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Longer days, cool breezes and a hint of sun ... spring is a time for enjoying the great outdoors. Unless, that is, you have Dry Eye. With symptoms including burning, stinging, excessive tearing and dryness, this season can be tough on eyes.1,2 Fortunately, the OPTIVE® range works fast and provides prolonged relief in either aqueous or lipid deficient Dry Eye sufferers.3-5 Recommend it to your patients and help make their spring epic.

References:
Glaucoma is the second most common cause of blindness worldwide affecting more than 67 million people.\textsuperscript{1,2} The prevalence of glaucoma is estimated to increase in the coming years owing to the ageing population reaching higher than 79.6 million by 2020.\textsuperscript{3,4} Although the mainstay of glaucoma therapy is still topical medication, frequently poorly responsive cases with progressive disease are encountered, who need surgical intervention for adequate pressure control.

The major surgical interventions in management of open-angle glaucoma are described under the title of filtering surgeries. Although different techniques and modalities have been employed by surgeons but all share the same concept. The aim of penetrating surgeries is to create a connection between the anterior chamber and the subconjunctival space allowing fluid passage with less resistance. Trabeculectomy was first described in 1968 and later approved by the FDA.\textsuperscript{5} Since then many developments have been reported.

**Conventional trabeculectomy**

In conventional trabeculectomy, the sclera is exposed by a fornical or limbal based conjunctival flap. A partial thickness scleral flap is prepared roughly 4x4 mm and half scleral thickness. Care must be taken to avoid corneal extension of the flap in the fornix-based approach to avoid leakage.

Application of topical MMC or 5FU antimetabolites reduces the incidence of failure in high risk patients. The potential side effects, that are increased with the use of these agents, must be considered and surgeons must be prepared for complications. These include hypotony, late leak and bleb related infections.

To prevent penetration of these toxic solutions, advancement into the anterior chamber is preceded by meticulous washing with BSS. The anterior chamber is then entered by a scleral punch or stab knife.

Some surgeons advocate the use of a paracentesis into the anterior chamber before sclerostomy, with introduction of methylcellulose or air to allow gradual pressure reduction and better control on the anterior chamber. After creating a surgical peripheral iridectomy the scleral flap is sutured and conjunctival layer is sutured tightly assuring no potential for bleb leakage.

**Introducing a new technique**

In a recent article published in *International Ophthalmology*,\textsuperscript{6} we introduced a new technique for penetrative trabeculectomy in primary open-angle glaucoma patients called sutureless trabeculectomy.

First a fornix-based conjunctival flap was created approximately 50 degrees in the superior temporal quadrant. Using a crescent knife a tangential scleral tunnel was prepared 3 mm posterior to the limbus with a horizontal width of 3 mm and depth of one third of scleral thickness. The tunnel was advanced 0.5 mm anterior to the limbus then opened into the anterior chamber using a 3.2 mm keratome.

Before entering the anterior chamber through the scleral tunnel the anterior chamber was filled with methylcellulose through a peripheral paracentesis to prevent chamber collapse and trauma to the corneal endothelium and crystalline lens. The scleral punch was used to enlarge the entry point into the anterior chamber and to ease removal of the trabecular meshwork.

Standard surgical peripheral iridectomy was performed. The conjunctival flap was secured to the limbus preventing bleb leakage. The methylcellulose was removed using a double cannula and balanced salt solution.

Follow-up of the 26 patients receiving this new sutureless trabeculectomy was performed for one year. When we compared our results with those

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**In short...**

Glaucoma is a very common cause of blindness worldwide and is expected to increase as a result of the continuing rise in the ageing population. Although topical medication is the mainstay therapy, frequent cases that respond poorly with progressive disease occur who require surgical intervention. In this article, the authors describe their novel technique for penetrative trabeculectomy in primary open-angle glaucoma patients, called sutureless trabeculectomy.
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of the control group (receiving conventional trabeculectomy), we found that the new technique gave well controlled IOP measurements, which were similar to those of the controls. Mean IOP of 11.00 ± 1.3 mmHg in the conventional group and 12.4 ± 3.2 mmHg in the sutureless group.6 None of the patients encountered serious complications.

Advantages of sutureless trab

Although similar outcomes were shown between conventional and sutureless trabeculectomy considering IOP control, in the following we mention some of the reasons why we believe the sutureless technique is advantageous.

First of all the size of the conjunctival flap is significantly smaller with less dissection needed in comparison with the conventional method (50 degrees with less than 5 mm posterior dissection versus 70–80 degrees with 10 to 15 mm posterior dissection). This has the advantage of less Tenon and conjunctival manipulation and therefore less activation of fibroblasts, obviating the need for antimetabolites. Eliminating the exposure of the eye with antimetabolites helps decrease related complications while allowing optimum outcomes.

Secondly, the scleral tunnel helps maintain target IOP by allowing the aqueous flow into the subconjunctival space more posteriorly (3 mm from limbus) in comparison with the conventional flap (extending to limbus), which also acts as a one way valve. This feature is favourable in two ways: 1. Theoretically, it prevents early postoperative over filtration, hypotony and related complications; 2. Additionally, the more posterior location of the bleb results in a more aesthetical result with less refractive change. In conventional trabeculectomy the proximity of the bleb to the limbus and its induced change in the corneal curvature can result in a significant change in the postoperative refraction of the patient. This might be reduced by the posterior location of the sutureless trabeculectomy.

Last but not least, the simplicity and safety of this technique in comparison with the conventional trabeculectomy helps the young and inexperienced surgeons to expand their armamentarium in treating poorly controlled and progressive glaucoma patients, despite maximum medical interventions.

Further evaluations

Lai and Lam first described this technique in 1999.7 Later Eslami et al. incorporated a similar technique with promising outcomes.8,9 However, they reported the difficulty in performing peripheral

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8 Ophthalmology Times Europe May 2014
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iridectomy as the pitfall of this technique and then further examined the same technique without peripheral iridectomy.\(^9\)

We resolved this limitation by introducing viscoelastics to the anterior chamber and maintaining the volume, also protecting the corneal endothelium and crystalline lens from possible trauma.

We plan to further evaluate the outcome of our patients in longer follow-up periods, assessing the long-term success rate. Evaluating a patient’s postoperative refraction change and comparison of the results with conventional patients can help in further assessment of possible advantages of this technique on everyday aspects of a patient’s quality of life.

References

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The authors of this article have no financial interests to disclose.
Doctors and researchers continuously seek new ways to improve treatments and outcomes for patients by applying new and existing technology in novel ways. Known in the medical industry for high power and efficiency, particularly in the field of skin resurfacing, carbon dioxide (CO\(_2\)) lasers are now finding a place in the world of ophthalmology. CO\(_2\) laser assisted sclerectomy surgery (CLASS) is proving to be a highly effective, minimally invasive, safe and simple method to surgically treat glaucoma patients. As participants in a prospective, multicentre study of 111 patients, Prof. Ehud I. Assia, MD, and Prof. Shlomo Melamed, MD, are at the forefront in the research, development and implementation of this approach.

Globally, glaucoma is the second most common cause of blindness. An estimated 8.4 million people in the world suffer from glaucoma-induced blindness and an additional 60 million are affected by optic neuropathy.\(^1\) Traditional treatment for glaucoma begins with hypotensive topical medications. Although these medications are proven effective at lowering intraocular pressure (IOP) when used as directed,\(^2\) a significant number of patients are not fully compliant, severely limiting efficacy of the treatment regimen.\(^3\)

“We resort to traditional penetrating surgical methods such as trabeculectomy and tube shunts when the state of the disease is dire enough to exceed the high risks associated with these treatments,” explained Prof. Assia.

“Although quite efficient at reducing the IOP, trabeculectomy is associated with too many complications, ranging from foreign body sensation and dellen formation, to leaking blebs, hypotony, blebitis and endophthalmitis,”\(^4\) said Prof. Melamed.

A new surgical option

CLASS is best suited for patients with mild to moderate primary open-angle glaucoma (POAG) and pseudo exfoliative glaucoma (PEXG) with baseline IOP between 20 mmHg and 35 mmHg, and even higher. Using the IOPTiMate (IOPtima, Israel) system, which uses CO\(_2\) laser of a 10.6 \(\mu\)m wavelength accompanied by a micro-manipulating scanner and a control unit, the sclera of the eye is thinned to allow percolation of the aqueous. The eye globe is not penetrated, and there is no need to insert and leave a foreign object in the eye.

“...CLASS may be most suitable for patients with uncontrolled glaucoma where a less invasive approach is preferred.”

(Prof. Melamed)

The surgeon begins by creating a conjunctival flap using the fornix base method and a standard scleral flap 5.0 x 5.0 into the clear cornea to expose the limbus. A scleral bed is created as a fluid reservoir. The CO\(_2\) laser beam rapidly ablates thin layers of dry sclera in a pre-selected pattern to ‘un-roof’ Schlemm’s Canal. Fluid then percolates through the intact trabecular meshwork. The percolated fluid absorbs laser energy and terminates the ablation; there is no penetration of the eye globe. The scleral flap and conjunctiva are closed and sutured (see Figure 1).

In short...

Carbon dioxide laser assisted sclerectomy surgery (CLASS) is being used as an effective and safe, minimally invasive treatment for glaucoma. In this article, two surgeons at the forefront of research, development and implementation of this approach discuss this surgical option and its benefits for the ophthalmic market.
One of the greatest benefits of CLASS is the ease of performing the procedure. The technique for unroofing the canal is very safe, yet productive. IOP is significantly reduced without the risk of hypotony and impact on vision is minimal, if at all. I continue to use a variety of glaucoma procedures, but find that CLASS may be most suitable for patients with uncontrolled glaucoma where a less invasive approach is preferred," emphasized Prof. Melamed.

Prof. Assia added, “Patients with mild to moderate glaucoma are often seen by comprehensive-care ophthalmologists rather than by glaucoma specialists. The precision of the CLASS procedure provides a solution that is very accessible to all surgeons. The laser beam is precisely guided by the micro-manipulating beam, and will ablate exactly what is chosen according to the defined shape and dimensions. Physicians simply have to exercise confidence in the device. Keeping the eye intact significantly reduces the risk of intraoperative and postoperative complications, as well as the follow-up interventions commonly associated with penetrating surgical alternatives.”

Clinical results
In a prospective, multicentre study of 111 patients, the procedure was performed on 85 eyes with POAG and 26 eyes with PEXG, with an average IOP of 25.7 ± 5.3 mmHg. Mean IOP dropped to 13.5 ± 3.7 mmHg at six months postoperative (N = 86) and remained stable through three years (N = 29) and five years postoperative (N = 8). Average number of hypotensive medications dropped from a mean of 2.3 ± 1.2 at baseline to 0.3 ± 0.7 at six months postoperative, 0.6 ± 0.8 after three years and 0.7 ± 1.0 after five years. At three years postoperative, 87.5% of patients achieved a reduction in IOP of 20% or greater, maintaining an IOP less or equal to 18 mmHg; 59.4% of patients were able to maintain the IOP goals without use of any medication.

Conclusion
CLASS is proving to be a very promising technology based on data from over 700 procedures.
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References

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Prof. Assia has indicated he has financial interest in APX Ophthalmology, BioTechnology General, Hanita Lenses, IOPtima.
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Warming up to the ‘ICE’ procedure

Combining microinvasive surgeries may be future of glaucoma treatment to improve results

By

Dr Steven R. Sarkisian Jr

Combining implantation of trabecular micro-bypass stents (iStent, Glaukos, Laguna Hills, California, USA), cataract surgery and endoscopic cyclophotocoagulation (ECP) (Endo Optiks, Little Silver, New Jersey, USA) — also referred to as the ‘ICE’ procedure — offers a dual-mechanism glaucoma treatment. This therapy enables surgeons to treat two sides of the glaucoma equation by simultaneously restricting inflow and enabling outflow.

Although medications can achieve a similar effect — such as aqueous suppressants to reduce aqueous production and prostaglandins to increase aqueous outflow — ICE is a surgical option that addresses the patient’s cataract and glaucoma in one procedure.

Perhaps the greatest benefit of ICE is that performing ECP and the iStent together can lead to the reduction or elimination of more medications than either procedure alone.

Ideal patients, surgical procedure

Patients ideally suited for ICE are those who are taking multiple medications and suffering from early onset open-angle glaucoma.

I typically start ICE with the ‘C’ component, namely, temporal clear corneal cataract surgery. Once the lens has been implanted, I begin the ECP by first removing the viscoelastic from the capsular bag. I then place Healon GV (Abbott Medical Optics, Santa Ana, California, USA) into the ciliary sulcus to optimize visualization of the entire ciliary process.

Next, I perform 360° of ECP followed by removing the viscoelastic from the ciliary sulcus. I place Miochol-E (Bausch + Lomb, Rochester, New York, USA) in the eye to bring down the pupil, which allows me to visualize the angle for implantation of the iStent. I place more Healon in the anterior chamber so that I can see the entire nasal angle and turn the patient’s head away from me about 45° and tilt the microscope as well.

I use a surgical gonioscopy, after placing some Healon on the cornea, to visualize the angle. I then implant the iStent through the cataract wound. Once I have made sure the wounds are sealed nicely and there are no leaks, I remove the speculum and the procedure is complete.

After the ICE, I prescribe a fluoroquinolone and difluprednate ophtalmic emulsion 0.05% (Durezol, Alcon Laboratories, Fort Worth, Texas, USA) for inflammation, to be administered quite aggressively every 2 hours, while awake, the day of the surgery.

I taper the use of the steroid drop rapidly after the first few days, and I monitor the eye for IOP spikes as a result of the steroids. If I find that the patient is having a steroid-response IOP spike, I may switch the prescription to a nonsteroidal anti-inflammatory drug or loteprednol etabonate ophtalmic gel 0.5% (Lotemax 0.5% Gel Drop, Bausch + Lomb).

Pearls for ICE

Placement of the iStent can also be assisted by the use of an endoscope (Endo Optiks) as opposed to a gonioscopy. Using the endoscope to visualize the angle eliminates the need for repositioning the patient’s head and microscope during the procedure.

The endoscope can also work as a stabilizer. I have often had patients with rapid movement of the eye, which can make implantation of the iStent somewhat difficult. Using the endoscope through a second...
port in the eye can stabilize the eye for easier and safer iStent implantation.

When I use it, I typically have to open up the paracentesis and I make sure the monitor is close enough to allow me to visualize the angle properly.

Why it works
As ECP and the iStent are microinvasive glaucoma surgeries (MIGS), they can be combined easily with cataract surgery. ECP can be done through the same wound as a cataract extraction, which, in my case, is a sub-2-mm procedure. ECP is appealing to patients, because it does not require sutures and therefore won’t lead to scarring and astigmatism.

“Combining MIGS procedures is the future of glaucoma surgery.”

Furthermore, there is no foreign body sensation or issues with having an extraocular reservoir. The recovery for ECP and other MIGS procedures is essentially the same as cataract surgery, which is a substantial benefit to the patient and changes both the surgeon’s and patient’s attitude about glaucoma surgery from one of “surgery is the last line of defence against glaucoma”, to bringing surgery on par with medical management and laser trabeculoplasty in the treatment algorithm.

Combining MIGS procedures is the future of glaucoma surgery. I predict we will see fewer trabeculectomies performed. Furthermore, mostly fellowship-trained glaucoma specialists, not general ophthalmologists, will do the few that are performed.

As more MIGS become approved by regulatory bodies, more procedures will be combined to improve results and streamline the patient’s surgical experience. Any physician familiar with cataract, ECP and iStent implantation as individual procedures will have little to no learning curve when combining them for ICE.
Multi-component IOL
A novel concept for paediatric cataract surgery

By Dr Dimitra M. Portaliou

It is known that congenital cataract in children even though a rare disorder is considered the most common cause of treatable blindness worldwide. The prevalence in newborns is approximately 1 to 13 cases in every 10000 births. Accurate diagnosis, ideal intervention timing and treatment choice are of extreme importance to ensure visual rehabilitation, avoid amblyopia and minimize the risk of complications.

During the last decade, advances in the ophthalmological field have made their way into the everyday clinical practice of paediatric ophthalmology as well. Nevertheless, despite the technological advances and constant improvements in surgical techniques and intraocular lens (IOL) technology, cataract surgery in children remains challenging and presupposes a customized approach and a highly skilled surgical team to ensure an optimum result.

One of the most crucial steps — decisions when performing paediatric cataract surgery — is the choice between aphakia or IOL implantation. Aphakia can be devastating for the young patient due to the necessity for a high hyperopic correction. However, the type of IOL to implant and the dioptric power of the IOL used are critical to avoid extreme refractive surprises and other complications postoperatively.

IOL implantation, type and dioptric power selected
The available options when performing cataract surgery in children are aphakia followed by immediate contact lens fitting versus primary IOL implantation. In children that have completed their 2nd year of life, IOL implantation is the preferred approach but surgeons still remain hesitant to implant an IOL in infants and children under the age of 2. The advantages of IOL implantation are numerous such as amblyopia prevention, lower rate of certain complications and higher compliance if contact lens fitting is impossible.

Despite the advantages, deciding on the IOL type and power remains challenging as the anatomy of children’s eyes is unique in certain aspects. Children’s ocular system is still developing and, therefore, is in a dynamic state, one that makes precision of measurements uncertain. Children’s eyes are characterized by steeper corneas, shallower anterior chamber depth and shorter axial length making correct biometry and accurate IOL calculations almost impossible.

Predicting the refractive change of young patients over time is another challenge for paediatric ophthalmologists. Trivedi et al. have concluded that there is a continuous myopic shift in refraction as age advances and suggested that the greatest change in axial length occurs during the first 2 years of life. In particular, there is a rapid growth of 0.62 mm/month during the first 6 months and sequentially a 0.19 mm/month in the time frame between the 6th and 18th month of life. The growth continues with a much lower rate (0.01 mm/month) until adulthood. Of course these general rules do not always apply as the natural variance in growth of the eye is unpredictable. Most surgeons aim for residual hyperopia when implanting an IOL, expecting a myopic shift during the growth process that will lead to emmetropia by the age of 18 years. Others aim for a slight myopia that will facilitate children’s near vision and possibly prevent amblyopia. No direct guidelines are available and, therefore, each surgeon is relying on his/her personal experience rather than a well established algorithm.

The type of IOL to implant is an important issue as well. In the bag implantation is preferable and polymethyl methacrylate (PMMA) the material of choice. Certain investigators have suggested the use of multifocal IOLs in children. Tassignon’s ‘bag-in-the-lens’ surgical approach is a technique in which the anterior and posterior capsules are

In short...
Despite technological advances and contact improvements in surgical techniques and IOL technology, cataract surgery in children remains challenging and presupposes a customized approach and a highly skilled surgical team to ensure an optimum result. In this article, Dr Portaliou discusses a new multi-component adjustable lens that may be the answer paediatric ophthalmologists have been waiting for.
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placed in the groove of a specially designed IOL after a capsulorrhexis of the same size is created in both the anterior and posterior capsules. The principle behind this IOL design is to ensure a clear visual axis by mechanically tucking the two capsulorrhexes into the IOL groove, thereby preventing any migration of proliferating lens epithelial cells and thus preventing posterior capsule opacification.

Multi‑component adjustable IOL
The possibility of an adjustable IOL represents a satisfactory alternative solution for many of the refractive difficulties that arise during IOL implantation in paediatric cataract surgery. In particular, the InfiniteVision Optics lens (IVO, MC‑IOL, Strasbourg, France) is an acrylic foldable posterior chamber optical system which enables customized correction of all degrees of sphere and cylinder in the primary surgery. At the same time, this lens allows for continual correction of all residual refractive errors postoperatively with the surgical exchange of one of the lens components. The use of a multifocal IOL front component is also possible. This specific lens ocular system consists of two components. The base lens or posterior component (hydrophobic acrylic) has a plate haptic configuration, which contains only spherical correction and can be implanted in the capsular bag, analogous to a conventional posterior chamber intraocular lens. The front lens assembly (hydrophilic acrylic) has two haptics extending off of the optic. These haptics are designed to fit into the two small bridges which project off the anterior surface of the base lens to secure the front lens assembly to the base lens [Figure 1].

In case of posterior capsule opacification, which is rather common in paediatric cataract surgery, YAG laser capsulotomy can be performed without compromising the safety of an enhancement surgery if it is judged as necessary. It is highly desirable to house the base lens in the capsular bag and allow capsule fibrosis to surround the base lens peripherally. When fibrosis is occurring, if the central area of the posterior capsule is involved, a small central capsular opening can be made, still allowing isolation of the vitreous body behind the base lens. This ensures that if a front lens exchange is necessary at some time point in the future repeated vitreous surgery would not be required.

The front lens assembly allows for spherical, cylindrical and multifocal primary corrections as well as immediate and long-term refractive adjustments. Implantation of the 2 components can be effectuated through a 1.4 to 2.8 mm incision and easily assembled or disassembled inside the eye.

This multi‑component lens is of great use in case of under‑or over‑corrections after cataract extraction and IOL implantation, which is often the case after congenital cataract, because the front lens is easily surgically exchangeable. Errors in biometry, preexisting or induced astigmatism and variable wound healing reduce the predictability level of any primary cataract surgery. In children predictability is even harder to achieve and therefore having the opportunity of refractive fine tuning postoperatively is essential.

The 2 year follow‑up of the initial clinical evaluation of the multi‑component IOL included 6 eyes of 6 patients with mean age 63.3 ± 12.7 years (range from 49 to 82 years) that underwent cataract surgery and lens implantation. The aim of this feasibility study was to evaluate the manufacturing expediency of the lens, the simplicity of the surgical implantation technique, the incidence of interlenticular fibrosis and the rate of complications. All surgeries were uneventful and no complications occurred. At 2 years postoperatively, interlenticular fibrosis had not developed and there was no statistically significant difference postoperatively in the endothelial cell density, anterior chamber depth and pachymetry.
readings. The study concluded that MC-IOL implantations were easy and safe to perform without the risk of intra- or postoperative complications.

Predicting the axial growth and the refractive change that accompanies it remains one of the key challenges in the follow-up of paediatric cataract surgery. The MC-IOL lens concept can facilitate paediatric ophthalmologists by customizing the primary surgery, by allowing a small variety of lenses in their inventory to cover a large refractive range of sphere and cylinder and by easing the burden of IOL choice.

and the front lens was removed. Then another front lens was inserted in the anterior chamber and attached to the small bridges which project off the anterior surface of the base lens. This resulted in a final refraction of +0.25 D with a final UDVA of 1, one week after the enhancement procedure. Clearly this case demonstrates the feasibility and safety of such a secondary procedure, backing up the proof of the enhancement concept, which is so essential for the paediatric cataract population. It is known of course that repeated complex surgeries can worsen the prognosis but this enhancement surgery is a minimally invasive procedure in which the refractive benefit for the patient out ways by far the risk taken.

Conclusions
The development of an adjustable, multi-component IOL (InfiniteVision Optics) allows for adjustments at any time postoperatively by removal and exchange of one of the optical elements of the lens implant. This gives the surgeon the opportunity of continuous refractive correction/modification of all known refractive errors until the completion of ocular biological growth, diminishing the risk of amblyopia postoperatively.

The concept of the multi-component lens may be the answer that paediatric ophthalmologists have been waiting for, by providing an alternative to conventional paediatric cataract surgeries…

The multi-component lens in paediatric cataract surgery may need to be designed with a smaller diameter compared to the adult design so as to fit in a child’s capsular bag and to avoid anterior chamber shallowing and glaucoma development.

Enhancement surgery — proof of concept
A case report of an enhancement performed with the IVO multi-component lens system has been previously described. The 78-year old patient in question had a postoperative residual refractive error of 2.25 D (refractive surprise) following routine cataract surgery and multi component IOL implantation even though the target refraction was emmetropia.

Patient underwent enhancement surgery 9 months after the primary surgery by removal and exchange of the front lens assembly. Using the same incisions created in the primary surgery the front lens assembly haptics were detached from the bridges of the base lens and the front lens was removed.

"The concept of the multi-component lens may be the answer that paediatric ophthalmologists have been waiting for, by providing an alternative to conventional paediatric cataract surgeries…"

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The concept of the multi-component lens may be the answer that paediatric ophthalmologists have been waiting for, by providing an alternative to conventional paediatric cataract surgeries that traditionally do not allow easy refractive adjustments for developmental, age related changes in the refractive status of the eye.

References

Would you implant this lens?

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Multifocal intraocular lens implantation in children

Are we anywhere near yet?

By Professor Jagat Ram, MS, Dr Aniruddha Agarwal, MS, Dr Jaidrath Kumar, MS, and Dr Adit Gupta, MS

Visual rehabilitation in children with cataract is a major challenge for the paediatric cataract surgeon. In children, implantation of a multifocal intraocular lens (IOL) remains a topic of debate the world over. Paucity of literature addressing the outcomes of children with multifocal IOLs results in lack of clarity on the issue. Moreover, there has been no head-to-head comparison of multifocal IOLs with monofocal IOLs in children. This prompted us to perform research and address a number of concerns among paediatric ophthalmologists.¹

Why try multifocal at all?

Studies such as the one conducted by Dr Phillip C. Jacobi et al.,² have shown promising results with the use of multifocal IOLs in children. Children with unilateral cataracts had a satisfactory outcome with multifocal IOLs as per a study by Dr José Cristóbal.³ Multifocal IOLs come with an advantage of promoting binocularity and improved stereopsis. In adult patients, multifocal IOLs considerably reduce the dependability on glasses. There is no evidence whether multifocal IOLs offer similar benefits in children.

The present study

Children with bilateral cataracts propose a unique clinical situation because they do not have normal eyes with youthful accommodation. In our study, we selected children older than 5 years of age so that by this time, the growth of the eye has been largely completed.¹ Children with bilateral congenital/developmental cataracts were included in the study.

We compared the performance of two types of multifocal IOLs, AcrySof IQ ReSTOR SN6AD1 IOL (Alcon Laboratories, Fort Worth, Texas, USA) with +3 D add for near and Preziol with +4 D add (Care group, Baroda, India). AcrySof IQ ReSTOR has apodized diffractive optics and Preziol is an aspheric refractive IOL.

Monofocal IOLs used in the study included Sensar OptiEdge (AMO, Santa Ana, California, USA) and Alcon MA60AC or SA60AT IOLs. The children were tested for near and distance visual acuity, fusional status, contrast sensitivity and stereopsis.

“In children, implantation of a multifocal intraocular lens (IOL) remains a topic of debate the world over.”

Results in brief

Similar to previous studies, our results reaffirmed the promising future with innovations in IOL design. The clinical photograph (Figure 1) shows a child with bilateral multifocal IOLs and a clear visual axis at one year follow up. The best corrected visual acuity was similar amongst multifocal and monofocal IOL groups.

However, there was spectacle independence in more than 70% cases with multifocal IOLs over one year follow-up period. It was encouraging to note that multifocal IOLs did not decrease the contrast sensitivity and stereopsis versus the monofocal IOLs.

Apopidized diffractive IOLs performed better than refractive IOLs. This means that with development of newer designs of multifocal IOLs, it is certainly possible to achieve good vision without compromising on its quality.

In short...

In children, implantation of a multifocal IOL remains a topic of debate the world over. With lacking evidence on post surgery outcomes and no head-to-head comparison of multifocal IOLs in children, this issue remains to be clarified. Therefore, the authors of this article were prompted to perform research in this area to address a number of concerns among paediatric ophthalmologists and here they present the key outcomes of their work.
Cutting-edge advancements for today’s ophthalmologist, now available in an app

Paediatric cataract surgery remains a challenge!
Surgical challenges faced by a paediatric cataract surgeon are numerous despite technological advancement. A high tendency of postoperative inflammation in young eyes complicates the issue further. While we know that there are no easy solutions, securing the haptics of the multifocal IOL well within the capsular bag is the *sine qua non* of achieving adequate IOL performance.

Future of multifocal lenses
Obtaining satisfactory long-term optimal visual results is the most challenging task for a paediatric cataract surgeon. More long-term studies discussing the outcomes in terms of contrast, near vision, depth of focus and binocularity with superior stereopsis will enable paediatric cataract surgeons to research focusing on reduction of this process will improve results with multifocal IOLs.

"Similar to previous studies, our results reaffirmed the promising future with innovations in IOL design."

"It is necessary that paediatric ophthalmologists ensure that they continuously update their clinical and surgical skills for the management of these difficult cases."

In our series, primary posterior capsulotomy with anterior vitrectomy was performed in all cases above 8 years of age. Development of posterior capsular opacification remains a problem in children and it is hoped that incorporating multifocal IOLs in their armamentarium.

Tackling amblyopia early and effectively requires continuous efforts of researchers all around the world. It is necessary that paediatric ophthalmologists ensure that they continuously update their clinical and surgical skills for the management of these difficult cases.

Finally, no research in the area of paediatric cataract would see the light of the day, if it was not for the determination of parents, who fight numerous odds to bring their child to the operating room. Their efforts must be lauded in every possible way.

References
Calculating IOL power for children

Accurate measurement more vital in paediatric population; challenge for long-term care

Implanting an IOL has become a more common practice during paediatric cataract surgery. Though the surgical management of paediatric cataract has improved, the accuracy of IOL power calculations has not shown similar improvement.

“Selection of an IOL power is one of the major challenges for the long-term care of children undergoing cataract surgery,” said Dr Rupal H. Trivedi, MSCR, research associate professor, Storm Eye Institute, Medical University of South Carolina, Charleston, USA. “Many of the late refractive surprises are attributed to a myopic shift in refraction from axial eye growth. However, early refractive surprises can be attributed to inaccuracy in IOL power calculations.”

The ultimate goal of paediatric IOL power selection is to provide a manageable course of refraction between IOL implantation and adulthood with the best possible adult visual acuity.

The axial length measurement is the single most important factor in making an accurate IOL power calculation, regardless of patient age, Dr Trivedi noted. However, accurate axial measurement is far more important in children than in adults.

In adults, every millimetre of error in axial length measurement translates into about 2.5 D error. In children — who typically have short eyes of 20 mm or less — every millimetre of error in axial length translates into about 3.75 D error. That difference in effect has a direct impact on how axial length is measured.

Contact versus immersion

Immersion ultrasound measurements are the standard of care in adults, Dr Trivedi explained.

Ophthalmic surgeons recognize that physical contact between the ultrasound probe and the cornea can result in corneal depression and an artificially shortened axial length measurement.

Multiple studies have shown that immersion A-scan measurement eliminates corneal compression and produces more accurate axial length measurements compared with contact biometry.

An informal survey of paediatric ophthalmologists found that 82% use the contact ultrasound method to measure paediatric eyes.

In short...

Determining the optimal IOL power for children is as much an art as a science.
Children, K value is obtained under anaesthesia using a handheld keratometer.

One of Dr Trivedi’s recommendations is to take K value as soon as possible after the induction of anaesthesia and immediately following IOP measurement to avoid corneal dryness.

A handheld keratometer is not the preferred tool for axis measurements, she explained, but the literature suggests that it is a practical tool to obtain an acceptable K measurement. The measurement should be taken without the use of an eyelid speculum.

Dr Trivedi suggested instilling a balanced salt solution to maintain a smooth corneal surface during measurement. Each eye should be measured twice as a way to improve accuracy, and the two readings averaged to obtain the final K number.

The two K readings should be within 1 D. If the two K readings are more than 1 D different, take a third reading and average the closest two readings.

Like keratometry, A-scan biometry should be performed for both eyes.

IOL power calculations are more variable in children as adults’ visual needs help determine the calculation. However, in children, the surgeon must also take into account the expected growth of the eye. The ideal IOL power would provide the best correction for amblyopia in childhood while inducing the least refractive error in adulthood.

Aiming for emmetropia in childhood is likely to result in a large refractive error in the adult eye, which is likely to require a second surgery to exchange IOLs.

At the same time, a near-zero refractive error in childhood simplifies treatment for amblyopia and results in better visual outcomes, Dr Trivedi emphasized.

Aiming for high hyperopia reverses those advantages and disadvantages. Better adult refraction avoids the need for repeat surgery, but complicates childhood amblyopia and produces worse visual outcomes. Targeting moderate hyperopia immediately after implantation is more likely to yield a more acceptable lifelong balance, she concluded.

**How do you calculate IOL power for children?**

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**Table 1:** Difference between contact and immersion techniques (defined as contact minus immersion measurements).

<table>
<thead>
<tr>
<th>Difference</th>
<th>–0.27 ± 0.30 (–0.96 to 0.33)</th>
</tr>
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<tbody>
<tr>
<td>Difference in axial length (mm)</td>
<td>0.02 ± 0.24 (–0.61 to 0.77)</td>
</tr>
<tr>
<td>Difference in anterior chamber depth (mm)</td>
<td>–0.30 ± 0.34 (–1.11 to 0.24)</td>
</tr>
<tr>
<td>Difference in IOL power for emmetropia (D)</td>
<td>1.06 ± 1.33 (–2.22 to 4.45)</td>
</tr>
</tbody>
</table>

Source: Trivedi and Wilson. Axial Length by Contact and Immersion Techniques in Children. (Table courtesy of Dr Rupal H. Trivedi, MSCR.)

"IOL power calculations are more variable in children... the surgeon must also take into account the expected growth of the eye."

"Aiming for emmetropia in childhood is likely to result in a large refractive error in the adult eye, which is likely to require a second surgery to exchange IOLs."

**Special contributor
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Dr Trivedi has no relevant financial disclosures."
Drug slows diabetic retinopathy, but delays may limit its effect

Long-term treatment with ranibizumab showed improvement in severity versus sham group

By Lynda Charters
Reviewed by Dr Michael S. Ip

The natural history of diabetic retinopathy (DR) changes with long-term intravitreal ranibizumab (Lucentis, Novartis, Basel, Switzerland) treatment in some eyes with diabetic macular oedema (DME). Severity of the DR regressed more in these eyes compared with sham-treated eyes.

There was also a lower likelihood of progression of the severity of DR, according to the 36-month results of the RISE and RIDE phase III trials.

The clinical unknowns, investigators sought to address in these trials that evaluated the severity of diabetic retinopathy with ranibizumab treatment, were:
- The long-term effects on the regression of DR.
- The long-term effects of ranibizumab on stopping the progression of DR severity.
- The baseline factors associated with development of proliferative DR in patients with DME.

In these clinical trials, patients were randomly assigned to sham treatment or either 0.3 mg or 0.5 mg ranibizumab, explained Dr Michael S. Ip, associate professor of ophthalmology, Department of Ophthalmology, University of Wisconsin, Madison, USA.

The treated patients received monthly injections to month 24. At that time, the treated patients continued treatment and those in the sham group crossed over to monthly 0.5 mg ranibizumab injections for the next 12 months.

Investigators evaluated severity of DR based on fundus photographs obtained at baseline and at 3, 6, 12, 18, 24, 30 and 36 months after ranibizumab treatment. Outcomes were two or greater and three or greater step changes (improvements) compared with baseline on the ETDRS severity scale.

Dr Ip recapped that the severity of DR was significantly more likely to improve in eyes treated with ranibizumab.

“Specifically, regarding the two or more step changes, 37.2% and 35.9% of patients treated with 0.3 mg and 0.5 mg of ranibizumab had improvements in DR severity. Regarding three or more step changes, the respective values were 13.2% and 14.5%.”

Progression over time

“These improvements were maintained to month 36,” Dr Ip continued. “In the original sham group that received 0.5 mg ranibizumab injections after crossover, there was some improvement in the retinopathy, although it did not reach the level of improvement seen in the patients initially treated with ranibizumab.”

At 36 months, regarding the two-step changes in the ranibizumab groups, 38.9% and 39.3%, respectively, of patients in the 0.3 and the 0.5 mg ranibizumab groups had improvements in the DR severity. Regarding the three-step changes, the respective values were 15.0% and 13.2%.

Investigators found that the severity of DR is significantly less likely to worsen in eyes treated with ranibizumab compared with the sham group.

There was also a slight reduction in progression in the sham-treated eyes that crossed over to active treatment. The halting of the progression in DR that was seen at 24 months continued to 36 months.

In the ranibizumab-treated groups, the baseline characteristic that may predict development of proliferative DR was — based on multiple covariate analysis — only capillary loss within the ETDRS grid. In the sham group, the severity of the DR and the presence or absence of subretinal fluid were associated with proliferative diabetic retinopathy.

“Ranibizumab-treated eyes with DME had greater regression of DR severity compared with the...”

In short...

The natural history of diabetic retinopathy is modified by long-term treatment with intravitreal ranibizumab, reports one ophthalmologist.
sham-treated eyes at 24 months that continued to 36 months,” Dr Ip said. “These eyes were less likely to have progression of severity of DR compared with sham-treated eyes at 24 months and the sham-treated eyes that crossed over to ranibizumab treatment at 36 months,” he added. “At 36 months, the risk of development of proliferative DR was about threefold greater in the sham-treated eyes compared with the ranibizumab-treated eyes.”

Results suggested that delaying ranibizumab may result in a reduced chance to improve the severity of the DR. However, it is unknown if delaying ranibizumab by less than 2 years would result in a similar loss of benefit, he explained.

“We speculated that the longer the delay, the greater the loss of effect of ranibizumab on the severity of DR,” Dr Ip said.

Though results were derived from large, randomized trials, the findings were derived from secondary and exploratory analyses, he cautioned. Investigators do not recommend using ranibizumab specifically or primarily to treat DR severity. Panretinal photocoagulation remains the primary treatment for advanced DR.

Regarding the finding that capillary loss was the factor in the ranibizumab-treated eyes that predicted the risk of progression to proliferative DR, assessing patients for capillary loss may be important to identify susceptible patients. Identification of other pathophysiologic mechanisms should be addressed in future trials, considering that some eyes still develop proliferative DR despite administration of chronic anti-vascular endothelial growth factor therapies, which suggested that other mechanisms may be involved.

Do you agree with these findings? www.oteurope.com/discuss

Special contributor
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Dr Ip is a consultant to Genentech.
Glaucoma is characterized by progressive optic nerve damage due to decreased blood flow or compression that results in functional impairment. According to the World Health Organization, glaucomatous optic neuropathy (GON) is the second leading cause of blindness worldwide, affecting approximately one in every 50 adults over age 40. Over 500,000 individuals suffer from glaucoma in the UK, and the disease accounts for 13% of those on the blind register in this region, making it the leading cause for preventable blindness in the UK.

The opportunity to intervene in the disease’s natural course by early detection and regular monitoring for progression has motivated a long history of efforts to improve the identification of glaucomatous structural changes. In most ophthalmic practices today, glaucoma is diagnosed and monitored with optic nerve photography and scanning ophthalmic laser imaging. Side-by-side review of optic nerve photographs is the current standard and most commonly applied technique for image review, yet its limitations include inconsistent interpretations leading to low interobserver reliability and a high rate of false positives.

Alternation flicker

Flicker is an image analysis technique in which baseline and follow-up images are aligned and rapidly alternated. Differences between photographs appear as movement and easily catch the viewer’s attention, thereby facilitating the efficient and sensitive detection of most forms of structural progression. Although early studies with flicker were promising, technological limitations prevented its incorporation into daily practice given the time needed to manually align the images and find a display source.

Automated alternation flicker (AAF) has made flicker’s application more practical by using an algorithm that automatically aligns and alternates optic nerve photos on any digital display. Thus, flicker can be readily viewed during a patient examination and potentially inform clinical management. AAF has been validated to provide a sensitive method for detecting features of glaucomatous structural progression.

Researcher Dr Brian L. VanderBeek published the high sensitivity of AAF for detecting peripapillary atrophy in *Glaucoma*, while also noting its advantages over traditional image review strategies.

“Alternation flicker demonstrated greater agreement and repeatability than side-by-side photographic comparison, the current clinical standard,” commented Dr VanderBeek.

AAF has also been shown to be effective in identifying risk factors for functional progression. A study by Dr Ru-Ik Chee and other researchers evaluating the agreement between flicker chronoscopy for structural glaucomatous progression and factors associated with progression found support for flicker’s validity.

“Reproducing the established association between age and progression supports the notion that flicker may be a valid tool to judge structural progression. Using flicker, an efficient and clinic-

**In short…**

Early detection and regular monitoring for progression in glaucoma intervention have been the motivation for a long history of efforts to improve the identification of structural changes. Currently, in most practices, it is still commonplace to use side-by-side review of optic nerve photographs; however, there are a number of limitations to this technique. Therefore, the authors have sought to expand the concept of automated alternation flicker to improve detection of glaucomatous optic neuropathy and highlight their findings in this article.
Subtraction mapping
We recently sought to expand the concept of AAF to improve detection of GON while eliminating the need for a digital display. To do this, we developed a novel image analysis technique through the auto-alignment and subtraction of serial optic nerve photos (ASSOP) in which a baseline optic nerve photo is subtracted from a follow-up image to produce a third image, the subtraction map (Figure 1). The subtraction map is a single static image highlighting only the differences between the two optic nerve photographs under assessment.

In our study, which was recently published in *Acta Ophthalmologica*, we measured the ability of a glaucoma specialist to detect features of structural progression (i.e., disc haemorrhage, peripapillary atrophy, neuroretinal rim loss, retinal nerve fibre layer degeneration) and parallax using ASSOP subtraction maps relative to AAF.4

“This pilot study shows that ASSOP is sensitive and specific in detecting glaucomatous progression.”

References

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None of the authors have any financial conflicts with the material presented within the manuscript. However, Dr Radcliffe has disclosed that he is a consultant and speaker for Reichert, Allergan, Alcon Laboratories, Carl Zeiss Meditec, and is a speaker for Merck Pharmaceuticals.

Do you currently use AAF?

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**Figure 1:** (A) Baseline, follow-up (B), and subtraction image (C), demonstrating neuroretinal rim loss in both the follow-up and subtraction images.

“Automated alternation flicker (AAF) has made flicker’s application more practical by using an algorithm that automatically aligns and alternates optic nerve photos on any digital display.”

ready tool, we have also reproduced [the association between older age and peripapillary atrophy], further supporting the validity of flicker chronoscopy,” wrote Dr Chee in the *American Journal of Ophthalmology*.3

This pilot study shows that ASSOP is sensitive and specific in tandem with flicker, though the clinical value of ASSOP remains to be validated.
Preservatives in glaucoma medications

By Professor Christophe Baudouin

Ocular surface disease (OSD) is common in glaucoma patients. Glaucoma is a long-term chronic disease and the main aim of the clinician is to lower the IOP and prevent progression. However, this can lead to patients taking an increasing number of eye drops over many years, and the long-term cumulative use of preserved topical medications increases the risk of OSD. Preservatives are essential in multidose topical glaucoma medications, to avoid microbial contamination. The most common and most studied is benzalkonium chloride (BAK); others include polyquaternium-1 (Polyquad), Purite and SofZia. They have potent antimicrobial properties, destroying the cell membranes of micro-organisms, but they may also affect the membranes of normal ocular cells.

What should the ophthalmologist do?
The following practical guidance outlines how the clinician can both recognize and respond to OSD in their glaucoma patient. If the OSD is due to the preservatives in the medication and the right steps are taken, it is usually reversible and easily managed.

1. Which patients are at risk?
Evidence has shown that risk for OSD increases with the duration of treatment (years) and number of medications taken. A clinical study on prevalence and risk factors for OSD among patients treated over the long-term for glaucoma or ocular hypertension, found that mild and moderate to severe OSD was present in 30% and 21% of the patients, respectively. The key predictors for OSD include the following:
   - **Number of different medications**: the risk of significant OSD increases with rising number of anti-glaucoma medications (Figure 1).
   - **Duration of treatment**: an eye drop tolerated for months or years may still have delayed side effects, which may become apparent only with careful and continuous monitoring of the patient.
   - **Pre-existing OSD**: patients who already have OSD may be particularly sensitive to preservatives, worsening their symptoms.

"Preservatives are essential in multidose topical glaucoma medications, to avoid microbial contamination."

**Figure 1: Severity of OSD by daily therapy, data from reference 3.**

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Group A (no OSD)</th>
<th>Group B (mild OSD)</th>
<th>Group C (moderate to severe OSD)</th>
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<tr>
<td>Monotherapy</td>
<td>62</td>
<td>46</td>
<td>29</td>
</tr>
<tr>
<td>Bi-therapy</td>
<td>25</td>
<td>31</td>
<td>33</td>
</tr>
<tr>
<td>Tri-therapy</td>
<td></td>
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</tbody>
</table>

p < 0.0001 for difference between therapy groups

**In short...**
There has been much discussion regarding preservatives in glaucoma medications. Preservatives are an important component of topical multidose glaucoma medications. However, many glaucoma patients have symptoms of ocular surface disease (OSD), which can affect quality of life, treatment adherence and surgical outcomes. In this article, Prof. Baudouin offers straightforward steps to assess OSD and identify the patients most at risk. Practical guidance is given regarding the appropriate treatment when OSD is suspected. The physician should consider switching to a preservative-free or fixed-combination treatment to reduce preservative exposure in these patients, rather than immediately adding an artificial tear or other medication.
2. Is OSD easily spotted?
Yes. Recognizing the signs and symptoms of OSD should be a routine part of clinical practice, and requires little extra time or effort on the part of the clinician.
• Patients should be asked about any symptoms they may have experienced relating to ocular discomfort during the entire course of the day (not just when instilling medication), including the timing and circumstances.
• A simple visual evaluation of the ocular surface and eyelid is usually sufficient to detect blepharitis, rosacea or contact eczema (Figure 2).

“Ophthalmologists should consider initiating PF treatment in any patient presenting with glaucoma who already has signs of OSD, such as allergy, dryness, rosacea or meibomitis.”

• Fluorescein staining followed by slit-lamp examination of the cornea and conjunctiva is often useful, to assess tissue damage and evaluate tear film stability by evaluating tear film break-up time (TBUT) (Figure 3).

3. How can exposure to preservatives be reduced, particularly when the patient needs multiple drops?
To reduce the frequency and severity of OSD in patients with glaucoma, a simple and effective step is to reduce ocular exposure to preservatives. This can be done by:
• Switching to a fixed-combination medication, thereby decreasing the number of eye drops required daily.
• Switching to preservative-free (PF) eye drops.
• Switching to a PF fixed-combination formulation.

Where a patient has signs of OSD or is on multiple medications, PF medications should be considered. The ophthalmologist needs to choose the most effective therapy that will both reduce IOP and maintain treatment adherence.

5. Is OSD reversible?
Yes. OSD resulting from glaucoma treatments is often reversible if the symptoms are mild or moderate, sometimes within a few weeks. Time and effort spent investigating OSD will be well invested, particularly when patients are undergoing long-term treatment with eye drops containing preservatives. Effective management of OSD improves patients’ quality of life as well as their ocular health, and is an essential part of caring for patients with glaucoma.

Implications for glaucoma care
Ophthalmologists often adopt an ‘additive strategy’, whereby a new treatment is introduced according to each new symptom, for example artificial tears for dry eye disease and antihistamine eye drops for allergies. However, in my clinical experience this practice is rarely effective, because the side effects of one treatment are seldom counteracted by the addition of another.

I recommend instead that a ‘subtraction strategy’ is adopted. Outcomes are generally better when the medication responsible
for the side effects is discontinued and a different treatment is adopted. This approach should be employed even though identifying which treatment is causing the symptoms of OSD can sometimes be challenging. If switching medications proves to be ineffective and symptoms become severe, consider stopping medical treatment in favour of surgery or selective laser trabeculoplasty, although many surgical patients will still subsequently require medication to meet their target IOP.

Primary glaucoma is a lifelong condition, it is vital that ophthalmologists do not focus solely on the risk of blindness, but also be alert to the possibility of OSD. Approximately 40% of glaucoma patients report changing their topical treatment because of ocular surface issues. By taking these simple practical steps, the ophthalmologist can dramatically improve their patient’s quality of life, adherence to therapy and clinical outcomes.

References

Do you follow similar steps in your practice?

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Author
Professor Christophe Baudouin is a professor of ophthalmology at Centre Hospitalier National d’Ophthalmologie des Quinze-Vingts, Paris, France. He is also the director of an INSERM research group dedicated to ophthalmology at the Vision Institute, University Pierre et Marie Curie, Paris, vice-president of the French Glaucoma Society and general secretary of the French Society of Ophthalmology, and a member of the American Ophthalmology Society and the Academia Ophthalmologica Internationalis. He was one of the first to report on the adverse effects of preservatives on the ocular surface. Professor Baudouin may be reached by E-mail: baudouin@quinze-vingts.fr

Prof. Baudouin has indicated that he is a consultant for and receives research grants from Alcon, Allergan, Santen and Théa.
Longitudinal versus torsional phaco

New technologies offer better patient recovery outcomes, becoming more preferred option

Most ophthalmic surgeons would likely agree that newer refractive surgical platforms offer improvements over older alternatives. However, comparing two different new platforms can be more difficult, according to Dr Wilson Takashi Hida, PhD.

“Most studies in our field compare new technology from one manufacturer against prior generations of technology from that same instrument maker,” said Dr Hida, medical director and chief of cataract sector of Brasilia Ophthalmology Hospital in Brasilia, Brazil. “When it comes to torsional and transversal technologies, there were a lot of studies that began around 2010 and they all reached the same conclusion: It is a better technology. But they all looked at machines from a single manufacturer. They were all looking at newer technology so of course it should be better than what came before.

“It is more difficult to compare different technologies in a real-world setting,” he continued.

Comparing, contrasting

Traditional longitudinal phaco used a jackhammer-like in and out motion for phacoemulsification. Bioengineers eventually realized that half the energy used in traditional longitudinal motion is wasted because material is only broken up when the tip moves forward. When the tip moves backward between cuts, it only generates more energy and more heat that can damage the eye.

Bausch + Lomb introduced a more efficient longitudinal platform (Stellaris Vision Enhancement System) which cuts using an elliptical lateral motion. Power modulation and pulse shaping are combined to optimize longitudinal ultrasound energy delivery.

Alcon Laboratories introduced the Infiniti Vision System, which adds torsional technology, called OZiL, to cut lens material using circular oscillations similar to turning a doorknob.

However, the motion of the phaco tip is just one of several variables that can affect procedural complications and outcomes.

Power output is important, Dr Hida noted, because lower energy output generally translates into less collateral damage to the corneal endothelium. Balanced fluidics keep the eye inflated, build and maintain currents that bring cataract fragments to the phaco tip, and help keep the tip cool to prevent thermal injury to the eye.

Fluidics are affected by vacuum, which is a function of the type of pump used and tubing size. Microincisions require micro tubing, but micro tubing requires more vacuum, which creates difficulties in managing fluidics.

Both platforms produced similarly good clinical results, but the Infiniti platform showed lower fluid use and shorter operative times, particularly for patients with hard cataracts.

“I use both machines on a regular basis, so there was no learning curve to affect the results of this comparison,” Dr Hida said. “Four hundred consecutive and routine cataract patients were prospectively (randomly assigned) to either the Stellaris or the Infiniti platform. Our goal was to compare the clinical and the intraoperative parameters using the same bevel-down technique with both instruments in a real-world population of real patients.”

Investigating further

The Stellaris system uses longitudinal ultrasound, a venturi pump, pulsed energy modulation energy via a straight microtip with a 150-µm stroke and a 1.8- to 2.4-mm incision. The Infiniti system uses torsional ultrasound, a peristaltic pump, pulsed energy modulation via a Kelman microtip with a 100-µm stroke and a 2.2- to 2.4-mm incision. The same technique was used for all eyes, including the same

In short...

Several new refractive surgical platforms have been introduced recently and many ophthalmologists are discovering they find the new technologies to be more efficient and produce better results.
ultrasound pulse rate and fluidic settings.

There were no statistically significant differences in patient age or in nuclear density by either LOCS III or Pentacam PNS assessment.

The Stellaris used significantly less total ultrasound time compared with the Infiniti, Dr Hida found, but the total case time was significantly shorter with the Infiniti system. Infiniti also showed significantly less fluid use per patient.

Despite the differences in intraoperative parameters, there were no statistically significant differences in corrected visual acuity between the two groups at 3 months after surgery. There was also no difference between the two patient groups in central cornea thickness or endothelial cell loss.

“Both machines are very good,” Dr Hida said. “It is not just this study that shows these platforms are an improvement over older technologies. In terms of clinical results, you can use either machine and produce very good results. For patients, visual recovery after surgery is what is important and both machines did very well.”

Dr Hida added that he is equally comfortable using either the Stellaris or Infiniti platforms.

He explained that some surgeons have preferences for one technology over another based on differences in their own experience and technique, but clinical outcomes are similarly high regardless of which instrument is used.

From a workflow perspective, Infiniti offers improved case time, which can boost patient throughput, and reduced fluid use, which might have an economic impact, Dr Hida explained.

“Some of my colleagues like one machine over another and some don’t care,” he said. “What we all agree on is that new technology is changing clinical outcomes for the better.”

Dr Hida receives research fees from Abbott Medical Optics, Alcon Laboratories and Bausch + Lomb, but no fees were received for this study.
Meeting preview: Vision UK 2014

12 June 2014, QEII conference centre, London, UK

This year, the Vision UK 2014 conference will be held on Thursday 12 June at the Queen Elizabeth II conference centre in London, UK. Attendees can look forward to key opinion leaders discussing the UK Vision Strategy and emphasizing the initiatives that need to be implemented across the UK.

“The conference is about bringing together examples of best practice,” said Anita Lightstone, chief operations officer of VISION 2020 UK and UK Vision Strategy programme director. “Plus, we have some absolute keynote speakers, the leaders in the field, to take forward and bring new ideas so it’s about the basis to make things better for the future.”

Quite a special year
“This year is quite special, as last year we re-launched the strategy for the period 2013–2018,” continued Ms Lightstone. “This is building on what we have done before, looking at where the new priorities are coming and they seem to be mainly about the need for really good research to underlie everything we do. Also, more emphasis on children and young people, they have very different needs to the older population. Finally, we will be looking at emotional support and rehabilitation.”

Nick Astbury, chairman of VISION 2020 UK, is actively involved with the development of the UK Vision Strategy and will be introducing this year’s conference. “Topics will include the importance of working collaboratively, sight loss prevention, how to reach the most vulnerable groups, innovative approaches to eye care delivery, emotional support, the latest developments in travel and transport and building successful careers,” he said.

To implement and address the priorities of the strategy, the programme this year has been separated into morning and afternoon sessions. Following the welcome reception and keynote address will be the ‘Morning streams’, which comprise four different areas of focus and will be mainly about examples of good practice followed by discussion.

Morning programme

Stream One: Making the Strategy happen
In this session three leading experts will discuss how they have worked collaboratively to put the UK Vision Strategy 2013–2018 into action.

Stream Two: The emotional impact of vision impairment
This session will examine the latest research and projects looking at the impact of sight loss.

Stream Three: Advances in travel and transport
Chaired by Chris Lewis, leading technology expert and chair of the Vision 2020 UK Technology for Life Group, this will look at the latest developments in travel and transport.

Stream Four: Oral Presentations from poster presenters
“As research is so much more important than it was, we’ve added this last session,” confirmed Ms Lightstone. This new session will give poster authors the opportunity to present their studies in quick-fire 10 minute oral presentations.

It will be chaired by Richard Wormald, FRCoophth Consultant, Moorfields Eye Hospital, London, UK, who commented, “This is the first year we’ve included oral presentation as part of the conference. We’ll be showcasing some of the amazing work being done...”
across the sectors across the UK in implementing the UK Vision Strategy. Delegates will get the chance to ask questions of the presenters to get a more in depth understanding of their work.

Afternoon programme
“The afternoon will be broken down into even more specific masterclasses,” explained Ms Lightstone. The six masterclasses will each look at specific avenues of how the UK Vision Strategy will be implemented. Separated into three outcomes, including two masterclasses each, attendees can expect informative presentations from key speakers and will have the opportunity to discuss initiatives and projects afterwards.

“The Masterclasses will ensure that delegates can engage with what is most relevant to them. It should be a very enjoyable and productive conference and a chance for delegates to meet each other and share experiences,” explained Mr Astbury.

“These really are about two-way learning, debate and examples coming forward,” added Ms Lightstone.

Outcome One
Masterclass A: Prevention of sight loss
This session will look at initiatives that are aimed at improving eye health and preventing sight loss.

“The provision of eye care in England is facing many challenges. In 2011/12, there were 23,616 people certified as having a visual impairment or severe visual impairment in England. Many of these case of sight loss were potentially preventable,” explained Professor Darren Shickle, professor of public health at the University of Leeds, UK, who will be one of the speakers during this masterclass. “The Vision UK 2014 conference will give us the opportunity to discuss the barriers to a fully engaged prevention pathway for eye health and changes that may be needed to reduce preventable sight loss in the future.”

Masterclass B: Reaching the hard to reach groups in eye care
In this session, speakers will discuss how patients with limited access to preventative eye care services can be reached, as these vulnerable patients can be often at most risk of sight loss.

Outcome Two
Masterclass C: New approaches to delivering eye care
Byron Pawinska, chief executive of The College of Optometrists and Trustee of VISION 2020 UK, will chair this masterclass, exploring innovative approaches to delivering eye care in the UK.

Masterclass D: The future of rehabilitation
This masterclass will examine key opportunities and challenges in rehabilitation and will look at the tools being developed to address the challenges.

Outcome Three
Masterclass E: Excellence in recruitment
In this session, best practices will be presented, which will highlight how leading businesses in the UK have enabled blind and partially sighted patients to build careers.

Masterclass F: Implementing the children and young people’s pathway
Sponsored by the National Blind Children’s Society, this session will feature best practice examples of how the UK children and young people’s pathway is being implemented throughout the UK.

First class services
After the sessions have closed, there will be the chance for peers to network and discuss the day’s topics as well as see the poster presentations be awarded. To round off the day, a ‘Question Time Panel’ will take place, to be chaired by BBC Radio 4’s chief political correspondent, Gary O’Donoghue.

“UK Vision Strategy is uniting framework for the sector, bringing together and emphasizing the priorities that need to change to get us first class eye health and sight loss services right across the UK,” stated Ms Lightstone. “So, it’s going to be a really good conference.”

“I am confident delegates will find the Vision UK 2014 conference practical, stimulating and inspiring as we look at putting the refreshed UK Vision Strategy into action,” concluded Mr Astbury.
Prevalence of ‘floppy eyelid’ syndrome among employed people

A relatively rare condition that may be detected with a focused eye exam

By Dr Milena Sredkova

The term ‘floppy eyelid’ was first used in 1981 by Culbertson and Ostler to describe 11 obese male patients with lax and easily everted upper eyelids, papillary conjunctivitis and chronic eye inflammation. Later Van den Bosch and Lemij added the term ‘lax eyelid’, including the non-obese patients with upper and lower lid laxity and dystopia of the lateral and medial canthus, ptosis, ectropion, chronic irritation of the ocular surface.\textsuperscript{1–3} Currently, the two terms are combined, and the patient’s profile is wider.

It is known that the disease affects predominantly obese men in the age group between 49–60 years, but so far there is no data on the distribution by gender or race. The only information in the literature is based on the studies of the incidence of the syndrome in patients with obstructive sleep apnoea. Karger et al. reported a relatively low frequency: 2.3% in patients with sleep apnoea, McNab identified three patients with FES among 20 OSA patients, while Chambe and co-workers described 25.8% incidence among 127 patients with OSA.\textsuperscript{4–6}

As a result of the limited amount of data currently available, a study was created to find the prevalence of the ‘floppy eyelid’ syndrome (FES) among a group of working people in the age range between 25–75 years. Here, I will present the details and outcomes of this study.

Materials and methods

For the purpose of the study two ophthalmologists examined 312 patients, referred for annual preventive eye examination, provided by the employer in accordance with Occupational Health Service requirements, between January and June 2012. The examinations were done in the outpatient department of the University Eye Hospital ‘Prof. Pashev’, Sofia, Bulgaria, and Outpatient Clinic ‘Denitza’ Montana, Bulgaria.

All patients underwent complete eye examination with particular attention to the eyelids and periorcular area. The suspect sign was the presence of ptosis and irregular course of the eyelashes. All patients positive for this sign, regardless of whether it was unilateral or bilateral, underwent a vertical traction test of the eyelid (in accordance with description of McNab), followed by slit-lamp examination to establish papillary conjunctivitis (Figure 1).

In cases with test values above 12 mm, easily everted eyelids and papillary conjunctivitis affecting

In short...

‘Floppy eyelid’ syndrome (FES) includes the triad: lax and easily everted eyelids, papillary conjunctivitis and chronic eye irritation. Although the ‘typical’ patient is middle aged, obese males with sleep apnoea, the disease is observed in women and children as well. The incidence of the syndrome has not yet been established. Researchers use indirect data based on the frequency of sleep apnoea in the general population. In this article, the author discusses a recent study determining the frequency of FES among patients of an active working age range.
Results
The aim of the study was to identify disease in patients without complaints. For this reason we formed a target age group from the working people, who are subject to annual preventive eye examinations provided by the employer. The distribution of people by workplace is presented in Table 1.

Demographic data is presented in Table 2. As it is shown, the average age of the study group is 47 years, including 177 males (56.73%) with an average age of 48.29 years and 135 female patients (43.27%), mean age 45.05 years.

According to the complaints patients were grouped into those:
- without complaints;
- with blurred vision (for glasses prescription);
- with burning and/or redness of the eyes.
Regardless of complaints, all the patients had been examined by an ophthalmologist during the previous 12 months.

We found ‘floppy eyelid’ in 14 patients, representing 4.49% of the entire group, of these 13 were male, (7.34% from the male group) and one was female (0.74% from the female group). The average age was 50.71 ±2.9 years (Chart 2).

In the group of the patients with ‘floppy eyelid’, 7 patients (50%) complained of blurred vision for near, 4 (28.57%) had no complaints, and 3 (21.4%) had irritation and/or redness at the moment of check-up. Among patients without ‘floppy eyelid’, 19.5% were without complaints, 26.2% had complaints of irritation and redness and 71.1% experienced blurry vision.

We compared patients with complaints in the ‘floppy eyelid’ group and in the group without floppy eyelid and found out that there was no statistically significant correlation between the complaints of irritation and redness and the presence of floppy eyelid. We found also no association between complaints of blurred vision and the presence of floppy eyelid.

There was difference only in patient’s group ‘without complaints’. We found in this group a statistically significant difference between patients with and without floppy eyelid, with coefficient F = 22.467 and a level of significance p <0.0001 (Table 3).

Discussion
There are no currently published studies in the literature on the incidence of FES. The only available data derives from studies for the incidence of the disease among patients with sleep apnoea. If we accept the assertions of the most researchers that more than 90% of patients with sleep apnoea have sleep apnoea, the frequency of this eye condition can be assessed indirectly by the frequency of sleep apnoea in the population. However, in this case the early, asymptomatic stages will probably be ommited.6–10

Probably, the reason for this incomplete data on the incidence of the disease is that the diagnosis is often missed or made after a long...
period of non-specific complaints. Another reason is the lack of consensus on the definition of the syndrome and recognized by all authors diagnostic criteria. From various publications it is known that the disease is often omitted due to nonspecific signs of ocular inflammation that mimic ‘chronic conjunctivitis’, or dry eye accompanied by blepharitis. As a result, a proportion of patients remain undiagnosed for a long period of time. In another group of patients the leading complaint of ‘eyelid drooping’, is often diagnosed incorrectly as ptosis of the eyelids.

Moreover, the patients in the early stages of ‘floppy eyelid’ have no serious complaints and are not referred to an ophthalmologist.

The main objective of this study was to find patients with floppy eyelids who are not yet diagnosed. We used the opportunity of the annual check-ups provided by employers to identify disease in the age group between 20 and 65 years — the group of actively working people (Table 2, results).

As shown in Table 1 (see results), the group is formed of people with different professions and different professional routines.

In the analysed group of patients the predominant gender is male (56.73%). This may affect our results because the floppy eyelid syndrome occurs more frequently in men. Therefore, we cannot implement the results from the incidence of the syndrome to a larger population or the general population.

### Table 2: Age distribution of patients.

<table>
<thead>
<tr>
<th>Patients</th>
<th>Valid</th>
<th>312</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>47.01</td>
<td></td>
</tr>
<tr>
<td>Std error of mean</td>
<td>0.655</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>46.00</td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Std deviation</td>
<td>11.571</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3: Analysis of the null hypothesis of a dependency between the indicator ‘no complaints’ and the presence of ‘floppy eyelid’.

<table>
<thead>
<tr>
<th>Sum of squares</th>
<th>Dif</th>
<th>Mean square</th>
<th>F</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>3.601</td>
<td>1</td>
<td>3.601</td>
<td>22.467</td>
</tr>
<tr>
<td>Within groups</td>
<td>49.531</td>
<td>309</td>
<td>0.160</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>53.132</td>
<td>310</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Despite these considerations, we can argue that after focused eye examination the ‘floppy eyelid’ can be detected before the complaints associated with the syndrome appear. We believe that our data on the incidence of the syndrome in the group of the employed people is reliable and was found to be 4.49% of the entire study group (7.34% male and 0.74% female). Our results are comparable to the previously published data in the literature that used indirect diagnosis.

Due to the small number of patients with FES in the group, we did not make an additional statistical dependency analysis between demographic, other indicators and ‘floppy eyelid’ factor. Such analyses can be made in larger surveys.

### Conclusion

FES is a relatively rare, often undiagnosed condition in patients with non-specific complaints. The importance of careful examination of lids and the periorcular area in the complex of the eye exam should not be underestimated. As a result of the reported high prevalence of sleep apnoea in patients with FES, it is important to recommend routine screening for symptoms of sleep apnoea to every newly diagnosed FES patient.

### References


### Further reading


**Do you encounter FES regularly?**

[www.oteurope.com/discuss](http://www.oteurope.com/discuss)

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Dr Sredkova has no financial interest in the subject matter.
**Objective screening**

Bausch + Lomb Technolas has announced that its SCORE Analyzer for the objective screening of the risk of corneal ectasia has received the CE mark in the European Union. This refractive surgery tool allows for the accurate and objective evaluation of early stage keratoconus.

The SCORE software algorithm was developed by Drs Damien Gatinel and Alain Saad (Rothschild Foundation, Paris, France), who had compared data for corneas with no risk of ectasia against data for a group of early subclinical keratoconus eyes with significant keratoconus in the contralateral eye. This algorithm is designed to use data from the ORBSCAN IIZ topographer. When examining a patient once using the topographer the software automatically associates the placido-based keratometric map, anterior and posterior corneal elevation and corneal thickness profile into one single value or SCORE.

Dr Gatinel commented, “The SCORE Analyzer helps the surgeon to decide whether LASIK or PRK surgery might be contraindicated, This new diagnostic tool will provide additional reassurance for both surgeons and patients.”

Visit [www.technolaspv.com](http://www.technolaspv.com) for more information.

**Portable exam tool**

Available from Volk is an electronic handheld ocular measurement device, Eye Check, which aids in the diagnosis of ophthalmic abnormalities.

The company states that the tool helps practitioners screen, diagnose and document ocular characteristics for contact lens fitting and general diagnostic purposes, through its ability to perform key measurements, such as pupil diameter, margin reflex distance and strabismus angle.

Additionally, it features an intuitive user interface that is reportedly easy to navigate by physicians and support staff, allowing for easy integration into practices. The real-time, accurate and objective results enable quick decisions to be made and can be output to electronic records management systems over WiFi.

Furthermore, the device can assist in the rapid identification of patients that are candidates for speciality lenses and, the company claims, reduce practice drop out rates.

More information is available on the company’s website [www.volk.com](http://www.volk.com).

**Laser for posterior segment**

Geuder has released a new laser system for the posterior segment, the endoTRON532.

This laser operates at 532 nm and provides a maximum output power of 1500 mW. According to the company, its coagulation performance results in a homogeneous, sharp-edged coagulation spot.

It is available as a standalone system of can be fully integrated into the GUI of the megaTRON S4 for up to 12,000 cpm in vitrectomy mode. When combined, an optimized touch screen for parameterization is offered. Additionally, a new footswitch allows the user to control both devices.

Furthermore, a wide range of single-use laser probes in 20, 23 or 25 G are available from the Uno Colorline product line and curved laser probes suitable for trocar-supported PPV are also available.

Further details can be found on the company’s website [www.geuder.de](http://www.geuder.de).

**Collaborative technologies**

Leica Microsystems and TrueVision 3D Surgical have expanded their partnership to fuse 3D technology into an entire line of ophthalmic microscopes.

This partnership, combining optical and digital microscopy into one platform, is aimed at driving precise patients outcomes, enhancing surgeon ergonomics and facilitating OR staff communication.

Dr Heinrich Dreyer, vice president of Leica Microsystems, Medical Division, said, “The partnership leverages Leica Microsystems’ ‘open architecture’ and world-class optical, ergonomic microscopes and TrueVision’s cutting edge visualization platform and suite of software applications. This integration creates a seamless, upgradeable platform that will help surgeons gain a more realistic perception of anatomical structures as a result of the depth perceived in 3D.”

More details can be found by visiting [www.leica-microsystems.com](http://www.leica-microsystems.com).
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The implantation of the EX-PRESS® Glaucoma Filtration Device is contraindicated if one or more of the following conditions exist:

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- Pre-existing ocular or systemic pathology that, in the opinion of the surgeon, is likely to cause postoperative complications following implantation of the device.
- Patient diagnosed with angle closure glaucoma.

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The implanting surgeon should be familiar with the instructions for use. The integrity of the package of the EDS and the EX-PRESS® Glaucoma Filtration Device should be examined. If the package is opened but not used, the device should be returned to the manufacturer for exchange. The EX-PRESS® Glaucoma Filtration Device and EDS should not be used if sterility or performance is subject to compromise. The detent button of the EDS should not be pressed until implantation, since it is for single use only. MRI of the head is permitted, however not recommended, in the first two weeks post-implantation. The EX-PRESS® Glaucoma Filtration Device should not be implanted in eyes with very thin conjunctiva because of a potential risk of conjunctival erosion.

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