD of exotropia at near and 45 PD of exotropia at distance. To promote fusional ability, strabismus surgery (bilateral rectus recessions of 7.5 mm) was performed. Two months later, at the time of refractive surgery, the patient was orthophoric.

**Table 2** (cont.)

| Refraction                 | BCVA           | Stereopsis (Seconds of Arc)   | Fusion (Worth 4-Dot) |
|----------------------------|----------------|-------------------------------|----------------------|
| $-1.25 + 3.50 \times 35$   | 20/20 HOTV     | 40                            | +                    |
| $-2.50 + 2.50 \times 45$   | 20/20 HOTV     | 40                            | +                    |
| $+1.25 + 0.75 \times 45$   | 20/20 HOTV     | 40                            | +                    |
| $+1.00 + 0.50 \times 45$   | 20/20 HOTV     | 40                            | +                    |
| $-6.50 + 1.00 \times 90$   | 20/100 Snellen | Nil                           | Nil                  |
| $-0.50$ sph                | 20/100 Snellen | Synoptophore gross stereopsis | Nil                  |
| $-0.50$ sph                | 20/80 Snellen  | 200                           | N: fuses             |
| $+0.75$ sph                | 20/70 Snellen  | 200                           | N: fuses             |
| $-6.50 + 1.00 \times 90$   | 20/100 Snellen |                               |                      |
| $-1.00 + 1.50 \times 105$  | 20/100 Snellen |                               |                      |
| $-1.00 + 1.50 \times 105$  | 20/80 Snellen  |                               |                      |
| $+0.75$                    | 20/80 Snellen  |                               |                      |
| $-4.00 + 3.00 \times 90$   | CUSUM          | Nil                           | Nil                  |
| $+2.00 + 1.25 \times 135$  | CSUM           | Nil                           | Nil                  |
| $+1.50 + 1.25 \times 135$  | CSUM           | Nil                           | Nil                  |
| Plano $+1.50 \times 135$   | 20/60 Allen    | 600                           | N: fuses             |
| $-9.00 + 3.00 \times 85$   | 20/400 Snellen | Nil                           | Nil                  |
| $+1.00$ sph                | 20/200 Snellen | Nil                           | Nil                  |
| $-0.50$ sph                | 20/200 Snellen | 3000                          | Nil                  |
| $-3.25$ sph                | 20/200 Snellen | 3000                          | Nil                  |
| $-10.00 + 1.75 \times 120$ | CUSUM          | Nil                           | Nil                  |
| $+0.75$ sph                | 20/200 Allen   | Nil                           | Nil                  |
| $+0.75$ sph                | 20/100 Allen   | Nil                           | Nil                  |
| $+0.25$ sph                | 20/100 HOTV    | Nil                           | Nil                  |

The patient refused to wear glasses, stating that they did not improve his vision, and because of other neurologic issues the patient would not tolerate wearing them. Consequently, LASEK surgery was performed to promote fusional ability and to aid in improving the overall level of vision, without the need for corrective lenses. By this time, prelaser refraction was  $-6.50 + 1.00 \times 90$  (SE  $-6.00$  D) in both eyes. Two months after LASEK, the cycloplegic refraction improved to  $-0.50$  sphere in the right and  $-1.00 + 1.50 \times 105$  (SE  $-0.25$  D) in the left eye. Visual acuity improved to 20/100 in both eyes. The boy now demonstrated gross stereopsis tested by synoptophore and was able to fuse at near as tested by Worth 4-Dot. Refraction 6 months after LASEK measured  $-0.50$  sphere in the right eye and  $-1.00 + 1.00 \times 90$  (SE  $-0.50$  D) in the left eye and at the 1-year evaluation was  $+0.75$  sphere in each eye. The BCVA had improved to 20/70 in the right eye and 20/80 in the left eye. Stereopsis improved further to 200 seconds of arc, and the patient maintained an orthophoric position at near and distance. Nystagmus had also visibly dampened in amplitude. According to his parents, after the laser surgery, he gained more confidence and was able to walk down stairs, which was something the patient had been unable to do before LASEK (Table 2).

**Case 3**

A 1-week-old girl presented with naevus flammeus affecting the right side of the face. The patient had upper and lower eyelid involvement secondary to Klippel-Trenaunay-Weber syndrome. On evaluation, cycloplegic refraction was equal in both eyes ( $+1.50 + 0.50 \times 90$ ; SE  $+1.75$  D). The anterior segment and

dilated fundus examination was normal in both eyes. The intraocular pressure (IOP) measured 15 mm Hg in the right eye and 11 mm Hg in the left eye. One week later, the IOP increased to 17 mm Hg in the right eye and the cycloplegic refraction suddenly changed to  $-4.00$  sphere (more than 5.00 D in 1 week). Despite treatment with timolol 0.5%, the IOP increased to 29 mm Hg in the right eye. Consequently, the patient had Ahmed valve implantation in the right eye at 7 weeks of age. The IOP in the right eye normalized, but cycloplegic refraction remained at  $-4.00 + 3.00 \times 100$  (SE  $-2.50$  D) in the right eye and  $+2.00$  sphere in the left eye. The fixation pattern became central, unsteady, and unmaintained (CUSUM) ( $\leq 20/300$ ), and the patient objected to covering the left eye. Glasses and patching of the left eye was initiated, but both were unsuccessful because the girl constantly removed both the patch and glasses. Due to continued poor compliance with standard treatment, vision continued to deteriorate. A contact lens correction was not possible because of the patient's young age and parental reluctance.

Consequently, the patient underwent PRK in the right eye at 1 year of age. Pre-laser refraction was  $-4.00 + 3.00 \times 90$  (SE  $-2.50$  D) in the right eye. The refraction 2 months after PRK was  $+2.00 + 1.25 \times 135$  (SE  $+2.625$  D) in the right eye, which changed to  $+1.50 + 1.25 \times 135$  (SE  $+2.125$  D) in the right eye by 6 months later. Her fixation pattern improved to CSUM (20/30 to 20/100). Occlusion therapy was reinitiated in the left eye. Compliance with amblyopia therapy improved after laser surgery, and visual acuity improved to 20/60 (Allen pictures) 1.5 years after the PRK treatment. Cycloplegic refraction was now plano  $+1.50 \times 135$  (SE  $+0.75$  D) in the right eye and  $+1.00$  sphere in the left eye. Occlusion therapy was discontinued 1 year later at the age of 3.5 years. At the last visit, at 5.5 years of age, 4.5 years after the PRK procedure, BCVA was 20/70 in the right and 20/20 in the left eye. Cycloplegic refraction was  $-0.50 + 1.00 \times 135$  (SE plano) in the left eye and  $+0.50$  sphere in the left eye. The patient was orthophoric and had gained stereopsis to 600 seconds of arc (Table 2).

#### Case 4

A 3.5-year-old girl with incontinentia pigmenti was referred because of a manifest esotropia in the right eye. The BCVA was 3/200 in the right eye and 20/25 in the left eye. The patient had a right esotropia of 18 PD at near and 14 PD at distance with no stereopsis. An afferent pupillary defect was detected in the right eye. Cycloplegic refraction was  $-8.00 + 3.50 \times 90$  (SE  $-6.25$  D) in the right eye and  $+0.50$  sphere in the left eye. Dilated fundus examination revealed marked optic nerve atrophy in the right eye. Patching therapy for amblyopia was unsuccessful. The patient seemed to improve with glasses alone, although it was difficult for her to keep them on because of facial dysmorphism (hypertelorism and extremely small nose). Vision in the right eye improved to 20/400 over a period of 6 months, but glasses were eventually discontinued because of intolerable aniseikonia. Due to severe seizures and developmental delay, a contact lens fitting was not possible.

The patient had LASEK treatment in the right eye at age 7 years. Pre-laser refraction was  $-9.00 + 3.00 \times 85$  (SE  $-7.50$  D) in the right eye and improved to  $+1.00$  sphere 2 months after LASEK. Refraction 6 months after LASEK was  $-0.50$  sphere and changed to  $-3.25$  sphere by 1 year after LASEK. The BCVA improved to 20/200. The patient gained stereopsis to 3000 seconds of arc and was able to appreciate the effect of a 3-dimensional movie for the first time in her life. Extraocular alignment improved

to 8 PD right esotropia at near and minimal right exotropia at distance, without the need for strabismus surgery (Table 2).

#### Case 5

A 2-year-old boy with Goldenhar syndrome was referred. The patient had had reconstructive surgery of the left upper eyelid (Tenzel flap) for a congenital eyelid coloboma. On examination, fixation pattern was central, steady, and maintained in the right eye ( $\geq 20/30$ ) and central, steady, and unmaintained in the left eye (20/30 to 20/100). Cycloplegic refraction measured plano in the right eye and  $-6.00$  sphere in the left eye. The patient had a left exotropia of 45 PD and a left hypertropia of 20 PD. The left nasolacrimal duct system was blocked. There was a subconjunctival dermolipoma present in the left eye inferotemporally. Fundus examination revealed a hypoplastic optic nerve and myopic changes in the left fundus. The right eye was structurally normal. Treatment with glasses and patching was initiated for amblyopia in the left eye but failed because the patient was not able to wear glasses due to facial defects. To promote fusional ability, the patient had strabismus surgery (left lateral rectus recession of 7.00 mm and left medial rectus resection of 7.00 mm with infero-placement of both muscles 1 tendon width). The dermolipoma was also removed that time. The blocked tear duct was treated surgically with Crawford tubing. Contact lens correction could not be attempted because of the lagophthalmus and mild exposure keratopathy in the left eye. Visual acuity deteriorated to CUSUM ( $\leq 20/300$ ) in the left eye. As a result, the patient underwent LASEK surgery in the left eye for correction ( $-10.00 + 1.75 \times 120$ ; SE  $-9.125$  D). Postoperative refraction at 2 months and 6 months after LASEK was  $+0.75$  sphere in the left eye. One year after LASEK, refraction measured at  $+0.25$  sphere in the left eye. Visual acuity improved to 20/100 by 1 year after LASEK. Despite maintaining excellent ocular alignment, the patient did not gain measurable stereopsis (Table 2).

#### DISCUSSION

The treatment of amblyopia in children with underlying medical and/or ocular pathology is complex and challenging because multiple factors may contribute to the amblyopia in these children. Treating amblyopia that coexists with a structural defect (such as optic atrophy or hypoplasia) is still controversial. Several authors describe successful results with amblyopia treatment for monocular structural anomalies.<sup>15-17</sup> Lengyel et al.<sup>18</sup> describe 3 children with severe organic eye diseases in whom occlusion therapy resulted in achievement of relatively good visual acuity during the sensitive phase of visual plasticity. Conversely, Yang and Lambert<sup>19</sup> applied occlusion therapy in 5 children with a structural defect of the optic nerve or macula and did not find any evidence of visual improvement. Additionally, they hypothesize that the enforced iatrogenic visual impairment resulted in significant psychosocial harm and developmental delay in their patient population. Still, despite variable success rates in treating amblyopia associated with structural pathology, Bradford et al.<sup>15</sup> recommended full-time occlusion because no better treatment option existed at the time.

Amblyopia in the defocused eye caused by anisometropia or bilateral high refractive error, including astigmatism or nystagmus, often responds well to glasses if the amount of anisometropia is 3.00 D or less.<sup>20</sup> However, anisometropia greater than 3.00 D, and especially myopic anisometropia, can induce dense amblyopia. Because of the large amount of aniseikonia induced when refractive error is corrected, this form of amblyopia is especially resistant to more traditional forms of amblyopia therapy, including glasses accompanied by patching and/or atropine 1% drops. However, with improvement in vision in the amblyopic eye, aniseikonia can become the most important factor in a child's inability to wear his or her glasses correction once amblyopia treatment is complete. Contact lenses offer another option and provide better quality of vision and larger visual field with improved contrast sensitivity.<sup>21</sup> However, because of the young age of many patients and coexisting ocular or medical problems, compliance with contact lens use during all waking hours is not always optimal or possible. In these cases, refractive surgery may provide a better option.

Autrata and Rehurek<sup>4</sup> compared visual acuity and binocular vision outcomes in children who received permanent refractive surgical correction of anisometropia with those who were treated conventionally with contact lenses.<sup>4</sup> According to their results, mean BCVA and binocular vision improved significantly in the laser-treated group. The results in our case series support Autrata and Rehurek's results. After having refractive surgery for the ametropic component of their amblyopia, BCVA improved 2 lines in 2 patients and 1 line in 2 patients by 6 months after surgery. Stereopsis improved in 3 patients. Our findings are also consistent with the results of Paysse et al.,<sup>11</sup> who performed PRK in 11 children, with stereopsis improving in 33% of their testable cohort. Two of our patients and most of their patients with improved stereoacuity after laser surgery were older than 2 years. In 3 of our patients, ocular alignment improved after surgery.

The effect of refractive surgery on ocular alignment is controversial. Nemet et al.<sup>22</sup> performed LASIK in 8 adult patients with stable refractive error and strabismus. Ocular alignment improved in all of their cases after LASEK. Conversely, retrospective studies have shown significant decompensation of the preexisting exodeviation with loss of binocular function after refractive surgery for moderate to high myopia.<sup>23,24</sup> Nucci et al.<sup>25</sup> performed PRK in 27 young adults with purely refractive accommodative esotropia and conclude that PRK is an effective treatment for esotropia associated with mild to moderate hyperopia. Stidham et al.<sup>26</sup> also report that hyperopic LASIK significantly reduced esotropia in patients with accommodative esotropia. Observations such as these may help explain why the prelaser strabismus noted in Case 4 improved after surgery without the need for subsequent strabismus surgery.

Amblyopia therapy compliance also improved in our youngest patient (Case 3) after refractive surgery. The girl was only 12 months old at the time of PRK. Paysse et al.<sup>11</sup> performed PRK in 11 children aged 2 to 11 years, roughly 50% of whom were younger than 6 years of age. Compliance with amblyopia occlusion therapy did not improve postoperatively in their patients. However, their older age may have played a role in lower postlaser amblyopia therapy compliance.

In our noncomparative case series, we present 5 individual cases in which anisometric amblyopia or high myopia was complicated by a wide range of medical and ocular conditions. The small hemangioma in Case 1 caused myopic oblique astigmatism significant enough to produce amblyopia in the right eye. Robb<sup>27</sup> reports that even small hemangiomas may exert pressure on the eye in a direction perpendicular to the axis of the astigmatism. The location of these hemangiomas usually induces oblique astigmatism and astigmatism at 180 degrees. As noted by Sjostrand and Abrahamsson,<sup>28</sup> increasing astigmatism, especially at an oblique angle, significantly increases the chance for developing amblyopia. Somer et al.<sup>29</sup> also verify that amblyopia treatment outcomes are less favorable in patients with against-the-rule and oblique astigmatism.

Case 2 (Pelizaeus-Merzbacher disease) has a rare X-linked leukodystrophy, classically characterized by nystagmus, spastic quadriparesis, ataxia, and cognitive delay in early childhood.<sup>30</sup> The LASEK surgery successfully eliminated the refractive component of the patient's anisometropia. As a result, visual acuity improved by a line in both eyes and the patient gained considerable stereopsis and fusion. Additionally, the nystagmus decreased in amplitude, and motor skills also improved (eg, walks down stairs alone). It seems that in Case 2, the patient's vision and fusional ability improved both from the refractive error correction and from the decrease in amplitude of nystagmus. Rabiah et al.<sup>31</sup> report that in patients having surgery for congenital cataracts, postoperative reduction or elimination of sensory nystagmus correlated with a better postoperative visual acuity. In addition, Biousse et al.<sup>32</sup> report that contact lens wear instead of glasses improves the visual function of patients with decreased vision secondary to congenital nystagmus by optimizing the patients' refraction. In addition, it has been shown that contact lenses can dampen the nystagmus itself, thus also improving visual acuity.<sup>33,34</sup> This combined mechanism may help explain the improvement in vision in Case 2, in conjunction with the decreased nystagmus amplitude noted after laser surgery, because refractive laser surgery would alter the visual and motor state in the same fashion as that seen with contact lenses.

Our previous research findings in children having PRK and LASEK demonstrate an overall myopic shift with time

that seems to be related to growth of the eye, rather than directly related to any complication of the laser surgery itself.<sup>1,2</sup> In Cases 1 and 2, over the first year of follow-up after surgery, instead of experiencing a myopic shift, these patients had progressive improvement in postlaser refraction. At present, we have no plausible explanation for this observation, but it is possible that a myopic shift will subsequently be observed with longer follow-up. One could postulate that the hyperopic shift observed may have something to do with changes occurring in the cornea as it heals after surgery and remodels over time. However, the exact cause of this phenomenon is not known at present.

As well as the documented improvement in visual acuity and refractive and fusional status, parents and primary caregivers indicated very positive functional changes in these patients after laser surgery. Based on our functional survey, caregivers were convinced that the improvement noted in all 5 children was directly related to the laser refractive surgery. For example, Case 2, who had leukodystrophy and nystagmus, began to walk down stairs alone shortly after the refractive surgery.

All our patients were in the amblyopiogenic age group and had anisometropic amblyopia or bilateral high myopia with underlying medical conditions associated with ocular pathology. According to our results with these 5 complex cases, we think that elimination of the refractive component of the anisometropia provides considerable visual and functional improvement in children, even those with coexisting ocular and medical disorders. Based on our positive results, we think that refractive surgeons and pediatric ophthalmologists should consider laser refractive surgery as a surgical alternative in patients with these more complex pediatric medical problems.

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