



Education
FORUM

Supplement
Dec/Jan 2023

INDIVIDUALIZING

PATIENT
OUTCOMES

FOR PRESBYOPIA CORRECTING IOLS



ESCRS Clinical Trends in Presbyopia Correction

Review of 2021 ESCRS Clinical Survey Data

BY THOMAS KOHNEN, MD, PHD, FEBO

Over the past six years, the European Society of Cataract and Refractive Surgeons (ESCRS) has collected data via the Clinical Trends Survey to understand the baseline trends and shifts in the treatment of refractive surgery patients. With over 150 questions and 1500 responses from delegates in 2021, we gained valuable insights into how presbyopia and toric intraocular lens (IOL) correction are managed among delegates. Year-over-year comparisons help us better understand how clinical trends evolve.

Presbyopia-Correction

According to delegate responses, there has been a 4%-point increase in presbyopia-correcting IOLs in the last six years. An 8%-point increase has been observed between 2019 and 2021 for extended depth of focus IOLs, and enhanced monofocal IOLs now account for 11%. Trifocal and bifocal IOLs decreased by 11% and 9%, respectively (Fig. 1). This decrease may be due to the consensus that trifocal (6.4%) and bifocal (5.3%) presbyopia-correcting IOLs are more likely to have functionally significant visual aberrations at night, even if the patient has a healthy ocular surface and no residual refractive error.¹

“ Year-over-year comparisons help us better understand how clinical trends evolve. ”

Astigmatism Correction

An 8%-point increase in cataract procedures involving toric IOLs has been observed between 2016 and 2021. For patients with 0.75D, surgeons tend to perform on-axis incision correction, while most patients with astigmatism > 0.75D are corrected with toric IOL, with the likelihood of using a toric IOL increasing with higher astigmatism power.

Optical biometry is still the most often used primary preoperative measurement, but a growing number of delegates are using tomography (Scheimpflug). The most common method for aligning the intended axis of placement of a toric IOL was ink marking with manual axial instruments. Other responses included digital image registration and ink marking at slit lamp without using any additional instruments. These responses are somewhat unexpected and match, to some extent, that 46% of respondents believe that >5 degrees of postoperative rotational error are acceptable before visual quality and visual acuity are significantly affected. It will be interesting to see how this will change over the next few years as we continue our education efforts.¹

A peer-reviewed publication based on the ESCRS Clinical Trend Survey is currently underway. This publication aims to analyze the multi-year survey data to provide further insights into how delegates manage their cataract patients and other therapeutic areas such as ocular surface and glaucoma.

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TYPES OF IOLs: PRESBYOPIA CORRECTION

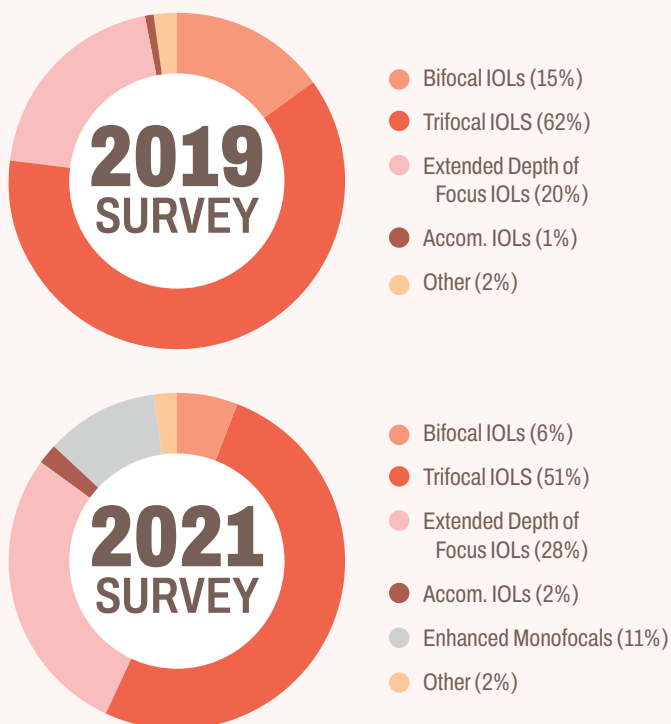


FIGURE 1. CHANGES IN PRESBYOPIA IOL CORRECTION AMONG ESCRS DELEGATES 2019-2021¹

The Importance of Functional Vision in Cataract Surgery

Addressing Intermediate Vision Correction and Dysphotopsia
BY FILOMENA RIBEIRO, MD, PHD, FEBO

Uncorrected presbyopia can have a significant impact on a patient's quality of life¹. Presbyopia should be seen as a chronic dysfunction. A study by Bekibebe & Gureje (2008) revealed that visual impairment had a high impact on quality of life, including physical, psychological, social, and environmental factors. Globally near vision problems had an even stronger impact on patient's quality of life when compared with distance vision². Further, lifestyles have changed, and the average cataract patient spends 5.5 to 7.5 hours on leisure activities and performs tasks at several working distances. Visual acuity and visual function are directly correlated. If a patient's visual disability is improved post-surgery but the visual function is still poor, it greatly impacts their quality of life.³

Consider a patient's activity limitation instead of poor visual acuity as the threshold for performing surgery. Use tools like the Catquest-9SF questionnaire to assess the impact of quality of vision on patients' quality of life. The questionnaire includes items relevant to cataract patients, including "walking on uneven surfaces" and near vision for near activities. Preservation of functional capacity should be the main indicator and goal of cataract surgery.³

Characterization of daily visual habits of cataract surgery candidates reveals the importance of intermediate vision for daily tasks.¹ The 2021 ESCRS Clinical Trends Survey indicates that pseudophakic patients were least satisfied with intermediate vision with monovision (18%) and presbyopia IOL (34%)

“ Preservation of functional capacity should be the main indicator and goal of cataract surgery. ”

correction (Fig. 2).⁴ Now that we understand the importance of functional vision, it is key to match the patient to the right IOL. Despite the relevance of the visual requirements of patients for the selection and implantation of presbyopia-correcting IOLs, few studies have been conducted on this issue.^{1,3}

Since presbyopia-correcting IOLs have the least patient satisfaction in intermediate vision, it is important to address that. The performance and optical design of a multifocal IOL are directly related to the range of functional vision that the lens can provide. This range allows patients to perform their daily activities at different distances. Still, it is important to recognize that each patient's visual needs vary, including vision at various distances they need functional vision and illumination conditions.^{1,3,4}

The study by Ribeiro et al. (2022) on the characterization of daily visual habits of cataract refractive surgery candidates revealed the mean percentages of time dedicated to distance, intermediate, and near vision. It also showed average times performing activities under photopic, mesopic, and scotopic conditions. On average patients spent 18.98% of their time using digital screens (Fig. 3).¹

PERCENTAGE OF PATIENTS “VERY SATISFIED”

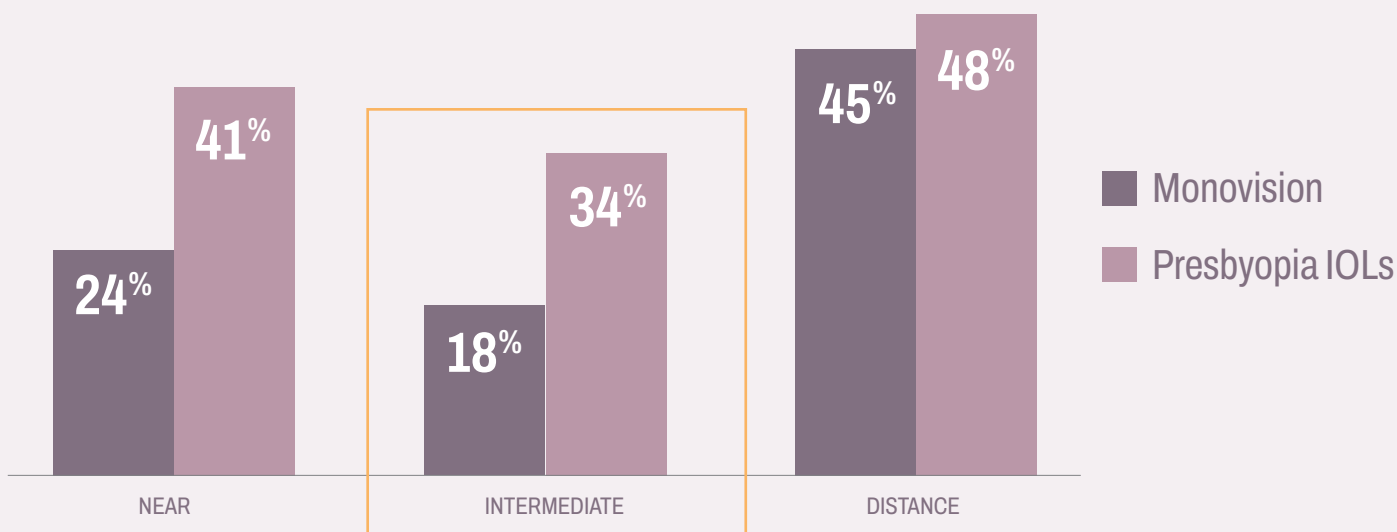


FIGURE 2. PERCENTAGE OF MONOVISION AND PRESBYOPIA IOL PATIENTS “VERY SATISFIED” WITH NEAR, INTERMEDIATE, AND DISTANCE VISION⁴

53% of ESCRS delegates believe that nighttime quality of vision is a concern for not performing more presbyopia-correcting IOL procedures.⁴ Indeed, this is a valid worry as there are many factors that contribute to dysphotopsia. 49% of patients who undergo cataract surgery will experience dysphotopsia, with 19.5% as early as 1-day post-op. Dysphotopsia can be characterized as positive and negative. Positive dysphotopsia is induced by an external light source and is characterized by halos, flashes, rings, and arcs. There have been many IOL design changes over the years to mitigate this phenomenon, but no design has been able to specifically eliminate it.⁵

“ 53% of ESCRS delegates believe that nighttime quality of vision is a concern for not performing more presbyopia-correcting IOL procedures. ”

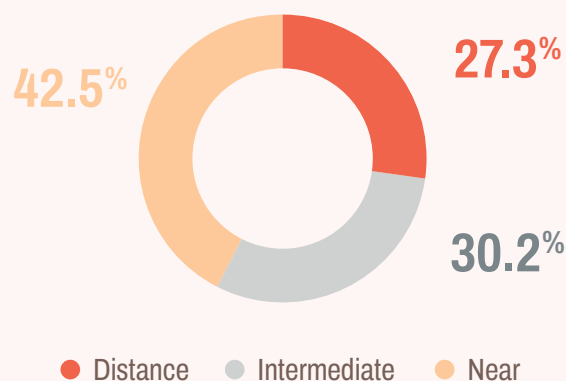
Negative dysphotopsia has numerous causes and appears as a dark shadow in the temporal visual field. It has an incidence of 15-20% post-operatively; however, due to several factors, including neuroadaptation, the incidence drops to 3% after one year. If needed, negative dysphotopsia can be reduced with reverse (anterior) optic capture, sulcus IOL placement, piggyback IOLs, Nd: YAG laser treatment, and capsulectomy. The most important step you can take to mitigate this issue is by better educating your patients, which will increase their awareness of these phenomena and will reduce unnecessary worry and complaints.⁵⁻⁶

Addressing functional vision and dysphotopsia concerns result in a happier cataract patient population. Combining conventional methods for visual assessment along with tools to measure the impact of visual dysfunction on a patient's quality of life is key. This allows the clinician to provide better recommendations tailored to a patient's daily living activities.³

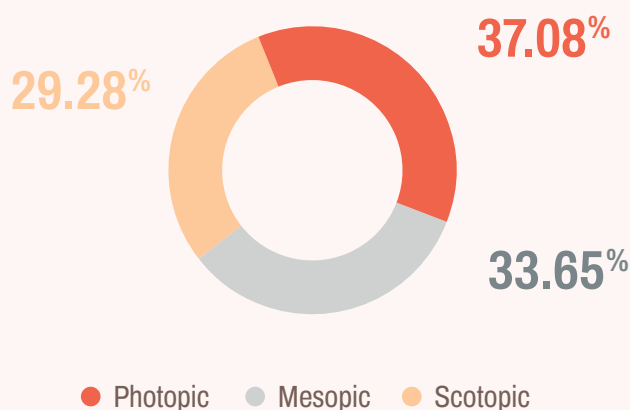
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MEAN PERCENTAGES OF TIME DEDICATED TO DISTANCE, INTERMEDIATE, AND NEAR VISION



MEAN PERCENTAGES OF TIME PERFORMING ACTIVITIES UNDER PHOTOPIC, MESOPIC, AND SCOTOPIC CONDITIONS



MEAN PERCENTAGES OF TIME WITH DIGITAL SCREENS WAS 18.98% (SD: 10.48; MEDIAN: 19.00%; RANGE: 2% TO 48%).

FIGURE 3. CHARACTERIZATION OF DAILY VISUAL HABITS OF CATARACT REFRACTIVE SURGERY CANDIDATES RESULTS¹

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Cataract Surgery Pearls

Matching advanced IOL technology to the presbyopia patient needs

BY RUDY NUIJTS, MD, PHD

Patient selection for advanced IOL technology is very important. Many presbyopia-correcting IOL designs are available, including monofocal plus, extended depth of focus (EDOF), extended range of vision (ERV), multifocal diffractive hybrid, and trifocal lenses. During a cataract surgery consultation, address the patient's visual needs and lifestyle and determine if the patient wants reduced spectacle dependence for near and intermediate distances after surgery.¹ When making recommendations, consider the reading and intermediate vision performance and the patient's willingness to tolerate increased glare and halos in exchange for reduced spectacle dependence.² Ensure that the patient understands that laser vision correction may be needed.

“...consider the reading and intermediate vision performance and the patient's willingness to tolerate increased glare and halos in exchange for reduced spectacle dependence.”

When selecting a lens for the patient, the ocular health, the type and amount of corneal astigmatism, and other comorbidities must be assessed.² For trifocal diffractive technology, a healthy eye, free of corneal pathology, without severe corneal irregularities, diabetic retinopathy, and no macular pathology or glaucoma is a requirement. A corneal topographer and optical coherence tomography (OCT) help tremendously in identifying these issues. Monofocal plus and EDOF IOL technology is more tolerant and allows inclusion of patients with mild ocular comorbidities. Ensure the patient understands each IOL technology's limitations and that no existing lens can guarantee perfect vision.

Monofocal Plus

Monofocal plus lenses have a unique anterior surface produced by a continuous increase in refractive power from the periphery to the center of the lens. This enables good distance visual acuity comparable to an aspheric, monofocal lens but also provides improved intermediate visual acuity (IVA).³ Clinical evaluation of this lens revealed contrast sensitivity, photic phenomena outcomes, and adverse rates were similar between a standard monofocal and enhanced monofocal lens.^{4,5} In another study comparing monofocal, monofocal plus, and EDOF lens performance, the contrast sensitivity was similar between all three. The monofocal plus achieved similar binocular uncorrected IVA compared to the EDOF lens. The defocus curves at -1.0D and spectacle independence score at an intermediate distance were identical to the EDOF.⁶

Extended Depth of Focus

EDOF IOLs create a single-elongated focal point which enhances the patient's depth of focus. This design helps reduce photic phenomena such as glare and halos and has a higher contrast sensitivity than standard multifocal IOLs. It improves intermediate vision at the expense of near vision.^{7,8} In a 12-month diffractive EDOF study by Schallhorn et al. (2021), 96.2% of the cohort had 20/50 or better intermediate visual acuity (VA), and 81.0% had near 20/50 or better VA.⁹

Patients best suited for this lens live an active lifestyle and want spectacle independence. It includes high demand for distance vision with activities that need good intermediate vision. Patients who would not be good candidates for diffractive technology, such as those suffering from dry eye and retinal diseases, would be well suited for a monofocal plus lens.¹ For those who desire monovision, it can be considered a premium monovision approach.

Extended Range of Vision

The non-diffractive ERV IOL has two surface elements. The first element is a slightly raised surface that stretches the area of focus to create a continuous viewing area. The second is a minimal curvature change that shifts the focus so all light energy can be used. This wavefront-shaping element creates a continuous extended focal range instead of multiple focal points.¹⁰

A three-month prospective study of bilateral implantation had good visual outcomes for this lens, with 64% of participants experiencing no difficulty reading. The binocular defocus curve was better than 0.10 logMAR over a range of -2.0 D to +0.5 D. The Dysphotopsia profile was also good, with 91% of participants reporting no halo or glare and 100% reporting no starbursts.¹¹

The patient profile for EDOF/ERV lenses includes those who live active lifestyles, engage in activities such as golfing, skiing, and running, and are risk-averse to visual disturbances. They also want good intermediate vision for computer work and playing music. These patients understand that since near vision is poor, they will need spectacles for reading fine-print documents. EDOF lenses can be suitable for patients with mild glaucoma and patients with a history of refractive keratotomy.¹ Monovision correction with EDOF IOLs has good results, with one eye corrected to emmetropia and the other myopic.⁸

EDOF/Multifocal Diffractive Hybrid

The hybrid IOL is a combination of an EDOF and multifocal lens which are both pupil-independent (Fig. 4).¹² Multifocal IOLs have several focal points on the retina with 3 to 5 D between primary and secondary focal points resulting in a depth of field of two to three times that of a monofocal IOL.⁸ It provides a good range of vision with improved contrast sensitivity. In a comparative study between a hybrid EDOF/multifocal, multifocal, and trifocal, there was no difference in the frequency and severity of dysphotopsia, including glare

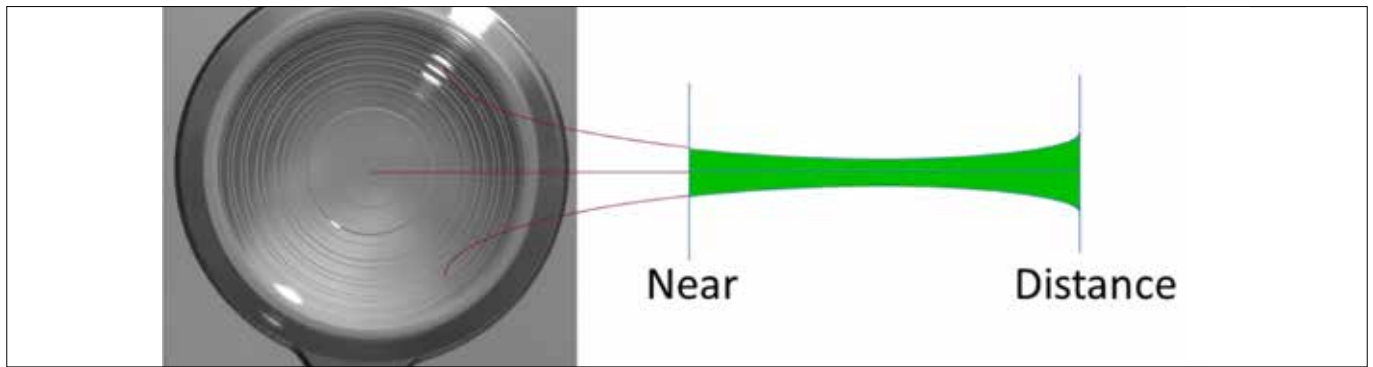


FIGURE 4. EXAMPLE OF AN EDOF/MULTIFOCAL HYBRID IOL STRUCTURE.

and halo. More than 96% of the participants were spectacle independent at all distances¹².

The best candidates for this type of lens desire spectacle independence at all distances and are okay with mild dysphotopsia.⁷

There are many IOL options for patients, but it is important to address patient's specific needs. Newer technology is more forgiving and will work for patients who may have been previously excluded from premium IOLs, including glaucoma suspects and those with extrafoveal drusen.¹² Choose IOLs that have milder optical side effects. Some patients may not be able to achieve spectacle independence, but patient education and proper IOL selection can help improve patient satisfaction and outcomes.

“ There are many IOL options for patients, but it is important to address patient's specific needs. ”

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Cataract Case Presentations

Four cases and many suitable solutions
BY BURKHARD DICK, MD, PHD, FEBOS-CR

This article will review and address real-world cataract surgery patient cases and discuss various suitable lens options.

Case 1: Patient asks for Spectacle Independence at all Cost

A 59-year-old-male presents with complaints of blurred vision and minor dry eye symptoms. He has a history of post myopic LASIK 20 years ago with a refractive error correction of -5.00 D confirmed with a Holladay report. Examination revealed that he has bilateral cataracts and relatively large pupils. The patient expects unaided vision at all distances post-surgery.

Solutions:

A trifocal IOL is one option to ensure spectacle independence at all distances. It is imperative to give patients the best lens possible and then downgrade if contraindications exist. A trifocal is the best option to achieve complete spectacle independence if the patient is okay with phenomena like halos and glares. Further, in this case, the patient has a thick enough cornea that a future enhancement would be possible if needed.¹

Other lens options would be a monofocal or monofocal plus when considering the small optical zone of the patient. A monofocal plus lens provides more visual flexibility

“A trifocal is the best option to achieve complete spectacle independence if the patient is okay with phenomena like halos and glares.”

(Fig. 5). A little refractive error does not drastically affect the outcome, and the patient will have a slightly better intermediate vision. However, monofocal and light-adjustable lenses would only give the patient the option of a blended vision approach that can be corrected with spectacles. The issue with using a diffractive multifocal is that if the patient is unhappy, the only solution is an exchange, which is not ideal if corneal trauma needs to be minimized in this patient.¹

Case 2: Patient asks for Correction Without any Dysphotopsia

A 63-year-old-male car mechanic, whose work activities consist of desk work, working overhead, and test driving, is looking for spectacle independence. He is also experiencing difficulties driving at night and would like a solution that does not involve dysphotopsia. Examination revealed a bilateral cataract with myopia and astigmatism.

WHAT IOL WOULD YOU CHOOSE FOR PATIENT #1?

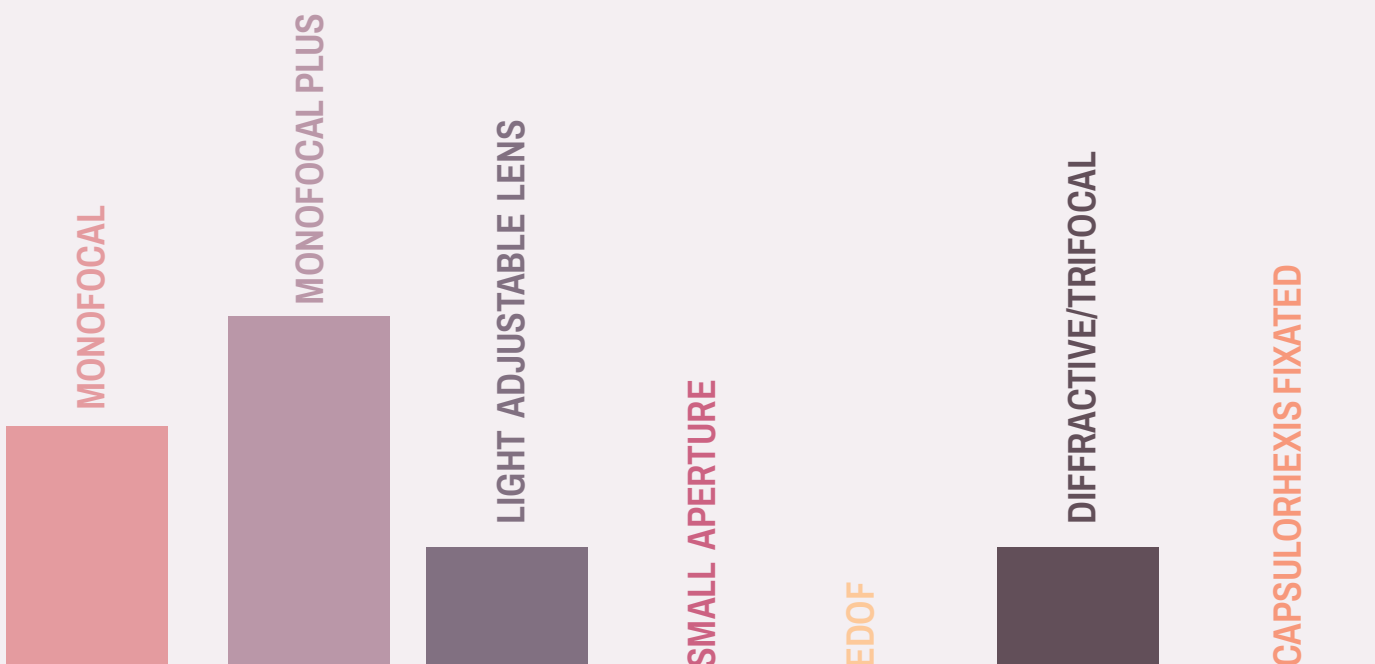


FIGURE 5. LENS CHOICES OF THE PANEL FOR PATIENT CASE #1

“**Modern EDOF lenses, such as a non-diffractive lens, have minimal levels of dysphotopsia and provide a wide range of vision at various distances.**”

Solutions:

A capsulorhexis-fixated lens eliminates all dysphotopsia, while a monofocal plus lens would avoid positive dysphotopsia and provide the patient with some intermediate vision. Modern EDOF lenses, such as non-diffractive lenses, have minimal dysphotopsia and offer a wide range of vision at various distances. Further, EDOF lenses are more tolerant to residual refractive error, while a diffractive or trifocal lens would not be suitable due to the patient’s astigmatism.

Case 3: Patient with Glaucoma

A 58-year-old male presents with myopia and mild to moderate open-angle glaucoma, where the right eye is more affected than the left. He was diagnosed six years ago and has a family history of glaucoma on his mother’s side. Medical history includes hypertension and sleeping apnea syndrome. Slit lamp examination reveals 3-4 nuclear sclerotic cataracts. Posterior examination shows a large cup-to-disc ratio, with neither eye following the ISNT rule. The inferior nerve fiber layer in the right eye is thin, with beginnings of notching observed (Fig. 6).

The patient’s visual field was stable from 2017 to 2022 with no defects. The patient’s highest intra-ocular pressure (IOP) is 25 mmHg, and the target IOP is <16 mmHg in the right eye and <18 mmHg in the left eye. He is currently prescribed one drop of preservative-free prostaglandin.

Solutions:

The asymmetry of the glaucoma is a concern when matching this patient with the right IOL. He would not be suitable for a trifocal IOL due to the low contrast sensitivity. A monofocal lens would be a safe option for this patient, especially given that he’s still relatively young and his glaucoma may progress in the future. A monofocal plus could offer a little bit of

intermediate vision. Still, if the patient is motivated to have some spectacle independence, a non-diffractive EDOF IOL would also be an option.¹

Case 4: Clear Lens Exchange

A 55-year-old female is seeking to undergo a clear lens exchange. She is unhappy with her vision, especially at near distances. She is hyperopic with slight astigmatism, and her expectation of surgery is good vision at all distances. Her endothelial cell count is normal, with 1 D of corneal astigmatism. The slit lamp examination is normal, with round and relatively large pupils, and the lens shows cortical cataracts. Her posterior segment is healthy.

Solutions:

The patient is a good candidate for a diffractive trifocal lens, which will provide vision at all distances but requires good overall ocular health. However, this patient has some issues with dry eye, which may suggest the implantation of an EDOF lens, which will be a more forgiving option.¹

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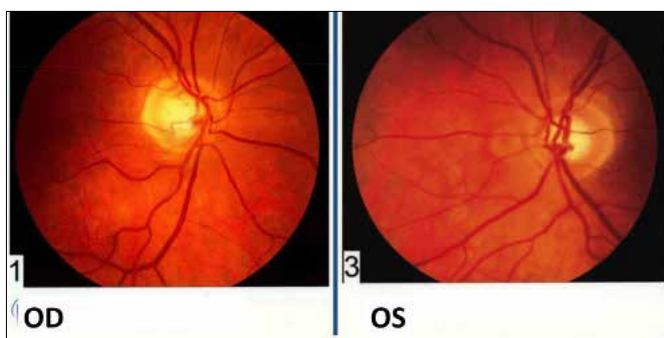


FIGURE 6. DISK PHOTOGRAPHS OF PATIENT WITH GLAUCOMA SHOW A DIFFERENCE IN NERVE FIBER THICKNESS.

Patient-Informed Consent

A Baseline in the Cataract Refractive Practice
BY ARTHUR CUMMINGS, MD, FRCSED, PCEO

Patient consent is the process whereby a physician provides the patient information necessary to make an informed decision about their care.¹ It is imperative in cataract surgery and is an ethical obligation by the surgeon. Patients have higher expectations due to the advances in cataract surgery, and informed consent is essential in the patient-physician relationship and building trust. From an ethical standpoint, successfully informed consent occurs when the patient believes they could have refused to have surgery but proceeded with it.²

“ ... an informed patient understands in layperson’s terms the nature of the procedure, including the potential benefits, risks, and alternative options. ”

Studies show that up to 50% of patients do not understand the surgical experience and struggle with retaining information about the procedure.³ However, an informed patient understands in layperson’s terms the nature of the procedure, including the potential benefits, risks, and alternative options. It also helps the patient understand the type of IOL selected, including the advantages, disadvantages, and compromises. A patient consenting to a procedure gives permission and agrees to it. In practice, this should reduce the risk of complications and patient dissatisfaction. It helps manage unrealistic expectations and should ideally be shared decision-making between the patient and the physician.^{1,2}

Patient education is crucial for achieving ideal outcomes, but it is also beneficial for medico-legal reasons. Managing expectations and the obligation to cover the different intra-ocular lens options to ensure the patient (Fig. 7) is able to give their informed consent are also essential.¹ Further, it is important to be specific about the type of cataract a patient has, as well as potential complications that may be peculiar to the type of cataract and the possible refractive outcomes.²

There are different opinions on when a consent form should be given to a patient. Regardless, patient-informed consent should be seen as a process rather than a single event, as this can allow the patient time to consider their options. Be wary that educating patients is complex, and some patients may not want to participate in the decision-making process.¹

In a study by Marasini et al. (2013), 69% of patients did not want to know about complications before surgery. Some patients experience anxiety, and interest in how much information they want to know before the surgery may vary. Most patients want to know what will happen during the surgery and what the outcome will be.² Ensure that the patient

understands the procedure well but does not overwhelm them with information.¹

Optimize patient communication by starting education early and in the clinic. Education should begin when the patient makes an appointment. Direct them to the practice website, send videos via text messages, and use tools capturing vision behavior. In the clinic, use patient information videos, allow patients to ask questions, and review again during the consent process, be it using paper consent forms or electronically.

Multimedia resources have been shown to increase patient understanding of the procedure.³ These resources include informational videos and diagrams.⁴ Information brochures have been shown to help with better knowledge retention.⁵ Videos have been linked to increased patient satisfaction and decreased patient visits.⁶ On the consent form, make sketches and remarks to document a conversation (Fig. 8).

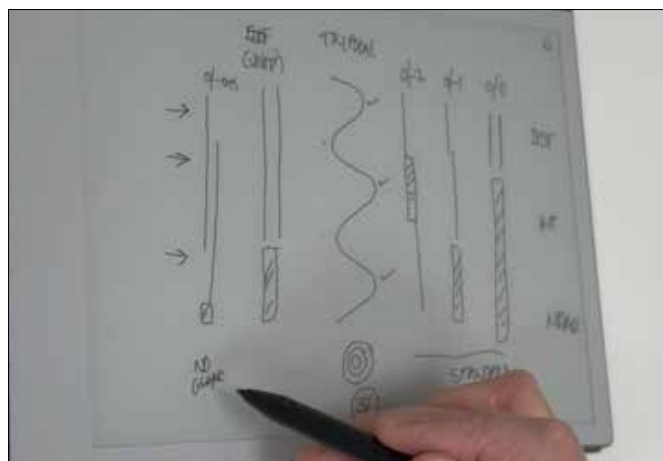
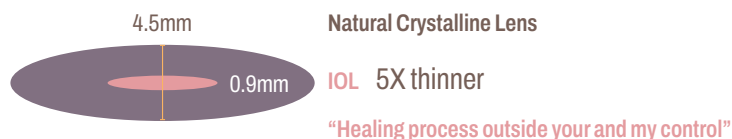


FIGURE 7. EXAMPLE OF EXPLAINING DIFFERENT LENS OPTIONS WITH A HAND-DRAWN SKETCH

SKETCHES



REMARKS/EXPLANATIONS WRITTEN ON THE CONSENT FORM

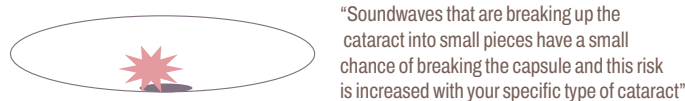


FIGURE 8. EXAMPLES OF SKETCHES AND REMARKS ON A CONSENT FORM

“ Understanding the definition of informed consent is the basis of good medical practice and legal defense. ”

For patients with astigmatism, show visual images comparing spherical versus spherocylinder correction. Explain the benefits of correcting toricity, including better visual quality, as the patient will have better-uncorrected distance visual activity, less eye strain, reduced risk of falling, and lighter and cheaper spectacles if needed.

Understanding the definition of informed consent is the basis of good medical practice and legal defense. As physicians, we must ensure our patients understand the procedure and actively participate. It is our ethical obligation to deliver informed consent. Different modalities to educate patients ensure that they can participate in the decision process.

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The Refractive Patient Journey

A Firsthand Perspective

BY FRANCESCO CARONES, MD

The refractive patient journey starts with the type of mindset you have for your practice. This journey includes the surgeon, practice, staff, marketing, community, and, most importantly, the patient. Presbyopia-correcting posterior chamber intraocular lenses (PCIOL) are standard for helping patients correct their presbyopia. The most important question is your practice non-PCIOL-oriented or PCIOL-oriented?

“ It is essential to choose the best-personalized solution for each patient. ”

In a perfect world where price and performance are no issue, every presbyopic patient would receive an advanced technology PCIOL. However, this is not always the case due to affordability and ocular health status. It is essential to choose the best-personalized solution for each patient.

A non-PCIOL-oriented mindset is focused on patient selection and incorporates a few exams and a consultation to determine which PCIOL would work best for the patient. The practice has a few staff members that deal with PCIOLs, focus on pros and cons, and understand that cost may be a barrier for some patients.

A PCIOL-oriented practice mindset is focused on IOL selection, excludes patients based on their eligibility, and the patient has all their exams before consultation for PCIOL. The entire staff deals with PCIOLs and the focus on the value and cost of IOLs are viewed as opportunities.

The patient journey in my practice consists of 4 phases and 13 individual steps (Fig. 9). After patients find our practice and make an appointment, they receive some materials before they arrive and check in at the front desk with our staff. After completing a lifestyle questionnaire, the first key element is in the preparatory phase, in which we assign responsibilities to different staff members. These staff member assignments include technicians and ophthalmologists. The technician runs and understands the minimum requirements for managing IOLs. They are usually the first person that introduces



FIGURE 9. THE CATARACT PATIENT JOURNEY BROKEN DOWN INTO 4 PASES AND 13 INDIVIDUAL STEPS

the patient to the scope of the journey. The ophthalmologist educates the patient about the different solutions for available presbyopia IOL, ensuring the patient understands all the information. It is essential to determine who makes the final choice from the options, the surgeon or the patient.

“ The patient journey begins before the patient steps into your practice. ”

The second key element is that, as the surgeon, you must know your presbyopia IOLs. Understand that there is not a single presbyopia-correcting IOL that will meet all expectations, and each one will have it's own drawbacks and compromises.

The third key element involves knowing your patient. Each patient is different regarding age and relative presbyopia, preexisting refractive error, and lens status. Lifestyle, daily activities, and the type of visual compromise the patient will accept also play critical roles. Finally, reviewing the cost of the procedure and surgical associated risk is essential.

Patient expectations with presbyopia IOLs are all about perception (Fig. 10). Compromises have quality vision-related

issues such as dysphotopsia and residual spectacle dependence. Benefits of IOLs include a range of focus and a gain in quality of life provided by spectacle independence.

The final key element is meeting the patient's expectations. Ophthalmologists need to understand their patient in terms of the benefits that justify and outweigh the costs and compromises that a patient will have to take into consideration. Ways to address this include chair time and conversation with the surgeon, interviews with friends and relatives, surveys and questionnaires, and objective vision behavior monitoring.

The patient journey begins before the patient steps into your practice. Determine what kind of practice you desire and know your presbyopia-correcting IOLs. Be cognizant that each patient is different and manage the patient's expectations to maximize satisfaction.



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$$\text{VALUE} = \frac{\text{BENEFITS}}{\text{COSTS}} \quad \text{VALUE} = \frac{\text{SPECTACLE INDEPENDENCE}}{\text{PRICE} + \text{COMPROMISES}}$$

FIGURE 10. HOW TO WEIGHT COST VS. BENEFITS TO MEET PATIENT EXPECTATIONS

*Supported by an independent medical education grant from
Alcon, Johnson & Johnson Vision and Zeiss.*