

## Subnormal Vision in Uneventful Cataract Surgery

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**Key words:** Foldable IOLs, pseudophakic, endophthalmitis, subnormal, lens

**Abstract:** With an exact estimation of the intensity of the Intraocular Lens (IOL), straightforward cataract medical procedure and coincidental postoperative period, the embed is fit for giving a visual acuity of 6/6 and a typical field of vision. Be that as it may, post operating outcomes are not generally in accordance with expectations. This postulation is an effort to estimate of the triggers of subnormal vision after coincidental cataract operation with back chamber intraocular lens through various careful strategies at the Krishna Institute of Medical Sciences, Karad, Maharashtra. Also, the connection between the kind of surgery and the IOL utilized and its impact on subnormal postoperative vision in Krishna Hospital. 185 of the 1,230 patients who experienced uneventful cataract surgery were determined to have sub-typical vision in our 18-month study. All pseudophakic patients who have experienced problematic cataract surgery with typical preoperative appraisal. The predominance of subnormal vision in our study was roughly 14.18%. Of the considerable number of components of sub-ordinary vision, the recurrence of Post-Capsular Opacification (PCO) was high (80.87%). The incidence of PCO was lower in the foldable IOLs contrasted with the square edge and the non-square edge.

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## INTRODUCTION

With precise estimation of intensity of intraocular lens, simple cataract medical procedure and uneventful post operating duration, the embed is fit for giving a visual sharpness of 6/6, an ordinary field of vision with no amplification and no chromatic and round deviations. Anyway post operative outcomes are not continually as indicated by the expectation. This study is an endeavor to discover reasons for odd vision among patients experienced uneventful extra capsular cataract extraction with back chamber intraocular lens by different careful techniques.

### Aim and objectives

**Aim:** To study the incidence of sub-normal vision after uneventful cataract surgery and find out relationship between different types of IOL and causes of sub-normal vision.

**Objectives:** To study the incidence of subnormal vision in patients who have undergone uneventful cataract surgery with posterior IOL implant in Krishna Hospital, in a period of 18 months.

**Literature review:** Colonel Henry Smith proposed intracapsular extraction without internal interference by

the AC. He used direct pressure with a muscle hook on the inferior peripheral cornea to remove the zonules. With sufficient mechanical zonulolysis, he then expressed the lens using pressure from the muscle hook creeping superiorly over the cornea. Because the zonules were still attached at the 12 o'clock position, they would act as a hinge causing the lens to tumble. The tumbled lens would thus present its inferior pole to the wound first. Further expression would finally, expel the lens from the eye. Later, Smith (1926) would describe a modification of his mechanical zonulolysis that would allow for an actual linear sliding of the whole lens without tumbling. Thus was born the famed Smith-Indian linear sliding maneuver. The "Indian" comes from the fact that Smith's surgery was performed during military duty while in India. He learned the technique from Lieutenant Colonel Mulroney in 1894. Smith picked up on the procedure, popularized it and published in 1926.

The next idea devised to remove the lens, traction, did improve its safety. A forceps was introduced to grasp the inferior pole of the lens. Gentle traction coupled with side-to-side movements enabled (Knapp, 1915) to lyse inferior zonules. With a continuous grasp on the capsule, a Smith muscle hook was used to help the tumbling lens.

Verhoeff (1916) was not satisfied with the tumbling maneuver. He designed the Verhoeff (1916) with open-ended half rings at the tips. Through a superior-sector iridectomy, Verhoeff grasped the tilted-up 12 o'clock pole of the lens and gently slid out the cataract. The forceps was designed in such a way that its tips were gentle on the capsule, thus, reducing risk of capsular rupture. Since, the lens was actually taken out of the eye without tumbling and with external pressure, there was less risk of in vitro damage (Verhoeff, 1916).

Another ingenious idea was proposed by Stoewer (1902). He used a suction device attached to the lens for lifting it out of the eye (Stoewer, 1902). Barraquer (1958) performed phacoerysis with a pneumatic forceps. His son, Jose Barraquer, developed an electric vacuum pump machine with a special erysiphake handle for suction removal of the cataract (Barraquer 1958). American surgeons invested in the machine but found it bulky and awkward; they still preferred the forceps delivery with the Verhoeff forceps, the Kalt smooth forceps or the Arruga Forceps.

The next breakthrough came to intracapsular surgery with the development of chemical zonulolysis. Mechanical Zonular destruction was first used by Christiaan and Luca. The latter used a curved probe to press down on the limbus. Barraquer (1958) demonstrated

the dramatic efficacy of chemical zonulolysis using an enzyme  $\alpha$ -chymotrypsin. Surgeons performed a new, simple method to loosen the lens completely without any deforming pressure. The major concern was the optical rehabilitation of the aphakic patient with glasses. Intraocular Lens (IOL) development from the 1940s through the 1970s enhanced aphakic rehabilitation during this period. Harold Ridley performed his first artificial lens implant at St Thomas Hospital in London on Nov 29, 1949 but the approach was not correct for the popular ICCE movement. The ICCE left nothing to support Ridley's posterior chamber lens. The intact zonular-capsular diaphragm was the safe scaffolding Ridley was looking for and after trying only two posterior chamber lenses in patients after ICCE; he put all the rest in ECCE patients (Ridley, 1960).

Kelman introduced his phacoemulsifier in 1967<sup>25</sup> but the potential for complications concerned many intracapsular surgeons. Seeing the nucleus manipulated into the AC and then blasted apart by the sonification tip was enough to dissuade many surgeons from straying from their refined and safe whole lens removal or ECCE nucleus. There were a few interested surgeons, however, who did like the Kelman concept. In the early 1970s, Sinskey used a one-handed procedure to eject the main nucleus, accompanied by the breakdown and ambition of the peripheral nuclear shell. Olson of Salt Lake City described the use of the Sovereign with Whitestar Technology in hyperpulse mode in 2001 and performed phacoemulsification through a 1-mm incision. He observed minimal thermal effect on the cornea using the micropulse technology and called the technique 'microphaco', Olson (2004), along with Soscia are accredited with important studies demonstrating the safety of this technology and thus, addressing early concerns raised by cataract surgeons.

Moving further away from ultrasound, alternative sources of energy were sought and a myriad of innovative ways of removing cataractous material were introduced. Laser photolysis proved to be one of the more successful additions to the armamentarium of cataract removal devices. The first use of lasers for cataract removal was reported by Krasnov (1975).

**Post-op endophthalmitis:** Endophthalmitis can be a rare but potentially devastating complication of intraocular surgery. In recent years, refinements in the diagnosis and treatment of this sight-threatening condition have led to significant improvement in visual prognosis. Indeed, with prompt medical and surgical intervention, up to 74% of patients attain visual-acuity outcomes of 20/100 or better (Pavan *et al.*, 1994; Weber *et al.*, 1986).

The most frequent cause of postoperative endophthalmitis is the exterior flora of the individual, i.e., organisms colonizing the conjunctival surface and periocular tissues such as the eyelid and nose (Speaker *et al.*, 1991).

Medical intervention is the Mainstay of Endophthalmitis therapy. Intravitreal antibiotic injection is the principal element of endophthalmitis treatment.

## MATERIALS AND METHODS

The 183 patients were treated with sub-normal vision after irregular surgery at Krishna Hospital over a span of 18 months and were included in the study. All pseudophakic patients who have undergone cataract surgery with normal preoperative assessment. Inadvertent cataract surgery does not cause intraoperative problems that can impact the results of the operation and result in a subnormal vision. Patients who have had a known case of diabetes and depression without maculopathy and have had disproportionately cataract operation.

## RESULTS AND DISCUSSION

The number of patients with SICS is 1154 and the number of patients is undergone phacoemulsification 136. The total number of cataract surgeries in the study period is 1290.

The data we received at the end of the study suggested that there was not much change in the number of cases of sub-normal vision above 40 years of age (Table 1). In Table 2 suggests that there was no variation in male and female ratio for sub-normal vision in our study.

Table 3 shows that incidence of sub-normal vision is more among SICS than phacoemulsification. In our study, there were 1154 patients who underwent SICS surgery, out of this 173 patients were diagnosed with sub-normal vision which comes to 14.99%.

In the other category, 136 patients underwent phacoemulsification surgery, out of which 10 patients were diagnosed with sub-normal vision which come to 7.35%. The study shows that the incidence of subnormal vision was much lower in phacoemulsification than SICS. Data in Table 4 shows that Incidence of sub-normal vision is least in Foldable (7.35%) followed by Square Edge (7.98%) and Non Square Edge (17.32%). In non-square edge category, there were 866 patients implanted with this type of IOL out of which 150 were diagnosed with sub-normal vision which come to 17.32%. In square edge category there were 288 patients implanted with this type of IOL, out of which 23 had sub-normal vision which is 7.98%. In the last, foldable IOL category there were 136 patients, out of which 10 patients were diagnosed with sub-normal vision which is 7.35%.

In our study out of 1290 cataract surgery, 183 patients were diagnosed with sub-normal vision which comes to 14.18%. Even after uneventful cataract surgery, sub-normal vision is not very uncommon condition which most of the ophthalmologists encounter in their practice. Type of IOL and type of surgery has a major influence on the final outcome, post uneventful cataract surgery. It is expected that after uneventful cataract surgery with in the bag IOL and uncomplicated post operative period, the patient should have a normal 6/6 vision. But some patients with normal fundus show variation in their vision even after uneventful surgery.

Table 1: Age wise distribution of sub-normal vision

Age	No. of cases
40-50	21
51-60	60
61-70	77
>70	25
Total	183

Table 2: Sex wise distribution

Sex	Cases
Male	94
Female	89
Total	183

Table 3: Relation between type of surgery and sub-normal vision

Types of surgery	Normal vision	Sub-normal vision	Sub-normal vision (%)	Total	p-value
SICS	981	173	14.99	1154	0.02529
Phaco	126	10	7.35	136	
Total	1107	183	14.18	1290	

p = 0.02529 (<0.05)

Table 4: Correlation between IOL type and sub-normal vision

Types of IOL	Normal	Sub-normal	Sub-normal (%)	Total	p-value
Square edge	265	23	7.98	288	0.0001
Non square edge	716	150	17.32	866	
Foldable	126	10	7.35	136	
Total	1107	183	14.18	1290	

p = 0.0001 (<0.05)

## CONCLUSION

This hospital based data suggests that the prevalence of sub-normal vision after uneventful cataract surgery was approximately 14.18% and of posterior capsular opacity was approximately 11.47%. In this study following results were observed that incidence of sub-normal vision is more among SICS than phacoemulsification. Incidence of sub-normal vision is least in Foldable followed by Square Edge and Non Square Edge. Occurrence of PCO is least in Foldable as compared with Square Edge and Non Square Edge. The incidence of PCO in square edge and non-square edge IOLs is lower in square edge IOLs. Occurrence of PCO, CME and DME are altogether low in Phaco than SICS. Occurrence of malposition of IOL, TASS and endophthalmitis isn't critical. There is high chance of malposition of IOL when placed in the sulcus as compared to in the bag IOL. Among all the reasons for sub-typical vision occurrence of PCO was most extreme with 80.87%. In this study, phacoemulsification proves to being a superior choice of cataract extraction. Square edge design IOLs helps in forestalling early PCO. Foldable IOLs implantation is desirable over PMMA non foldable IOLs. Confirmation of IOL in the bag is necessary on an intra-operative basis to avoid subluxation of IOL.

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