



## DELAYED UNFOLDING OF IOL AFTER CATARACT SURGERY- A REFRACTIVE SURPRISE

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### ABSTRACT

Despite numerous advances in surgical techniques, IOL materials, IOL designs, biometry and IOL power calculation formulas, patients can still have significant residual refractive errors after successful cataract surgery. We are presenting here such rare cause of residual refractive error because of delayed unfolding of IOL after cataract surgery in a 42 year old male with immature senile cataract in right eye.

**Key words:** Surgical techniques, Length measurement, Keratometry measurement.

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### INTRODUCTION

In 1992 prior to the advent of optical biometry, Olsen [1] reported that:

1. 54% of refractive surprise due to errors in axial length measurement
  2. 38% due to errors in predicting the post operative IOL position
  3. 8% due to errors in keratometry measurement.
- Similarly Norr by [2] in 2008 found commonest source of error to be:

1. Postoperative IOL position (36%)
2. Error in postoperative refraction (27%)
3. Axial length measurement (17%)
4. Keratometry (10%)
5. Pupil size (8%)
6. Variation in refraction across pupil and IOL power (1%).

Optical biometry is an essential tool for improving the accuracy of IOL power calculation. In patients with dense cataract where optical biometry is not feasible, immersion ultrasound biometry provide similar level of accuracy. Percival [3] using ultrasound measurements and customised lens constants reported 97% of eyes achieving a refractive outcome within 1 dioptre of target. Gale [4] suggested a benchmark for cataract surgery to achieve 85% within 1dioptre. There are various protocols available to improve the accuracy of measurements and all of them are based on rechecking the measurements when the probability of these occurring in the population is very low. One of the rare causes for residual refractive error is delayed unfolding of IOL which was encountered by us in this case.

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### CASE REPORT

A 42 year old male presented to outpatient

department with three years history of diminution of vision in right eye and intolerance to ambient light. The patient was systemically stable with no history of known drug allergy. Family and personal history was not contributory. Patient underwent thorough ophthalmological examination and found to have best corrected visual acuity of 6/18 in right eye and 6/6 in left eye with no improvement with a pin hole. Head posture maintained. No facial and dental anomaly was found. Hirschberg test was central in both eyes. Orthophoria was found on cover-uncover test. Examination findings are summarised in below table.

Patient underwent slit lamp examination after dilatation and was found to have immature senile cataract (Nuclear cataract grade 2 along with Posterior subcapsular cataract) in his right eye as shown in figure 1.

**On fundus examination**

Media, disc margins, neuroretinal rim and foveal reflex was healthy. Cup: Disc ratio was 0.3:1 and arteriovenous ratio was 2:3 without any tortuosity/ dilatation. There was no evidence of haemorrhages, exudates, perivascular sheathing or neovascularization.

**IOL WORK UP**

Preoperative keratometry (Automated auto refractometer) was:

- K1=44.5×80°
- K2=45.35×170°
- AL=22.40
- IOLP=21.5 (Immersion technique)

Patient underwent phacoemulsification and posterior capsule intraocular lens implantation and Patient was discharged uneventfully. But on the first follow up day patient complained of blurring of vision and found to have astigmatism of -3DC at 140 after refraction. After slit lamp examination under dilatation to our surprise there was incomplete unfolding of one of the heptic of IOL but was in the posterior capsule as shown in figure 3.

Patient was again admitted and proper unfolding was done with dialer with the help of viscoelastics under coverage of antibiotics. On the next day patient had 6/6 (unaided) vision and this resumed a smile on the patient and the surgeon’s face. Comparison of preoperative and postoperative keratometry values are shown below.

Some time in hurry after putting the lens, surgeon do viscoaspiration and hydrate the ports without ensuring whether lens is properly unfolded or not which later on presents as a post operative refractive surprise as experienced by us in this case.

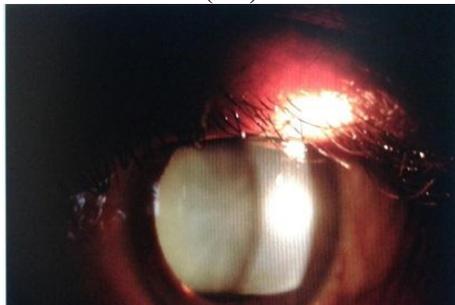
**Table 1. Examination of RE and LE**

Examination	RE	LE
IOP (Applanation) at 12:00 pm	12mm Hg	14mm Hg
Extra Ocular Movements	Full & Free	Full & Free
Forehead	No abnormality detected.	No abnormality detected
Eyeball (size, shape, position)	No abnormality detected.	No abnormality detected.
Eyelid (position, margins, aperture, cilia)	No abnormality detected.	No abnormality detected.
Lacrimal Apparatus	No abnormality detected.	No abnormality detected.
Conjunctiva and Sclera	No abnormality detected.	No abnormality detected.

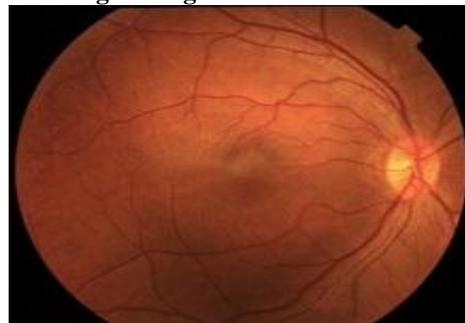
**Table 2. Comparison of K1 & K2**

Preoperative values	Postoperative values
K1=44.5×80°	K1=44.75×90
K2=45.35×170°	K2=45.85×180°

**Fig 1. Showing findings on slit lamp examination (RE)**



**Fig 2. Showing findings on fundus examination (RE)**



**Fig 3. Showing findings (incomplete folding) on slit lamp examination (RE)**



## DISCUSSION

Delayed unfolding of IOL is a rare cause for post operative refractive surprise after an uneventful cataract surgery. Identifying the cause of a refractive surprise is critical in picking the correct refractive enhancement procedure to correct the surprise. Not all surprises need to be corrected. Prior to any such enhancement it is important to identify and demonstrate the benefits as well as the potential risks a patient may expect from an enhancement procedure. It is important to keep in mind the trade-offs a patient may have to accept by carrying out an enhancement procedure. Patients who end up myopic in their non-dominant eye may well prefer the accidental monovision. Similarly patients with multifocal lenses may well prefer a longer working distance attained by a small hyperopic surprise. Prevention of refractive surprise requires a consistent method of biometry. Refractive surprise after cataract surgery may be one of the causes of patient dissatisfaction. Reducing the risk of refractive surprise requires a consistent approach to:

1. Measuring eyes
2. Reconciling the measurement with the patients refractive history
3. Using a modern theoretical formula [5] like the SRK-T, Haigis or the Holladay 2 and customizing formula constants for surgeons as well as different lenses.
4. A methodical assessment with repeat measurement is needed to identify the cause.
5. Combined effect of multiple small factors must be considered.
6. A risk benefit assessment is critical to establish the need for a refractive enhancement.

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7. All surprise need not require surgical correction.

However options for correcting unexpected refractive errors in cataract surgery are: Prescription of glasses, Contact lens use, Repositioning in cases of Toric IOLs, IOL exchange, Piggyback IOL implantation and Laser refractive surgery.

## CONCLUSION

Refractive surprises after cataract surgery may be one of the causes of patient dissatisfaction and poor surgical outcomes. Some time in hurry after putting the lens, surgeon do viscoaspiration and hydrate the ports without ensuring proper unfolding of IOL which later on can present as a post operative refractive surprise. Therefore it is recommended that after putting the lens surgeon must ensure the proper dialing and unfolding of IOL reducing chances of residual refractive errors.

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## CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

## STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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