Initial results with a non-diffractive, extended depth of focus intraocular lens (IOL) in patients targeted for emmetropia

Mr Ankur Barua[1], Prof Sunil Shah[1,2] , Dr Raquel Gil-Cazorla[2]

1. Midland Eye, UK

2. Life and Health Sciences, Aston University, Birmingham, UK

Introduction

- RayOne EMV intraocular lens (IOL) is a new non-diffractive, extended depth of focus IOL.
- The optical design of this IOL utilises an increase in spherical aberration at the centre of the optic that gradually reduces at the margins.
- The theory is that this design enables an increased range of functional vision.
- When a -1 D target is used in the non dominant eye, the EMV can provide up to 2.25 D of extended depth of vision



Purpose

To report on the first results in cataract patients implanted with a non-diffractive, extended depth of focus (EDOF) IOL (RayOne EMV IOL).

Methods

•This is an ongoing, prospective case series of patients in a private clinic in Solihull, England.

• All patients underwent bilateral implantation with this pre-loaded, non-diffractive EDOF IOL after undergoing routine cataract removal using either phacoemulsification or femtosecond laser cataract surgery.

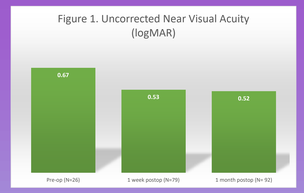
•All patients were targeted for emmetropia.

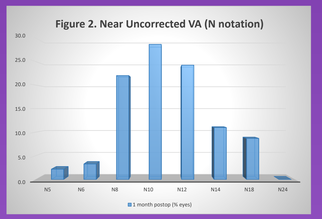
Results

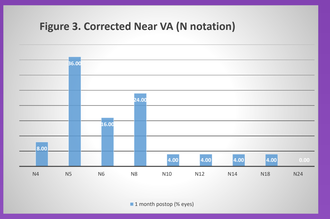
- For this analysis, 92 eyes of 63 patients with a minimum of 1-month post-op data were included (Amblyopic eyes and those with mild macular changes were also included).
- At the 1-month visit, there was an improvement in UNVA from baseline of close to 2 lines of vision (Figure 1), which equates to N10 indicating that patients can read magazines, books, unaided.
- In global, pooled results with the EMV IOL (N=206 eyes), patients achieved a mean UDVA of 0.132 LogMAR (Max = 0.65/Min = -0.1 LogMAR) and a mean UNVA of 0.322 LogMAR (Max = 0.6/Min = 0.1 LogMAR).
- Our initial experience indicates that the diffractive-free design reduces patient visual complaints, including dysphotopsia, which is in line with patient reported outcomes available through RayPRO:
  - Of the EMV patients who have reported on their experience through the RayPRO three months after surgery (N=30), 89 % of patients were satisfied with the results (Figure 2a), with no reports of dysphotopsia (Figure 2b).

Parameters	Preoperative	1 week	1 month
SE (D)	-0.95 ± 3.23	-0.32 ± 0.68	-0.34 ± 0.57
Refractive cylinder (D)	-0.91 ± 0.62	-0.70 ± 0.68	-0.72± 0.44
UDVA (logMAR)	0.64 ± 0.38	0.16 ± 0.51	0.11 ± 0.17
CDVA (logMAR)	0.03 ± 0.12	0.0 ± 0.07	0.0 ± 0.08

Table 1. Preoperative and postoperative refractive error and visual acuity







Conclusions

•The use of greater spherical aberrations at the centre of the optic appears to provide patients with a greater range of vision, compared to a standard monofocal IOL.

•Although our experience is early, the design approach provides a high degree of patient satisfaction with good visual outcomes and appears to be a very good option for patients who want to reduce their dependence on glasses after cataract surgery.

References

1. Greenstein S, Pineda R 2nd. The quest for spectacle Independence: a comparison of multifocal intraocular lens implants and pseudophakic monovision for patients with presbyopia. *Semin Ophthalmol.* 2017;32(1):111–115. doi:10.1080/08820538.2016.1228400

2. Sachdev GS, Sachdev M. Optimizing outcomes with multifocal intraocular lenses. *Indian J Ophthalmol.* 2017;65(12):1294–1300.

3. Shah S, Peris-Martinez C, Reinhard T, Vinciguerra P. Visual outcomes after cataract surgery: multifocal versus monofocal intraocular lenses. *J Refract Surg.* 2015;31(10):658–666.

4. Wang SY, Stem MS, Oren G, Shtein R, Lichter PR. Patient-centered and visual quality outcomes of premium cataract surgery: a systematic review. *Eur J Ophthalmol.* 2017;27(4):387–401. doi:10.5301/ejo.5000978

Author Contact Details:

Email: profsunilshah@gmail.com