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Letter to the Editor

# Presbyopia correcting IOLs and the ocular surface disease… The good, the bad and the ugly

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The last two decades were especially fruitful for the refractive surgeons and for the industry who have been showing tremendous development in both understanding and meeting patients' desire for spectacle independence. Ever since the first trials from Dr. Kenneth Hoffer with his early 1980's effort in producing a multifocal IOL to the latest achievements from different companies in putting trifocals and EDOF optics to the market. Nowadays, when basically everybody is using either smartphones and computers or any other mobile device when it comes to presbyopia or cataract extraction most of are going for a spectacle independence at more than one distance. But the adoption of these mobile screens has led us to the point where another optic is also critical to the refractive outcome and that is the ocular surface.

Let us start from the beginning and discuss the presbyopia correcting IOLs that are present, that have been on the market and probably will come to our arsenal one day. We have come a long way since Dr. Hoffer understood that the brain can tolerate a lot of refractive error when he first saw his patient with dislocated IOL which was 20/20 both uncorrected and with the aphakia correction. We all know the story after that when Dr. Hoffer basically glued two IOLs into one for the first split bifocal lens to be born. Soon after that, several companies started developing concentric either refractive or diffractive multifocal IOLs. Alcon had started with the introduction of bifocal diffractive IOLs with different additions. AMO had developed their ReZoom which was a refractive bifocal IOL but industry knew and also the surgeons sensed that these optics had major problems in terms of causing a lot of glare and halos and last but not least the quality of vision was compromised because of the light loss. Fortunately, all of the companies have been researching and developing new breed of optics since then. It was 10 years ago when a German company introduced a new kind of assymetric split optic which gave good intermediate vision and all of the other companies had to think of a new approach. One year later a Belgian company launched the first trifocal IOL which gave birth to what has been the best in RnD for the patient. All of these IOL manufacturers have been pushing to the limit their experts in order to present what is "the next big thing in IOLs".

In the present, especially in Europe, we have in our arsenal diffractive appodized trifocals, non appodized diffractive trifocal lenses, assymetric refractive optics with additive paraxial asphericity, low add either refractive or diffractive IOLs mimicking EDOF optics, small aperture or what I think is the true EDOF lens, spherically aberrated optics with different signs in order to extend the depth of focus, you name it and list goes on and on forever. We have been discussing pseudo accommodative IOLs which I believe will truly be the game changer.

It seems that we have had it all. The patient is coming for exam, wanting to get rid of his/her glasses and we have had more than 90% of the time, great success. Either some of the patients desire spectacle independence or we explain to them that their cataract is a fantastic opportunity to replace their old, cloudy and non-working lens with a new IOL which will give them some freedom from glasses. But now, we have to deal with another issue, we have to truly understand and not only that we have to have in mind that current patients are all starring at the screens of mobile devices. Several weeks ago, it was published in a study that people using mobile devices for more than two hours a day are at great risk of developing meibomian gland atrophy. Ocular surface disease and MGD can not only compromise our work, it can bring a lot of tense to our work. We have all seen these patients that

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a week, a month or maybe more after the refractive lens exchange has been great and they come some time after with a slight complain that "Dr., sometimes I see, sometimes it is not that clear" or "Dr., some nights the glare is more and some nights it's not". Most of the time we prescribe artificial tears, we do not really dive into the complaints but at the end of the day we are confused with ourselves. I call these - the ugly ones.

I would like to stress the moment when I started diving deeply into their slight complaints, into the patients' feedback. It was nearly three years ago, when a one of these truly motivated for spectacle independence patient came in. She was and still is a lawyer and she was tired of her glasses. A very high myope into her late 60s frustrated of using one pair of glasses for driving, one pair of glasses for computer and was so for a multifocal toric IOL. We did everything right… We checked the retina – perfect, we did endothelium microscopy – perfect, we did topography – excellent and we were ready to go. The surgery went uneventful, on the day after the operation refraction was nearly perfect and she was very happy with the outcome. It was early one month after the surgery when she came back with a lot of disappointment. Her vision was 0.3 Snellen even though everything was good with the eye. The lens was there where we left it, the retina was perfect, but her refraction was reading a lot of residual astigmatism. We made a topography and the image that we saw amazed us. From nearly 4.5 D cyl preop, one month after the surgery it was close to 2.25 D cyl and it was nothing close to regular astigmatism. During the next six months, it was a lot of talking to the patient and a lot of artificial tears, cortecosteroids and what not. Nine months after the operation, the corneal astigmatism sticked to 2.75 D cyl, the lawyer's vision was 0.3 Snellen and I was depressed. On the 15 month after her cataract extraction, we implanted a sulcus fixated pin hole IOL and the outcome was fantastic but I was still unhappy. Soon after that, she came to do her other eye but fortunately we have introduced a strict protocol for evaluating tear film stability. The lawyer had terrible glands and TBUT well under 3 sec and we started a very interesting cycle with her… IPL then topography, another IPL then topography and we repeated that five times. At the end, we implanted a low add toric multifocal targeted for -1.0D in the second eye and she was delighted and so were we.

The tear-epithelium layer being the one with the biggest refractive power in the eye is now the one that is most crucial to our success, to our results. The lifestyle that we are diving into is exposing a greater risk to the health of our glands. The better understanding of how the tear film is connected to the IOL that we are implanting is the key to our positive surgical outcomes. Some years ago, we were looking only at the retina and the health of the endothelium and it was enough but now everything has changed, and it has changed for good. Because all of the instruments and the devices that we owe are giving us better understanding and better outcomes than ever before.