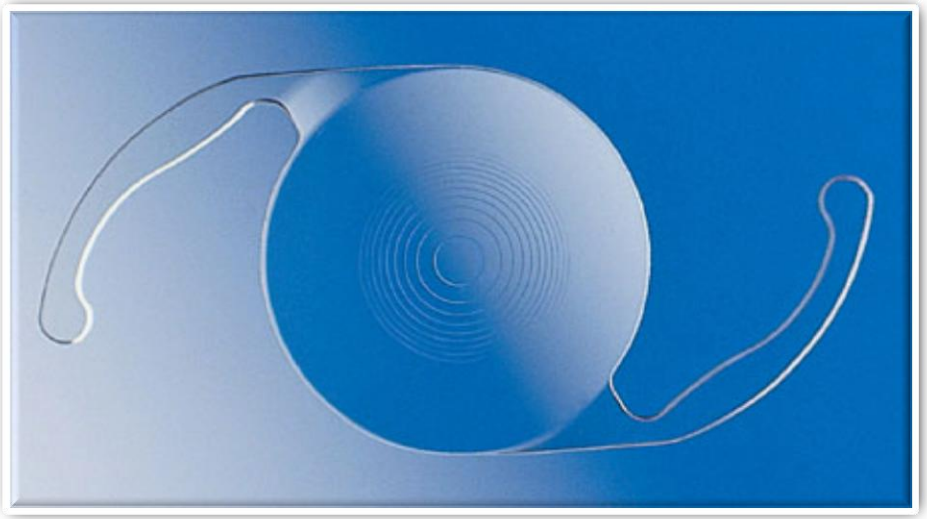


Phacoemulsification with Multifocal IOL

Trend in Cataract Surgery

Cataract responsible for 50-80% bilateral blindness in India[1]

It took until 1990 for phacoemulsification to become the preferred technique of cataract extraction for the majority of cataract surgeons[2]

*ICCE: Intracapsular cataract extraction

#ECCE: Extracapsular cataract extraction

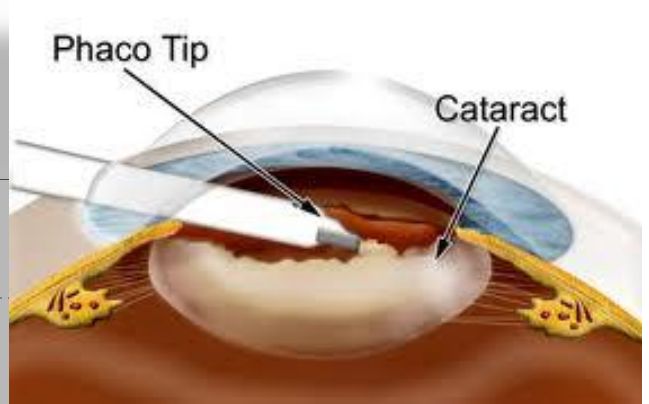
1. Indian J ophthalmol 2008;56:489-494
2. Survey of ophthalmology may–june 2000; 44(6): 541

Phacoemulsification

- Charles Kelman introduced phacoemulsification in 1967 after being inspired by his dentist's ultrasonic probe

- Phacoemulsification-

  sutureless, self-sealing tunnel incisions; and foldable intraocular lenses (IOLs) have changed cataract surgery dramatically over the past two decades



Basic skills in modern cataract surgery

- **Tunnel incision:** proper configuration self-sealing nature
- **Capsulorhexis:** continuous, curvilinear, complete
- **Hydrodissection:** proper, safe and complete
- **Lens rotation:** carefully done, safe
- **Nucleus division:** in different ways
- **Phaco–aspiration:** low power, high vacuum
- Foldable or hydrophilic **IOL implantation**

http://www.expertconsultbook.com/expertconsult/ob/book.do?method=display&type=bookPage&decorator=none&eid=4-u1.0-B978-1-4160-3225-0..00044-1&isbn=978-1-4160-3225-0#lpState=open&lpTab=contentsTab&content=4-u1.0-B978-1-4160-3225-0..00044-1--s0255%3Bfrom%3Dtoc%3Btype%3DbookPage%3Bisbn%3D978-1-4160-3225-0&search=none

IOL Options

- **Monofocal (Traditional)-** most patients need spectacles after implantation, at least for near vision

- **Cataract surgery has evolved** aiming not only to improve vision but also to provide correction of ametropia and presbyopia

Multifocal IOL's are an attractive option

- **Multifocal IOL's** were developed to provide patients with an IOL with more than 1 focal point, enabling good visual acuity at more than 1 distance

J Cataract Refract Surg 2011; 37:859–865
Clinical Ophthalmology 2011:5 45–56

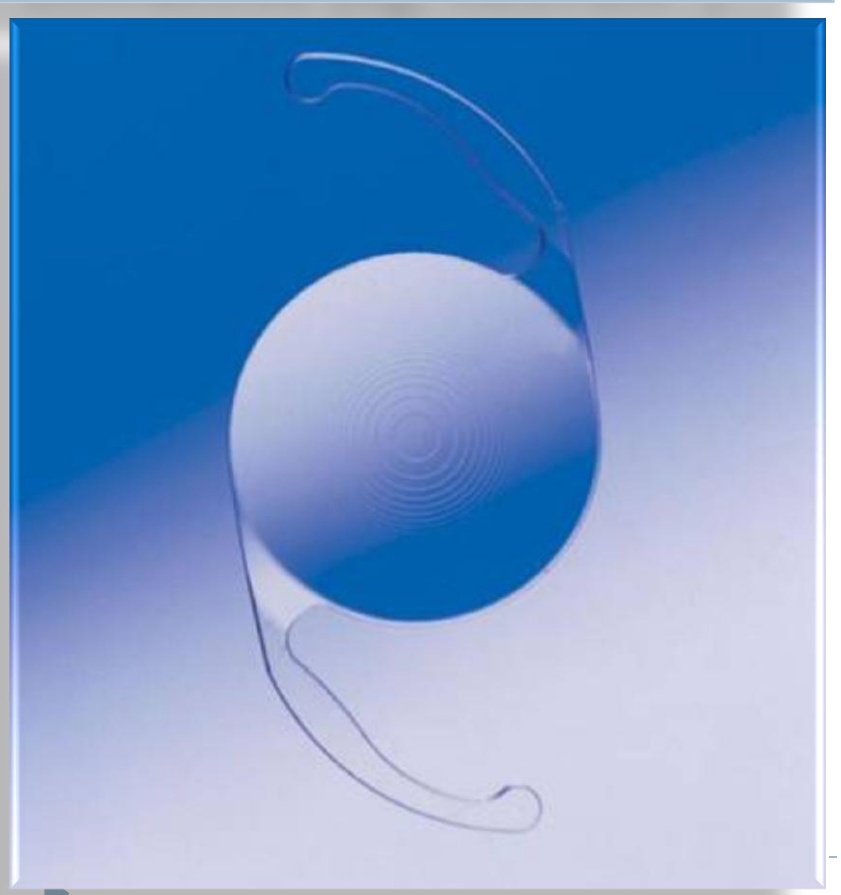
Multifocal IOL Features

- Allow multiple focal distances
- Once securely placed in the capsular bag, the function of these lenses will not change or deteriorate
- Reduce or eliminate need for spectacles

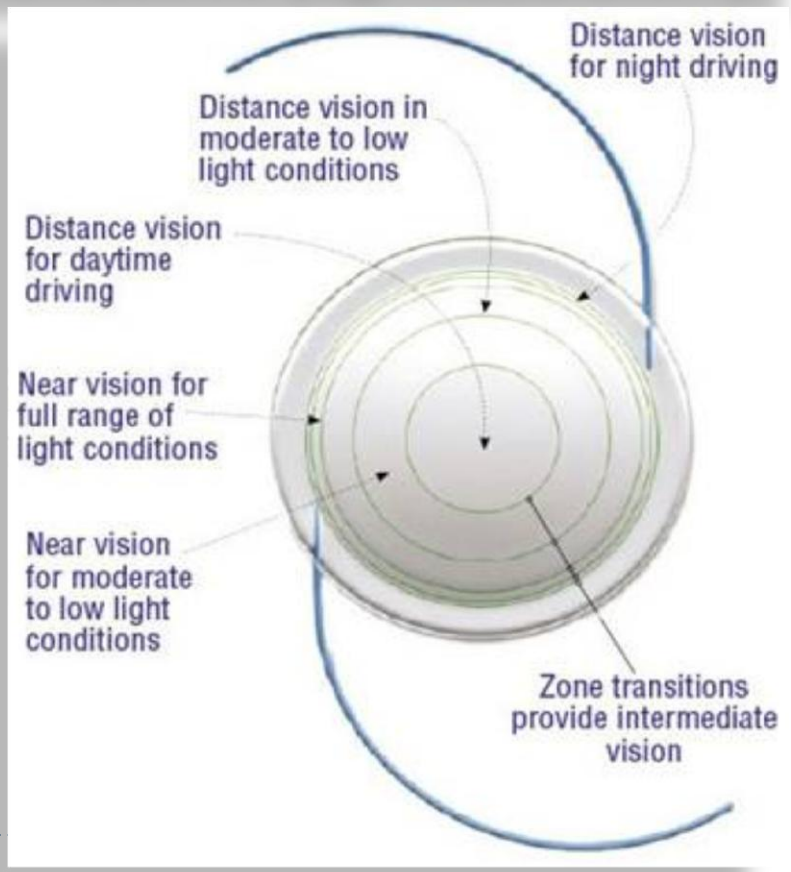
Ophthalmol Clin N Am 2006;19: 89 – 105

Multifocal IOL Types

Diffractive (eg. ReSTOR®)

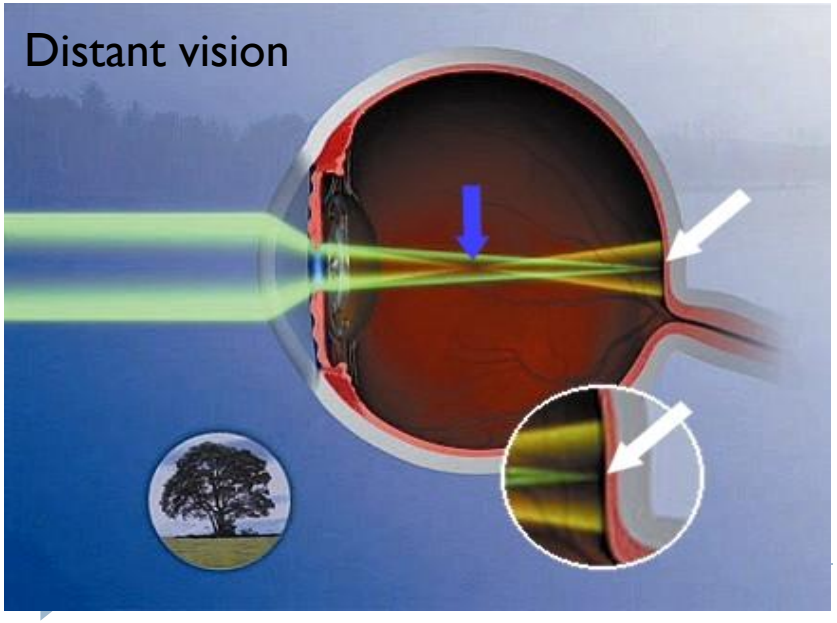


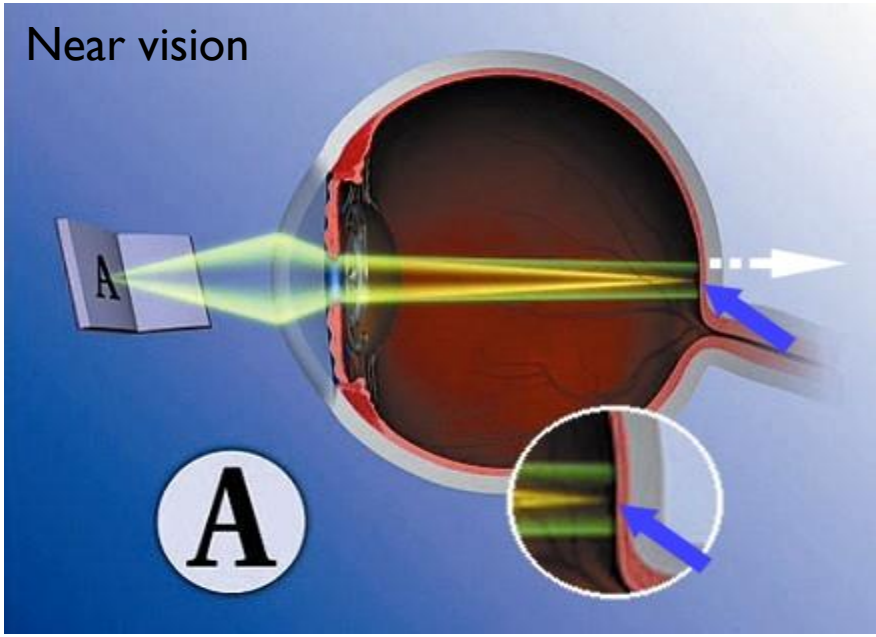
Refractive (eg. ReZOOM®)



Diffractive Multifocal IOL

- Have gradual diffractive steps on the IOL implant that create a smooth transition between focal points
- The IOL also bends incoming light to the multiple focal points to increase vision in various lighting situations
- Haloing is a side effect





Ophthalmol Clin N Am 2006;19: 89 – 105

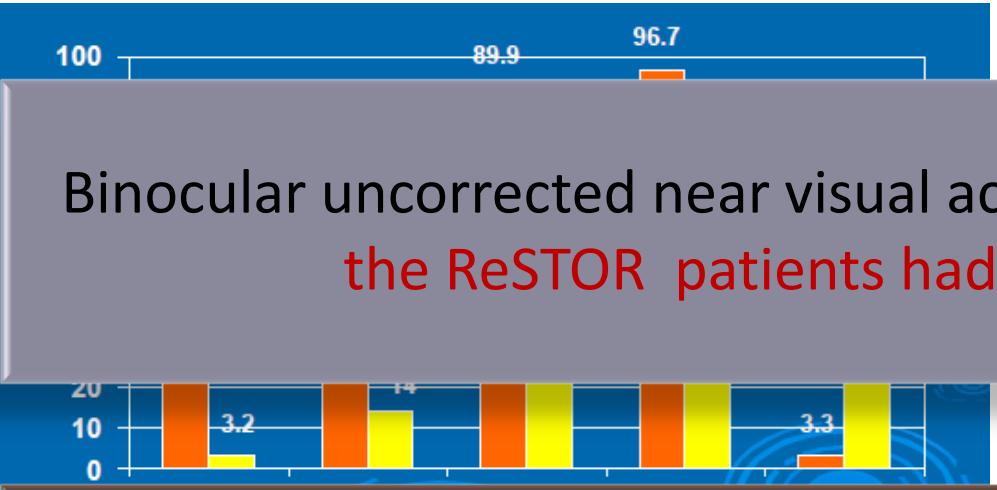
AcrySof ReSTOR IOL

- FDA approved for cataract surgery in 2005
- Uses an apodized diffractive design on the front surface
- Single piece, foldable, hydrophobic acrylic, posterior chamber IOL
- Works well with patients who require:
  - ✓ Stronger reading add
  - ✓ Pupil that still constricts with light and accommodation

Ophthalmol Clin N Am 2006;19: 89 – 105
http://www.reviewofcontactlenses.com/content/c/36169/

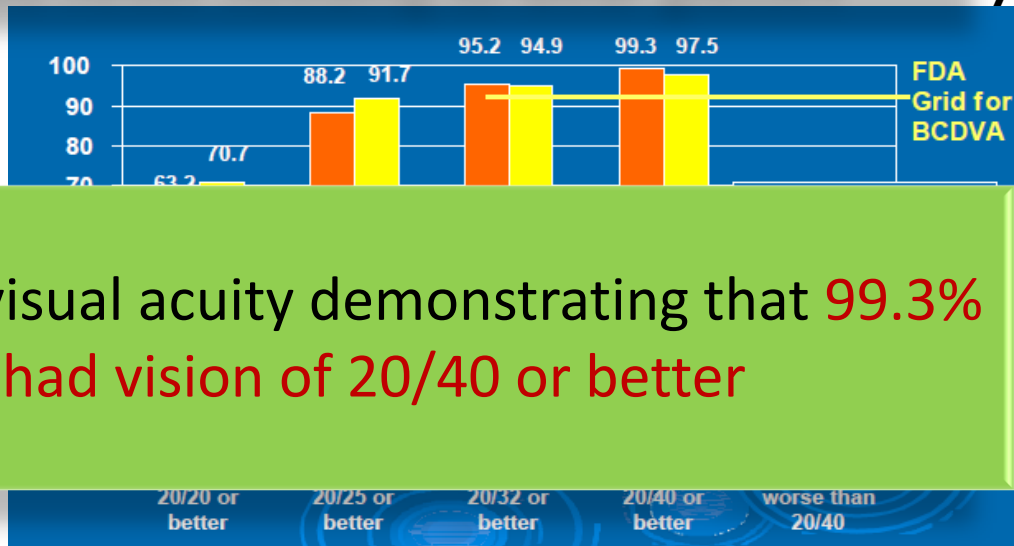
Results with ReSTOR IOL

Binocular uncorrected near visual acuity



Binocular uncorrected near visual acuity demonstrating that 96.7% of the ReSTOR patients had 20/40 vision or better

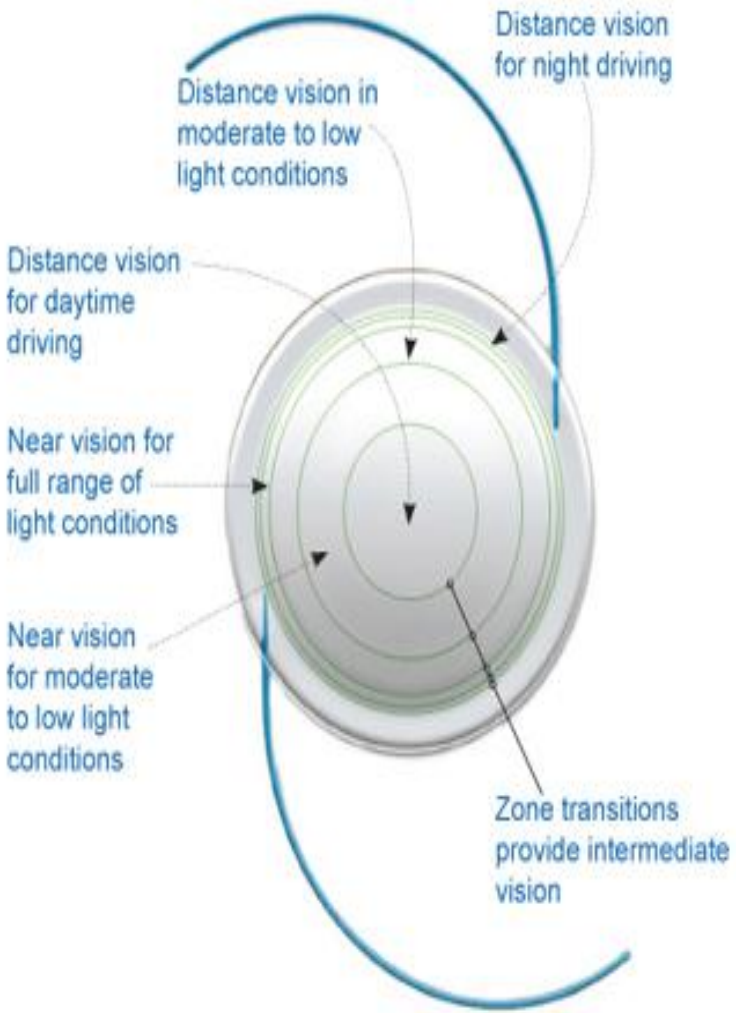
80% of ReSTOR patients reported never needing to wear glasses



Binocular uncorrected distance visual acuity demonstrating that 99.3% of the ReSTOR patients had vision of 20/40 or better

Refractive Multifocal IOL

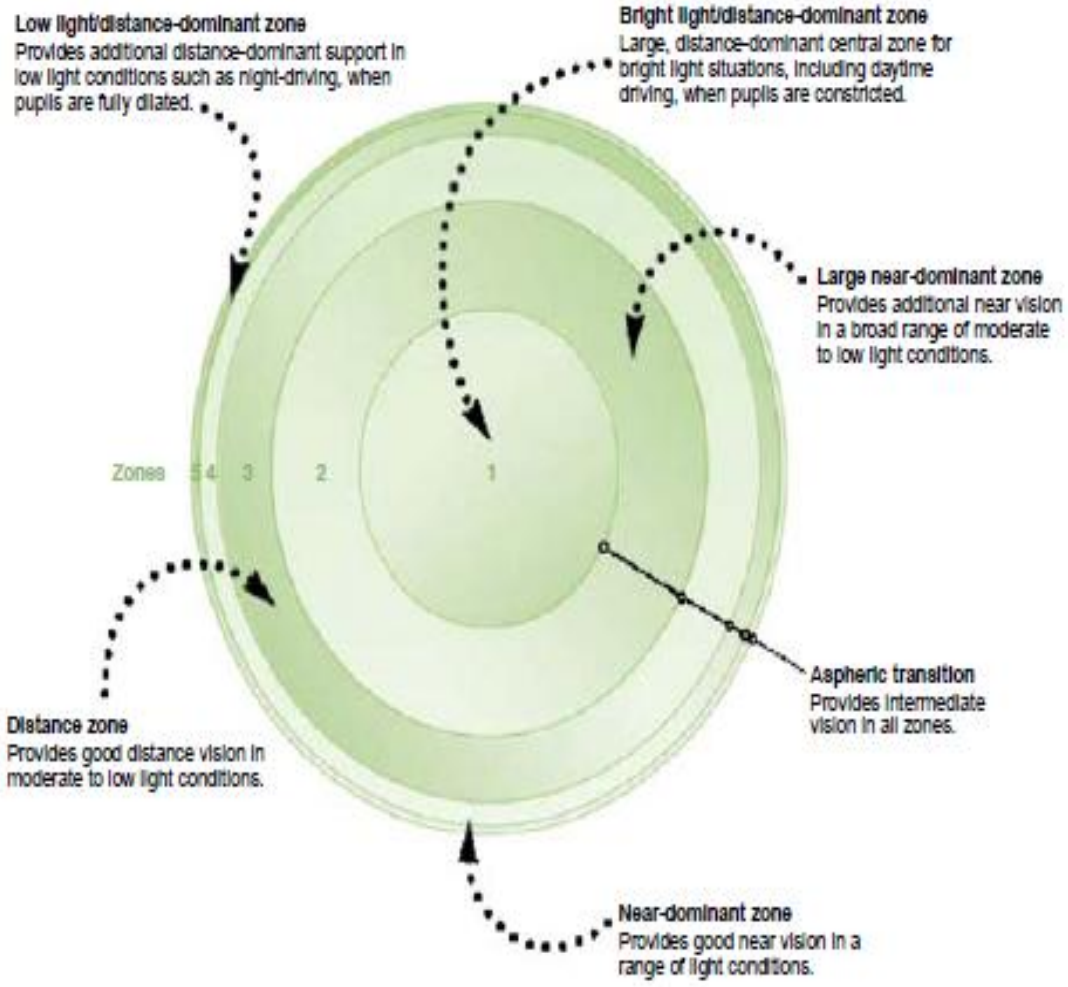
- Designed with several optical zones on the IOL
- Uses these concentric refractive zones to produce near and distance images
- Less frequently used than diffractive IOL because of increased night time visual side effects such as halos around headlights



Ophthalmol Clin N Am 2006;19: 89 – 105
http://www.reviewofcontactlenses.com/content/c/36169/

ReZoom refractive IOL

- Approved by FDA in 2005
- Flexible three-piece lens
- Permits implantation in capsular bag
- Minimizes decentration
- Enhanced to improve optical performance while providing distance, intermediate, and near vision



Ophthalmol Clin N Am 2006;19: 89 – 105

Clinical data have demonstrated :

- Better intermediate vision in a comparison with monofocal IOLs
- Better mean binocular and monocular distance corrected intermediate visual acuity vs. monofocal IOL
- 80% of ReZoom patients were spectacle independent compared with 60% of Array IOL patients

Ophthalmol Clin N Am 2006;19: 89 – 105

Comparison of outcomes with Multifocal IOL's

- **Aim:**

  To compare the clinical outcome of different multifocal intraocular lenses (IOLs)

- **Results:**

- **Multifocal IOLs produced better uncorrected near visual acuity** (0.470 versus 0.141) resulting in **higher spectacle independence** compared with monofocal IOLs

- **Diffractive multifocal IOLs produced** a similar uncorrected distance visual acuity (0.105 versus 0.085) *and* ***better uncorrected near visual acuity*** *(0.217 versus* 0.082) *resulting in higher spectacle independence* **compared with refractive multifocal IOLs**

Halo incidence rates with different types of multifocal implants did not differ significantly

Clinical Ophthalmology 2011:5 45–56

- **Conclusion:**

- Multifocal IOLs provide better uncorrected near visual acuity than monofocal IOLs

- Less need for spectacles

- Multifocal IOL design might play a role in postsurgical outcome, because better results were obtained with diffractive lenses

Contraindications for Multifocal IOL's

Multifocals are contraindicated in patients who have:

- Any type of maculopathy
- Corneal disease
- Opacification of the cornea

They would not do well in patients who have:

- Conditions affecting transmission or processing of light back to the brain (eg. a stroke, some type of atrophy from glaucoma, or a type of genetic disorder that affected the retina, optic nerve, or the brain)

http://eyeworld.org/article.php?sid=5909

Preoperative assessment with Multifocal IOL implantation

- Important to detect macular pathology before cataract surgery
- **OCT (Optical coherence tomography) of the posterior pole should be integrated into the preoperative assessment**
- Better patient selection for multifocal IOLs and long-term results can be achieved with OCT
- OCT can be reliable even in the presence of a mild to moderate cataract

Complications

Halos, Dysphotopsia

Occur in 10 to 20 % of patients, although they have become less common and less intense with modern IOLs

With ReZoom IOL (Refractive):

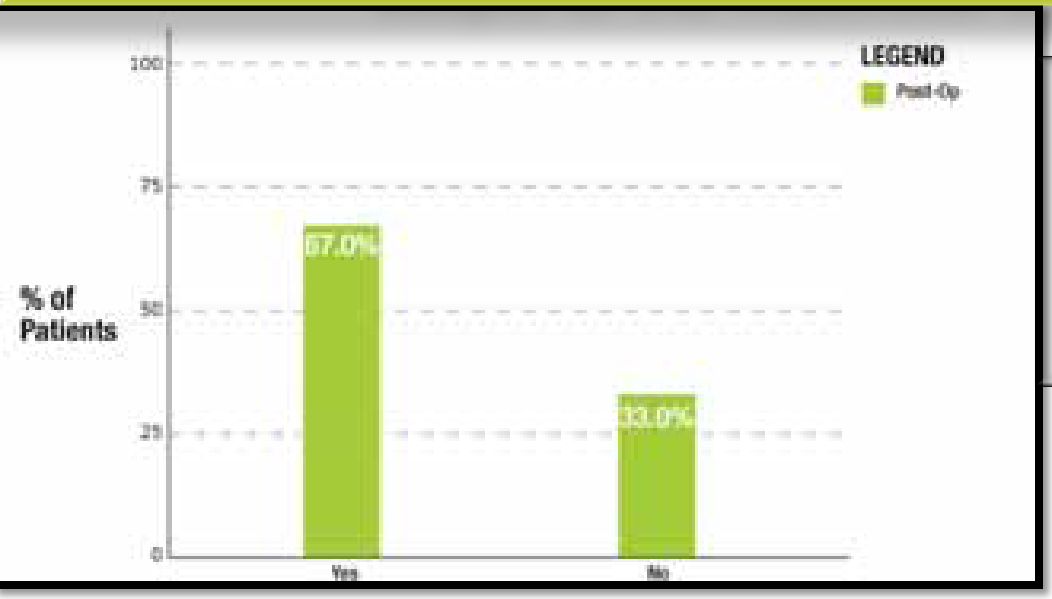
- During initial 90 days postoperative period,
- 31% experienced dysphotopsia
- <2% experienced severe halos (prevented driving at night)

AcrySof Restor IOL (Diffractive):

- < 8% complained night time or day time halos
- one patient complained of lost color vision

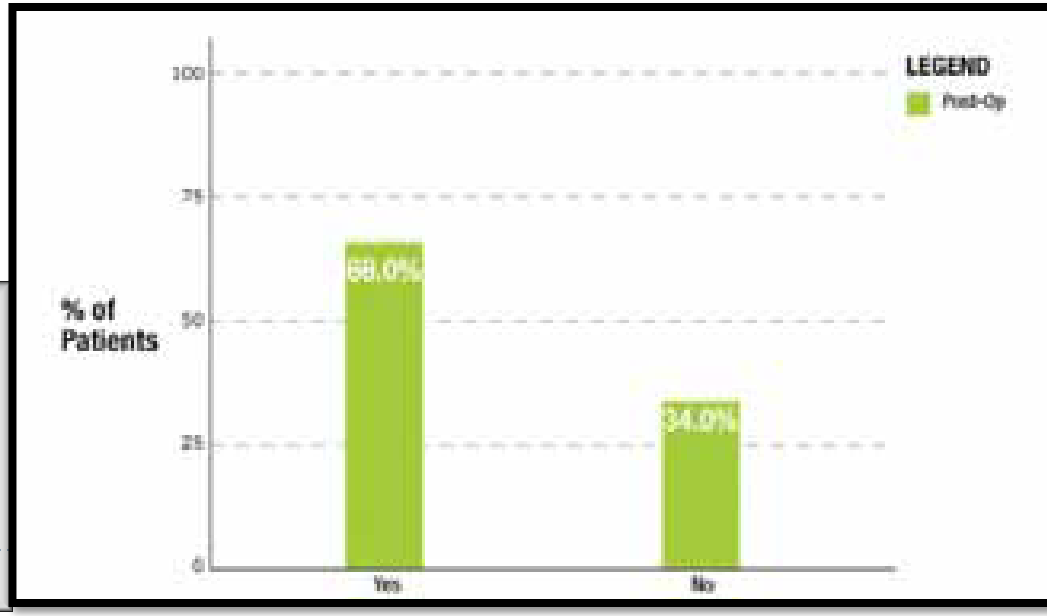
http://m.eurotimes.org/1225/clinical-news/patient-complaints-following-iol-implantation/
CATARACT & REFRACTIVE SURGERY TODAY I SEPTEMBER 2008

Dysphotopsia slowly dissipates over 6 to 12 months, as patients' brains adapts to the multifocal zones of the IOL



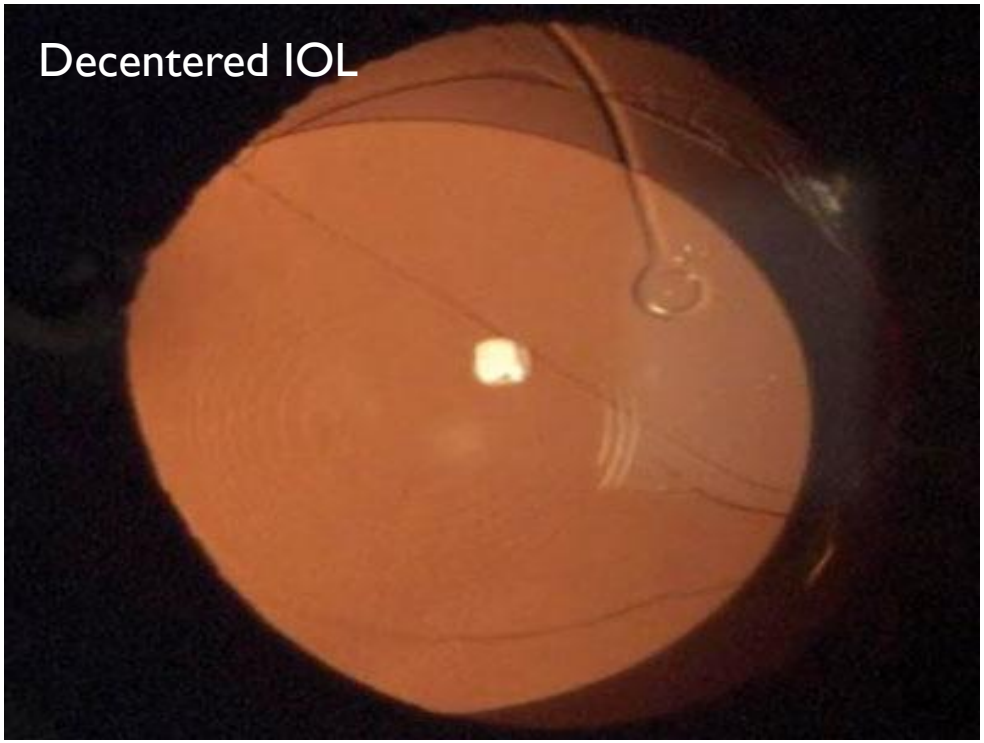
67% patients reported an improvement in halos between the 6-week and 6-month follow-up periods

More than 65% of patients reported an improvement in glare between the 6-week and 6-month follow-up periods



Ghost images

- Rare photic phenomenon
- Generally as a result of decentered IOLs



- Re-positioning the IOL or exchanging it with another multifocal IOL will generally result in a satisfactory outcome

http://m.eurotimes.org/1225/clinical-news/patient-complaints-following-iol-implantation

Most patients report that they are happy with their vision in multifocal IOLs

However, some patients do express dissatisfaction and require further treatment to relieve their symptoms

http://www.reviewofcontactlenses.com/content/c/36169/

Dissatisfaction after implantation of Multifocal IOL

- **Aim:**

  To analyze the symptoms, etiology, and treatment of patient dissatisfaction after multifocal IOL implantation

- **No. of patients**: 76 eyes of 47 patients
- **Results:**

- 94.7% reported blurred vision
- 38.2% reported photic phenomena
- 84.2% were amenable to therapy with refractive surgery, spectacles and laser capsulotomy, the most frequent treatment modalities
- Intraocular lens exchange was performed in 4.0%

Conclusion:

The cause of dissatisfaction after implantation of a multifocal IOL can be identified & effective treatment measures taken in most cases

J Cataract Refract Surg 2011; 37:859–865

PCO

- Leading cause for visual complaints following multifocal IOL implantation
- Make sure to carry out a thorough capsule polishing during surgery
- When Nd-YAG capsulotomy becomes necessary:

Best to use a large 5.0mm, cross-opening, beginning at periphery, to avoid marks on the optic and to reduce photic effects

http://m.eurotimes.org/1225/clinical-news/patient-complaints-following-iol-implantation

Take Home Message

- Latest generation of multifocal IOLs provides patients with a tremendous opportunity for independence from spectacles
- These lenses satisfy more patients and have fewer disadvantages
- However, there is potential for glare, halos, and night vision problems
- These symptoms are usually mild and temporary, but important to address dysphotopsia proactively

Cataract & refractive surgery today may 2012


Thank You