

Refractive Surgery in Children

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CASE PRESENTATION

Accompanied by her parents, a 14-year-old female presents with contact lens intolerance secondary to giant papillary conjunctivitis. She is a rising tennis star and finds that glasses provide her with less depth perception than contact lenses. She desires laser vision correction. Her examination is normal with a pachymetry of 560 μm . Her refractive error is -3.50 D OU, and Figure 1 shows her computed topography.

How would you proceed? What if the patient were younger than 8 years of age, was contact lens intolerant, and presented with severe anisometropic amblyopia and a history of failed current amblyopic therapies? Would your answer be different?

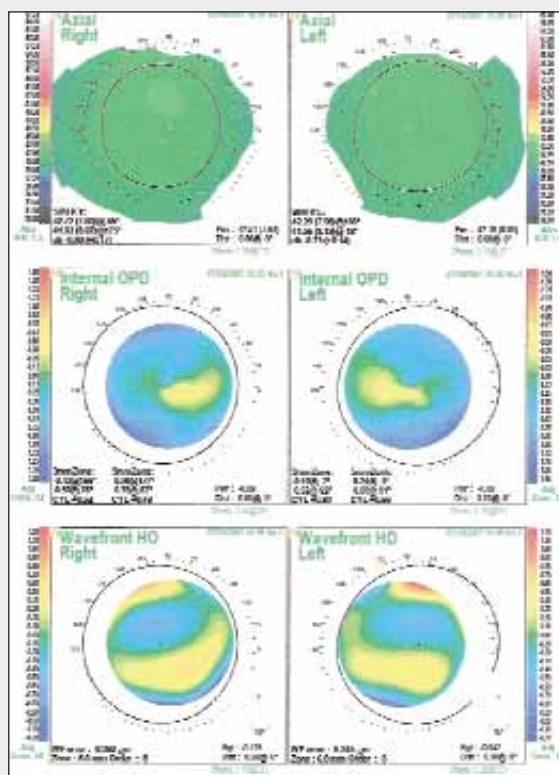


Figure 1. Computed topography is normal in this pediatric patient.

LUIS F. RESTREPO, MD

LASIK in children and teenagers is a highly controversial subject. In short, most qualified refractive surgeons are opposed to this practice for several reasons. The first is that LASIK modifies the shape of the cornea, and the procedure's long-term results and stability are based on the cornea's capacity to maintain those changes. The human eye generally reaches its adult size at around 14 years of age but not until the age of 17 in some cases. A growing organ is changing in shape, so how could any surgeon give a prognosis of a stable outcome? In addition, refractive errors usually change during childhood and adolescence, and most are not stable before an individual reaches his or her early twenties. How could you perform surgery for an error the final value of which you cannot even guess?

Besides some certain controlled clinical studies and very specific cases, I would say that the refractive surgery community as a whole rejects the practice of LASIK in children and teenagers.

RENATO AMBRÓSIO, JR, MD, PhD

LASIK is only acceptable and appropriate in children with anisometropia to prevent amblyopia. We still do not have proper eye tracking for such procedures, which typically need to be performed under general anesthesia and involve patients who are not able to cooperate with fixation. Topographic decentration is not as bad, however, as one might anticipate. Refractive surgery may also be advocated in children with bilateral high ametropia that is resistant to conventional therapy, but more information is needed before pediatric refractive surgery can be widely adopted. The main problem is ectasia screening. Parents should be very well educated, and a detailed consent is mandatory. A large, prospective, multicenter, randomized, controlled clinical trial is needed.

Unfortunately, many of my colleagues do not respect refractive surgery and are using LASIK or PRK as elective procedures for children. Dealing with these practitioners is a challenge. I do not believe, however, that there is a magic age at which to perform refractive surgery. For example, consider a 17-year-old patient whom I have

been observing since she was 14. Her refraction has been stable for 2 years, and her topographic and biomechanical parameters have been stable and appropriate for that time period. To me, she would be a candidate for laser vision correction. Daoud et al recently published an excellent review of this subject.¹ Another distinct situation that may become increasingly common, however, regards corneal collagen cross-linking to treat keratoconus in teenagers before they develop the full-blown disease. When and how to perform this type of intervention are important points that lack guidelines at the present time.

ARTHUR CUMMINGS, FRCSEd

LASIK or any other refractive surgery is elective. It is meant for patients 18 years of age or older who have a stable refraction, who understand the risk/benefit ratios, and who can make a decision at their leisure under no pressure. LASIK is only indicated in children under the following circumstances: the child has anisometropic amblyopia that cannot be satisfactorily corrected with contact lenses or glasses, and the eye would be lost to further use if LASIK were not performed due to this defect.

There is no place for LASIK in children who simply want to get rid of their glasses. Their refraction is by no means stable. These individuals are still growing. They are not mature enough to make a decision such as this one or to undergo refractive surgery under local anesthesia.

ALEKSANDAR STOJANOVIC, MD

We have been highly restrictive on this matter in Norway, and very few such surgeries have been performed. The indication has been amblyopia with anisometropia for which all other conservative alternatives have been exhausted. Knowing that the corneal biomechanical stability is lower in young eyes, I would be especially skeptical of performing LASIK in children. Even the mildest surface ablation should be performed on children as a measure of last resort.

MIRKO R. JANKOV II, MD PhD

Medically, refractive surgery is the last recourse in children, when all of the other solutions, such as spectacles and contact lenses, are of no use. I emphasize the need for persistence, training, and motivation on the part of parents and children in order for them not to give up prematurely on nonsurgical therapy. Only when all such efforts are in vain should we dare to think about refractive surgery.

In terms of indications, refractive surgery make sense for highly anisometropic children who cannot use the contact lenses *and* are young enough for the procedure to make a difference in the development of their vision—in conjunction, of course, with the occlusion of their opposite eye.

That would be restricted to children of up to 6 or 7 years of age, at which point amblyopia has become established and resistant to conventional treatment. Typically, however, patients are older so that surgery would have no impact on their already developed amblyopia. In general, parents confound the high refraction with amblyopia, and they expect LASIK surgery to miraculously cure their child's amblyopia by removing the refraction altogether.

Regarding predictability, eyes grow while patients are in their late teens or even their early 20s. Certainly, some individuals mature earlier or later than the average, but we cannot guess whom. At best, we can guess where the refraction will stabilize, meaning that refractive surgery will have poor predictability. Moreover, the biomechanical response of a young cornea has not been well studied, which casts refractive outcomes in pediatric patients further in doubt.

To me, the greatest objection to refractive surgery in children is its lack of safety. The onset of keratoconus—an absolute contraindication for refractive surgery in adults—occurs during puberty. Ignoring this fact is therefore utterly irresponsible. Although corneal collagen cross-linking has indeed changed the course of the keratoconus treatment, especially when disease is detected early, by no means should we produce ectasia in children.

Legally and ethically, pediatric refractive surgery is profoundly questionable. A third party (a parent) must give consent for this elective procedure, because the patient is unable to do so. The emotional dimension of this situation is a problem in itself. Parents would do almost anything to help their children, and they are thus vulnerable to suggestions and promises of miraculous solutions. Advertising refractive surgery for children should be considered highly unethical, because it targets parents' emotions rather than their reason.

I believe that refractive surgery should not be performed in children, because its safety has not been proven and there are excellent alternative treatments with significantly lower risk. In extremely rare situations, for children of up to 6 to 7 years of age, refractive surgery may be a solution, but the option must be presented to parents in a sensitive and ethical manner.

OSAMA IBRAHIM, MD

I believe that refractive surgery (not necessarily LASIK) in patients younger than 18 years should be confined only to cases of anisometropia (mostly myopia but also hyperopia and astigmatism). In these cases, surgery is performed not to eliminate the patients' dependence on glasses but rather to help them wear glasses properly and engage in effective amblyopic therapy. Refractive surgery should *never* be performed bilaterally in these cases.

I believe that my colleagues and I have performed the

REFRACTIVE SURGERY

COMPLEX CASE MANAGEMENT

largest series of LASIK surgeries in anisometropic children, with more than 10 years of follow-up. Considering that emmetropia is not always our goal, the procedure's safety, predictability, and efficacy are similar to in adults. In terms of stability, eyes that became emmetropic tended to maintain this outcome, even if the fellow eye's refraction changed. Eyes that were undercorrected continued to lose effect and progressed similarly to the contralateral eye. Eyes that were overcorrected also lost effect with follow-up but less so than the fellow eye. ■

Editor's note: For further discussion of LASIK in children, read "Refractive Surgery in Children: Indications and Contraindications" in the September 2009 edition of Cataract & Refractive Surgery Today Europe.

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1. Daoud YJ, Hutchinson A, Wallace DK, et al. Perspective. Refractive surgery in children: treatment options, outcomes, and controversies. *Am J Ophthalmol.* 2009;147:573-582.