

COVER STORY

Trifocal IOLs rank high in European surgeons' preferences

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Among IOLs for presbyopia, trifocal options are gaining increasing appreciation. According to many users, physicians and patients, the combination of distance, intermediate and near vision gives crisp image quality with only a small price to pay in terms of optic phenomena. Not yet available in the U.S., they have been used in Europe for several years.

Damien Gatinel, MD, PhD, had a pivotal role in the development of the trifocal optic concept.

“About 12 years ago I was using bifocal IOLs, and patients were coming back to me asking for spectacles to use at intermediate, mostly because they did not feel comfortable reading on computer screens. I realized this was a huge unmet need which bifocal IOLs were not able to address. I started working at a new optic profile to fill in the intermediate gap and called it trifocal,” he said.



The vast majority of patients want to see at all distances without spectacles, do not like monovision and want to preserve binocular distance vision, according to Damien Gatinel, MD, PhD.

The first company to step into the new stream was PhysIOL. At the time, Gatinel was working with the company's engineers to improve the design of their monofocal implants. He proposed his idea of a trifocal optic, they found it

Source: Damien Gatinel, MD, PhD

interesting, and the new project took off.

"When the FineVision IOL was produced and implanted, we immediately noticed that no one was coming back to complain about poor intermediate vision. We knew at that point that we had hit the target. The defocus curves of these patients were significantly different, with far less reduction in the intermediate range than what we were used to seeing with bifocal IOLs," Gatinel said.

Glare and halos were no more bothersome than with other lenses, contrast sensitivity was not reduced, and the perception was that the intermediate vision issue had been successfully addressed without creating new problems or unforeseen drawbacks.

Personal preferences

Trifocal IOLs are best indicated for patients who want to see at all distances without spectacles, do not like monovision and want to preserve binocular distance vision — in other words, the vast majority of patients, Gatinel said.

"All people want to be able to read and do other near activities. Many use the computer or other electronic instruments. All those who drive want see the dashboard in their car. Some like to play music. And everyone likes to have a good distance vision. Trifocal lenses are the most versatile. When there is no contraindication for multifocal IOLs, they definitely are my first choice. The toric model also allows correction of astigmatism," he said.

His preference still goes to the FineVision, and he does not see significant improvements in terms of performance in the trifocal lenses that were produced later.

"I may be biased, but when we developed the FineVision lens with PhysIOL, we explored many possibilities. We considered different designs and eventually selected the one which was the simplest and in our opinion most effective. However, individual surgeons may feel more comfortable with specific materials and designs, and it is always good to have a variety of choices in your lens selection," he said.



Sheraz Daya

Sheraz Daya, MD, started using the FineVision IOL in 2011, and it is still his favorite lens. He also uses the Zeiss At Lisa and particularly likes the toric At Lisa because of the bitoric optic design, which he says is physiologically better and yields good outcomes.

One problem with the At Lisa is that it is a plate haptic lens with the same overall length for all eyes, he said.

"It does not take into consideration that hyperopes often have small eyes and small bags, and the lens can bulge forward. And in myopes, the lens can rotate, which is especially a problem with toric lenses," he said.

If a toric lens rotates, he waits 2 to 4 weeks until the bag contracts, then he puts the lens back in the correct position.

"The FineVision has two versions, the Micro F and the Pod F, with four-point fixation haptics and sits in the bag better," Daya said.

He finds that both lenses are good and uses them in 95% of his patients.

"Everyone who is suitable for a multifocal lens would probably get one in my practice, including patients who had previous LASIK surgery, both myopic and hyperopic," Daya said.

When these patients develop cataract, they want to maintain the range of focus they were used to without glasses. To calculate the lens power, he uses a variety of methods. The most consistent in terms of outcomes is the K reading from the Holladay Report available on the Pentacam (Oculus), combined with the Holladay 2 formula.

"It works really well. My overall enhancement rate since 2007 is 6%, and in the last couple of years, I did not have to enhance anybody," Daya said.

More options

"I have experience with almost all the trifocal lenses, but the one that fits better my needs is the At Lisa, both in the spherical and the toric model. I also like the FineVision a lot. Patients are very happy with it, and in a study over 5 years, we showed that it has a very low rate of Nd:YAG capsulotomy. For a number of reasons, a combination of material and design, the At Lisa is more prone to [posterior capsule opacification]. I use a capsular tension ring to inhibit PCO with the Lisa. On the other hand, the At Lisa is the lens that performed better in terms of vision in our studies," **Jorge L. Alió, MD, PhD**, said.

He also uses the Hanita SeeLens, which offers good performance and a zero YAG rate, he said. It is a stable lens that favors near vision and is ideal for patients who have more of a need for near than intermediate. Conversely, the At Lisa is better for people who need sharp intermediate vision.

"I have had experience also with the TriDIFF, a lens manufactured in India by Care Group. It is a very good lens, very similar to the At Lisa and FineVision but with a much lower cost, which makes it affordable for patients who don't have the income for more expensive lenses," Alió said.

Arthur Cummings, MD, has been using the At Lisa and the Alcon PanOptix, but not the FineVision, which only recently has become available on the market in Ireland.

"The one that I'm enjoying the most is the PanOptix, for a number of reasons. Being based on the AcrySof platform, it is very stable in the bag. It does not rotate, which is an invaluable advantage for the toric version. The A-constant is good, and the defocus curve is what suits most people's needs," Cummings said.



Jorge L. Alió

The plate haptic design of the At Lisa may grant even better rotational stability, but Cummings prefers C-loop haptics. In his patients, he has found a higher satisfaction rate and less dysphotopsia with the PanOptix. "I have heard good things about the FineVision IOL from colleagues," he added.

Trifocals in spectrum of premium lenses

Fewer patients are now excluded from multifocal options because many different technologies are available to fit the diverse needs of individual patients. Success now depends on making the best and most appropriate choice case by case, according to Alió.

In the U.S., Bausch + Lomb has begun enrolling patients in a clinical trial of the enVista MX60EF trifocal IOL to evaluate the safety and effectiveness of the lens when implanted in the capsular bag; the estimated study completion date is August 2021.

"In Europe, we have a wide range of choices," Alió said. "Refractive lenses are well represented by the Oculentis Mplus, a varifocal lens with continuous transition in power between distance and near. This IOL is advantageous in many cases, especially if you use the low near vision add model with +1.5 D for near. Diffractive lenses have advantages and disadvantages. Intermediate vision is good, near vision is average, maybe not the best, but they are good lenses for general use. Refractive trifocals have the drawback of optic phenomena that can lead to some distortion, while diffractive models have decreased contrast sensitivity and halos in most cases."

With patients who drive at night or are mostly active in low to medium environment illumination, such as in restaurants, Alió prefers refractive trifocal lenses because they do not cut down on contrast. On the other hand, for those who are more active

in daylight, such as at home or in the office, his choice goes to trifocal diffractive models.

“About 50% of my patients are implanted with trifocal IOLs and the other 50% with the refractive varifocal multifocal lens. In patients with very advanced age and low contrast sensitivity, I definitely prefer the latter, particularly with the low near vision add,” he said.

Broad range

The best IOL is the one that works best for the patient, Gatinel said. Extended depth of focus (EDOF) IOLs are the latest emerging technology and might be a good option for patients who are not so interested in near vision. However, their biggest asset was supposed to be the reduction of photic phenomena due to the lesser energy dispersion, he said, and he believes that promise has fallen short.

“PhysIOL is now working on an EDOF lens with improved near vision. It will be less than with a trifocal, but maybe enough to read on smartphones or on another very bright near target. It will never be ideal for reading a book in normal illumination because, again, for this you need more energy efficiency on the near focus,” Gatinel said.

“I personally don’t use EDOF lenses,” Daya said. “There is this false thinking that they get less halo and glare, but they get more and the vision is not so crisp. In addition, near vision is poor.”

Patients implanted with a trifocal in one eye and an EDOF in the other eye notice a difference between the two lenses.

“They say they can see with the EDOF, but it is not clear; there is a blur all around, especially at distance. Intermediate is fantastic. They like that, but nothing is clear, and halos and spider webs are significantly more in the EDOF eye. It is true that patients need intermediate vision more and more now, but also want to be able to move closer and see if an 8 is a 0 or an 8,” Daya said.

In his experience, the only patients who are not happy with trifocal lenses are music conductors who work in dim light at a distance between 85 cm and 100 cm.

“They don’t see well with a trifocal at that distance. They might be better with an EDOF or with an intermediate dominant lens,” he said.

Daya implanted more than 4,000 patients with trifocal lenses in the last 7 years and has not needed to remove any of them. Patients are happy and spectacle-independent, with the exception of orchestra conductors, who need to use 1.25 D spectacle addition when they stand on the podium.

New technology for IOL selection

One device, currently undergoing trials, may change the way IOLs are selected for patients by providing objective data on day-to-day use of vision for each individual, according to Cummings.

"Within the next few years it's going to be ludicrous to even think that at some point we chose an IOL without objective data," he said.

This new technology, named Vivior, is a wearable monitor fitted on the patient's own spectacles or a clear pair of spectacles if the patient does not currently wear glasses, which over a number of days tracks viewing distance, activity, head position, ambient light and other context parameters. Measurements are monitored, recorded and saved to the cloud for processing and analysis.

"It gives you all the information you need on the patient's visual lifestyle, an objective defocus curve, the true time they use specific viewing distances. By using Vivior in our trials, we realized how misleading patient-reported information might be. Patients don't know what they need, and if they do, they don't know how to tell us what they need. And we are not particularly good listeners, anyhow," Cummings said.

Since using this device within the current trial, Cummings has significantly increased the number of patients to whom he prescribes presbyopia-correcting IOLs.

"I used to do maybe 4% or 5% of my cases with premium presbyopia-correcting lenses, and now 70% of the patients who go through Vivior choose a premium lens. The patients themselves are more confident in making this choice because they know exactly what problem you are going to address, and they are far more inclined to accept the compromise of this technology, which is and probably will always be some amount of dysphotopsia," Cummings said.



Arthur
Cummings

Do not underestimate near vision

There are currently about 350 different lenses on the market, and if on one hand this wide choice improves the chances of meeting all needs, on the other hand it creates the risk of being paralyzed by analysis and the paradox of choice, Cummings said.

"A device that provides us with objective criteria for IOL selection is going to be really helpful," he said.

For instance, he noticed during the Vivior study that everyone underestimates the amount of time spent for near vision. They equate near vision with reading vision and are not aware of how often and for how long they look at mobiles phones.

“Today there is much more that happens at close that is not reading,” he said.

There is a lot of emphasis today on computer vision, and a lens that provides good intermediate vision is a must-have. However, this should be achieved without sacrificing near vision.

“Life changes, and if today you use the computer a lot, in some years you might want to take up a craft or a hobby where you need sharp near vision. You cannot implant patients with a lens that is not good for near vision,” Daya said.

“The advantage of trifocal IOLs is that they give a broad range of vision, with a more natural, younger type of defocus curve where there are no big depths,” Cummings said. “You need to explain to your patients that you cannot give them the vision of a 20-year-old, that it is not going to be perfect, but generally speaking there is no other lens on the market that gives a broader range of vision and a better quality overall.”

From the beginning of the presbyopic IOL era, and while multifocal lenses continue to develop and multiply, the quest for the holy grail of restoring true accommodation has never been abandoned.

“Accommodating lenses were there before trifocals and are something we continue to pursue, despite the not outstanding results obtained so far,” Cummings said. “They have not lost attraction, but the bar is rising all the time for them because trifocals are getting so good that it is difficult to imagine how to overcome their performance.” – *by Michela Cimperle*

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For more information:

Jorge L. Alió, MD, PhD, can be reached at Vissum Corporation, Avenida de Denia, s/n, 03016 Alicante, Spain; email: jlalio@vissum.com.

Arthur Cummings, MD, can be reached at Wellington Eye Clinic, Beacon Court, Sandyford, Dublin, D18 T8P3, Ireland; email: abc@wellingtoneyeclinic.com.

Sheraz Daya, MD, can be reached at Centre for Sight, Hazelden Place, Turners Hill Rd, West Sussex, East Grinstead RH19 4RH, UK; email: sdaya@centreforsight.com.

Damien Gatinel, MD, PhD, can be reached at Fondation Rothschild, 29 Rue Manin, 75019 Paris, France; email: gatinel@gmail.com.

Disclosures: Alió is a consultant for Zeiss, Hanita, Oculentis, Ophtec and Care Vision Group. Cummings is a consultant for Vivior, Alcon and WaveLight. Daya is a consultant for Bausch + Lomb, PhysiOL and Zeiss. Gatinel is a consultant for PhysiOL, Nidek, WaveLight and Zeiss.

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