

A NEW STANDARD IN MONOFOCAL IOL DESIGN

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Advances in lens technology offering an extended depth of focus (EDOF)—and thus vision potential across near, intermediate, and distance—have been a game changer for helping patients achieve refractive results after cataract surgery. However, some patients

may not qualify for these options, may not be interested, and/or may not want to risk the low potential for photopic phenomena. There is still a need for advanced technology monofocal IOLs, not as a replacement for EDOF technology, but as an option that does more than simply replace the cataractous crystalline lens.

The Lentis Quantum (Teleon) enhanced monofocal IOL offers an innovative design intended to give patients improved intermediate vision via an elongated focal point in the center of the lens. In effect, this “Q-zone” mimics an extended range of focus, but because a progressive surface profile is used, there is no interruption of light focusing on the retina as there would be with a multifocal or trifocal design; therefore, the chance of unwanted photopic phenomena is greatly reduced. With this design feature, the Quantum provides asphericity for a progressive power profile that is neutral to spherical aberration in the eye, but importantly, does not add spherical aberration to the visual system.

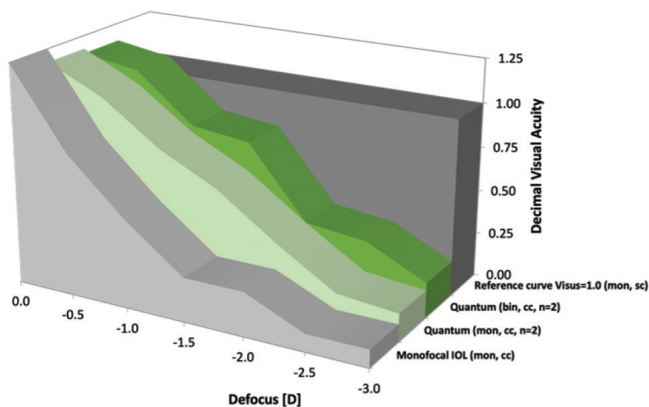


Figure 1. Defocus curves for the Quantum implanted monocularly (mon) or binocularly (bin), compared against a standard monofocal IOL and a Visus IOL.

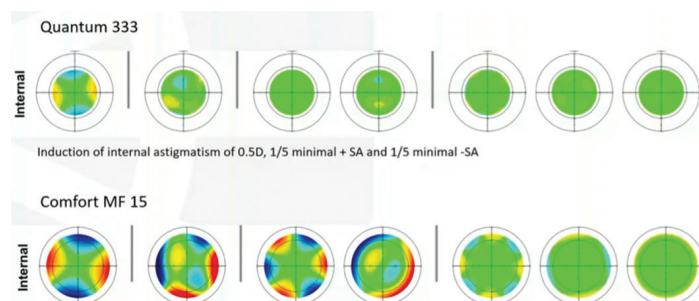


Figure 2. Aberrometry from eyes implanted with the Lentis Quantum (top) compared to the Lentis Comfort MF15 EDOF IOL (bottom).

RESULTS: FROM BENCHTOP TO CLINIC

Because of its design, the defocus curve associated with the Lentis Quantum suggests greater visual acuity in the intermediate zone, compared to an aspheric monofocal IOL, and one that is smoother across all vision zones compared to a trifocal design (Figure 1). In the clinical setting, this means the Quantum intentionally does not induce spherical and total higher order aberrations (Figure 2). This leads to reduced potential to provide vision across near and intermediate below 60 cm compared to EDOF technology, but because it also yields fewer photopic phenomena, patients are more likely to be satisfied with the final vision. As well, a variety of monovision strategies could be considered for those patients wishing to use their post-cataract vision across all three zones. In this regard, the Quantum is like any other monofocal IOL, offering the flexibility to tailor the surgical plan to the patient’s needs, yet with greater intermediate vision than a standard IOL when targeting emmetropia.

These theoretical benefits are evident in outcomes from a series of eyes comparing postoperative refraction among eyes implanted with the Lentis Quantum or Lentis Comfort (unpublished data). Among patients receiving the Quantum, spherical equivalent, sphere, and cylinder improved from 0.40 D, 0.68 D, and -0.56 D preoperatively, respectively, to -0.04 D, 0.15 D, and -0.31 D at 3 months, respectively. No touch-up surgeries were needed in this group. Meanwhile, uncorrected distance visual acuity improved from 0.5 D logMAR at baseline to 0.08 D logMAR at 3 months in the Quantum group and from 0.38 D to 0.06 D in the Comfort group. Monocular intermediate visual acuity improved from 0.23 D logMAR at baseline to 0.17 D logMAR at 3 months in the Quantum group and from 0.27 D to 0.05 D in the Comfort group. The intergroup differences were not statistically significant for either measurement. These results suggested a clinically significant enhanced EDOF effect in intermediate visual acuity and a high degree of precision for achieving the target refraction.

CONCLUSION

The new Lentis Quantum represents a substantial advancement in monofocal IOL technology, mimicking EDOF technology for improved intermediate vision but with a low chance for photopic phenomena. This low risk should be encouraging to surgeons considering whether to offer premium lens technologies, as the Quantum offers most of the advantages associated with multifocality but fewer risks. Moreover, because the Quantum can be used in various monovision approaches, it offers flexibility in tailoring the final vision to the patient’s postoperative vision goals. In summary, patients can achieve independence from glasses in most cases, and compared to diffractive IOLs, there are more options for retreatment to refine vision postoperatively if needed. ■

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