

# A Clinical Investigation into Post-Operative Visual Recovery Following Cataract Extraction Procedures

Chayanika Deka<sup>1</sup>, Aalia Abdullah<sup>2</sup>, Ayush Kumar<sup>3</sup>, Mr. Tarun Kumar Soni<sup>4</sup>

<sup>1</sup> M. Sc. Optometry & Ophthalmic Technology, Department of Allied and Healthcare Sciences, Mewar University, Chittorgarh, Rajasthan, India

<sup>2</sup> Assistant Professor, Department of Allied and Healthcare, Max Institute of Allied and Paramedical Education, Lucknow, Uttarpradesh, India

<sup>3</sup> Assistant Technologist, District Hospital, Chittorgarh, Rajasthan, India

<sup>4</sup> Tutor, Department of Allied and Healthcare Sciences, Mewar University, Chittorgarh, Rajasthan, India

## **Abstract—OBJECTIVES**

### **Primary Objective-**

To assess postoperative visual outcomes after cataract surgery. Secondary Objectives-

To evaluate changes in UCVA and BCVA.

To study postoperative refractive outcomes.

To identify early and late postoperative complications.

To analyze factors associated with poor visual outcomes.

### **METHODS:**

From Oct 2024 to Jan 2025, this research was undertaken in the Keshav Porwal Hospital as well as in the Shree Siddhi Vinayak Hospital, Bhilwara, Rajasthan. This study included 120 patients aged  $\geq 50$  years diagnosed with age-related cataract. Preoperative visual acuity was recorded using Snellen's chart. Patients were managed using either ultrasonic phacoemulsification or Manual small incision cataract surgery (MSICS), followed by placement of posterior chamber IOL. Postoperative visual acuity was assessed on day 1, 1 week, 4 weeks and 6 weeks after surgery. Data were analyzed to determine the proportion of patients achieving visual acuity of 6/18 or better and 6/6.

### **RESULTS:**

Initial assessments revealed that a significant number of participants presented with a baseline vision of counting fingers (CF) at a distance of 3 meters, or an equivalent of 6/60 on the snellen scale. Postoperatively, a significant improvement in visual acuity was observed, with the majority achieving 6/18 or better, and a considerable proportion attaining 6/6 vision. Phacoemulsification showed slightly better visual outcomes compared to MSICS, although both techniques were effective in restoring vision.

### **CONCLUSION:**

Cataract surgery is highly effective in improving visual acuity and reducing visual impairment among elderly patients. Regular assessment of surgical outcomes is essential to maintain high standards of ophthalmic care and enhance patient satisfaction.

**Index Terms**—Cataract, Visual acuity, Phacoemulsification, MSICS, Intraocular lens (IOL), Postoperative visual outcome.

## I. INTRODUCTION

Vision plays a vital role in maintaining independence, productivity, and overall quality of life. Any impairment of vision significantly affects daily activities and socioeconomic well-being.[1] Cataract, defined as the opacification of the crystalline lens of the eye, is the leading cause of reversible blindness worldwide.[2] According to the WHO, cataract accounts for nearly half of global blindness, specifically, affecting the elderly population within emerging nations like India.[6] Age-related (senile) cataract is the most common type and typically occurs in individuals above 50 years of age. [4] The condition develops gradually and presents with symptoms such as blurred vision, glare, reduced contrast sensitivity, and difficulty in night vision. If left untreated, cataract can lead to severe visual impairment or blindness. [4] Cataract surgery is the only effective treatment for restoring vision. Over the years, surgical techniques have evolved from intracapsular and extracapsular extraction to advanced procedures such as ultrasonic phacoemulsification and MSICS, followed by the

placement of a posterior Intraocular lens.[3],[4] These modern techniques have significantly improved surgical safety, reduced complications, and enhanced postoperative visual outcomes.

Assessment of visual outcomes after cataract surgery is essential for evaluating the quality of surgical services and ensuring adherence to international standards. The World Health Organization recommends that at least 80% of operated eyes should achieve a postoperative visual acuity of 6/18 or better.[13] Regular monitoring of visual outcomes is essential for evaluating the quality of surgical services and enhancing patient satisfaction.[6]

#### Clinical Features of Cataract:

The symptoms and signs of cataract depend on the type and stage of lens opacity. Slit lamp examination remains the gold standard for grading and classifying these opacities. [3]

##### 1. Symptoms:

- Painless progressive diminution of vision– Most common presenting complaint.
- Blurred or cloudy vision
- Glare and halos around lights– More common in posterior subcapsular cataract.[4]
- Difficulty in night vision
- Frequent change of glasses
- Monocular diplopia (double vision in one eye)
- Improvement of near vision in elderly (“Second sight”)– Seen in nuclear cataract due to myopic shift.[3]

##### 2. Signs:

On ocular examination:

###### A. Visual Acuity:

- Reduced visual acuity (e.g., 6/60, counting fingers, hand movements in advanced cases)

###### B. Torchlight Examination:

- Loss of lens transparency
- Greyish or white pupillary reflex

###### C. Slit Lamp Examination:

Different types of cataract:

- Nuclear cataract – Yellow/brown discoloration of nucleus.[3]
- Cortical cataract – Spoke-like opacities.[4]
- Posterior subcapsular cataract – Plaque-like opacity behind the nucleus.[3]

###### D. Fundus Examination:

- May be difficult in mature cataract
- Important to rule out retinal pathology to ensure a good visual prognosis.[3]

Types of Age-Related Cataract: [3]

- Nuclear sclerosis
- Cortical cataract
- Posterior subcapsular cataract
- Mature cataract
- Hypermature cataract

Treatment of Cataract:

1. There is no medical treatment proven to reverse or cure cataract. Surgery is the only definitive management. [3]

Types of Cataract Surgery:

###### A. Phacoemulsification:[3],[4]

- Most commonly performed modern technique
- Small (2.2–3.0 mm) corneal incision
- Ultrasound used to emulsify lens
- Foldable IOL implanted
- Faster recovery
- Less induced astigmatism

###### B. Manual Small Incision Cataract Surgery (MSICS):[15],[17]

- Scleral tunnel incision
- Lens removed manually
- Rigid PMMA IOL implanted
- Cost-effective
- Suitable for dense cataracts

###### C. Extracapsular Cataract Extraction (ECCE):[3],[4]

- Larger incision
- Rarely performed now
- Slower Recovery

###### 2. Intraocular Lens (IOL) Implantation:

- After removal of the cataractous lens, an artificial intraocular lens is implanted to restore refractive power.[3],[4]

Types of IOL:

- Monofocal IOL
- Multifocal IOL
- Toric IOL (for astigmatism correction)
- Foldable or Rigid IOL[3],[4]
- Proper IOL power calculation (biometry) is

essential for achieving good postoperative visual outcome.[3],[4]

1. Postoperative Treatment:

Medications:

- Topical antibiotics[25]
- Steroid eye drops[3],[4]
- NSAID drops[3],[4]

Instructions:

- Avoid eye rubbing
- Avoid heavy lifting
- Maintain eye hygiene
- Regular follow-up visits[10]

Complications of Cataract Surgery: Early Post-operative complications:

- Endophthalmitis [24],[25]
- Increased intraocular pressure
- Corneal edema
- Dry eye

Late post-operative complications:

- Posterior capsule opacification (PCO)[8]
- Cystoid macular edema[7]
- Retinal detachment
- IOL displacement

II. REVIEW OF LITERATURE

1. Global Burden of Cataract:

According to the World Health Organization (WHO) 2026 report, at least 2.2 billion people globally have a vision impairment, with at least 1 billion cases being preventable or unaddressed.[1] Cataract remains a leading cause of distance vision impairment, affecting approximately 94 million people worldwide.[1] Recent data from the Lancet Global Health (2026)[2] reveals that nearly 1 in 2 people requiring sight-restoring cataract surgery still lack access to care, highlighting a significant global surgical gap.

2. Historical Evolution of Cataract Surgery and Outcomes:

Earlier techniques like intracapsular cataract extraction ICCE showed limited visual outcomes due to aphakia and high postoperative refractive errors.[3]

With the introduction of ECCE and posterior chamber IOL implantation, visual outcomes significantly improved. [3]

Modern phacoemulsification further enhanced results due to:

- Smaller incision
- Reduced surgically induced astigmatism
- Faster visual rehabilitation[3]

According to Kanski et al. Phacoemulsification with foldable IOL implantation is considered the gold standard technique with excellent postoperative visual prognosis in uncomplicated cases.[3]

3. Determinants of Visual Outcome:

1.1 Preoperative Factors:

Ophthalmology by Myron Yanoff and Jay S. Duker[4] emphasized that visual outcomes depend heavily on:

- Pre-existing retinal pathology
- Glaucoma
- Corneal opacity
- Diabetic retinopathy
- Accurate biometry and IOL power calculation
- Studies show that undetected macular pathology significantly reduces postoperative best corrected visual acuity (BCVA).

1.2 Surgical Technique:

Several comparative studies between Ultrasonic Phacoemulsification and MSICS show:

<u>Parameter</u>	<u>Phaco</u>	<u>MSICS</u>
Visual Recovery	Faster	Slightly delayed
Astigmatism	Less	Slightly more
Cost	High.	Low
Visual Outcome	Comparable	Comparable

Research from India and other developing countries demonstrated that MSICS provides visual outcomes comparable to phacoemulsification, especially in high-volume settings.

Gullapalli N. V. S. Murthy highlighted the importance of monitoring outcomes in community cataract programs to improve surgical quality. [6]

4. WHO Outcome Classification:

The World Health Organization[5] classifies outcomes as:

- Good:  $\geq 6/18$
- Borderline:  $< 6/18$  to  $6/60$
- Poor:  $< 6/60$

Studies across Asia and Africa report:

- 75–90% good outcomes
- 5–15% borderline
- $< 10\%$  poor outcomes[6]

Poor outcomes are often associated with:

- Posterior capsular rupture
- Endophthalmitis
- Cystoid macular edema
- Posterior capsular opacification[7]

#### 5. Postoperative Complications Affecting Visual Outcome:

Literature consistently identifies:

- Posterior Capsular Opacification (PCO) – Most common late complication[8]
- Surgically induced astigmatism
- Cystoid macular edema[7]
- Endophthalmitis[9]
- Residual refractive error

PCO incidence varies between 10–30% depending on IOL material and surgical technique. [8]

#### 6. Visual Acuity vs Functional Vision:

Recent literature emphasizes that assessment should not be limited to Snellen's visual acuity alone.[10]

Functional outcomes include:

- Contrast sensitivity
- Glare testing
- Quality of life questionnaires
- Patient satisfaction

Studies demonstrate significant improvement in:

- Daily activities
- Mobility
- Independence[10]
- Psychological well-being

#### 7. Outcome Monitoring in India:

Indian epidemiological studies have shown improved visual outcomes over the last two decades[6] due to:

- Increased phacoemulsification adoption[3]
- Better IOL technology[3],[4]
- Structured training programs[6]
- Government blindness control initiatives[1],[6]

Hospital-based audits report

- 85–95% patients achieving BCVA  $\geq 6/18$
- Significant reduction in poor outcomes

#### 8. Gap Identified in Literature:

Although multiple studies show good postoperative outcomes:

- Some rural setups still report suboptimal results[6]
- Limited data is available regarding long-term visual quality after cataract surgery[10]
- Variation in surgical outcomes exists between different surgical centers[8]
- Insufficient documentation of functional visual outcomes in many studies[10]

Therefore, regular assessment of visual outcomes is necessary to maintain surgical standards and improve patient care. [5]

### III. AIM AND OBJECTIVES

Aim:

To assess the visual outcomes after cataract surgery and evaluate the improvement in visual acuity among patients undergoing cataract extraction with IOL implantation.

Objectives:

Primary Objective-

- To assess postoperative visual outcomes after cataract surgery.

Secondary Objectives-

- To evaluate changes in UCVA and BCVA.
- To study postoperative refractive outcomes.
- To identify early and late postoperative complications.
- To analyze factors associated with poor visual outcomes.

### IV. RESEARCH METHODOLOGY

Materials and Methods:

- Study Design: Prospective observational Study
- Study setting: Nalbari Eye Hospital, Nalbari
- Study Population: 120 Patients who were undergoing cataract surgery.
- Study Duration:

-Data collection:- 3 Months (Oct'2024 to Jan'2025)

-Analysis:- 2 months

**Inclusion Criteria:**

- Adults aged  $\geq 50$  years.
- Diagnosed with age-related cataract.
- Undergoing Ultrasonic Phacoemulsification or MSICS.
- Willing to give informed consent.
- Preoperative and postoperative follow-up available.

**Exclusion Criteria:**

- Traumatic, congenital, or complicated cataracts.
  - Pre-existing eye diseases affecting vision (ARMD, DR, advanced glaucoma, corneal opacity).
  - Intraoperative complications (if excluding).
  - Patients unwilling or unable to complete follow-up.
- Sample size: 120 patients

**Methodology/Procedure:**

**1. Pre-operative Assessment:**

- Detailed history
  - Visual acuity (UCVA & BCVA)
  - Slit-lamp examination
  - IOP measurement
  - Keratometry, biometry
  - Fundus evaluation
- Surgical Procedure:**
- Standard MSICS or Ultrasonic phacoemulsification with PCIOL implantation (documented).

A pre-operative evaluation of the eye including the detailed history and visual acuity is done. Slit-lamp grading was done for nuclear cataract (nuclear color, nuclear opalescence), cortical cataract (C) and posterior subcapsular cataract (P). Tonometer was used to measure IOP during the pre-operative evaluation of cataract patients to establish a baseline and screen for underlying conditions like glaucoma or ocular hypertension. Keratometry and A scan ultrasound were carried out to determine the required dioptric power of the IOL. Fundus evaluation was done pre-operatively to rule out posterior segment diseases that could limit visual recovery. Traumatic cataracts and cataract associated with corneal lesions, glaucoma, hypertension, diabetic mellitus and other ocular comorbidities were excluded. Operations on cataract are carried out under operating microscope and by using disposable microsurgical instruments.

**2. Post-operative Assessment:**

- Visual acuity on Day 1, Week 1, Week 4, and Week 6
- Slit-lamp evaluation
- IOP check

- Evaluation for complications
- Refraction at 4–6 weeks

Operated patients were assessed on a slit-lamp biomicroscope on the 1st day after surgery and again during the 1st week, to review cornea, surgical wound, anterior chamber and implanted lens. The vitreous and retina were examined with +90 D Volk lens. Steroid, antibiotic, cycloplegic-mydratic and anti-inflammatory eye drops were used for 2 to 6 weeks after surgery.

At follow ups, the eye was examined for post-operative complications and the presenting vision was recorded by Snellen's chart and with pinhole to determine the best corrected visual acuity (BCVA). At the 6-week follow-up, besides correcting the refractive error, patients who had persisting post-operative complications were advised to come for further follow-up and management till 3 months. All patients with vision less than 6/18 with any underlying cause that was amenable to treatment were referred for treatment including Nd:YAG laser posterior capsulotomy.

The visual outcome was assessed with presenting visual acuity or best corrected visual acuity (BCVA) on Snellen's chart and measured at the follow ups starting from at least 1st week to 6 weeks and more after the surgery. The visual outcome of cataract surgery standards set by WHO are: Good outcome is defined as 6/6 – 6/18, Borderline outcome as  $< 6/18 - 6/60$ , Poor outcome having  $BCVA < 6/60$ . [4] The data collected were entered in Tables and analysed. Common complaints after an otherwise uncomplicated, successful cataract surgery with a good visual outcome are unwanted images such as flashes, arcs etc. as in positive dysphotopsia (PD) and a dark shadow or a crescent in negative dysphotopsia (ND). Counselling for these complaints is all that is required for the patient's satisfaction and to give the patient a good vision related quality of life.

**V. RESULT AND DATA ANALYSIS**

A total of 120 cases were included in this hospital based study. 66 (55%) males patients and 54 (45%) females in the age group of 50 years and above were selected. Maximum number of patients were in the age group of 50-55 years. The mean age group of patients was between 50-55 years (52.5 years). Cases

were having age-related cataract. All cases were managed using either ultrasonic Phacoemulsification or Manual SICS, followed by the placement of a posterior chamber IOL but the overall outcome also depends on skill of the surgeons. In our study, pre op VA (<6/60) was recorded in 70 cases and post op visual outcome at 6 weeks after the cataract surgery with VA (<6/60) was recorded in 06 cases. Pre op VA (<6/18-6/60) was recorded in 45 patients and post op visual outcome at 6 weeks after the cataract surgery with VA (<6/18-6/60) was recorded in 04 patients. Pre op VA (6/6-6/18) was recorded in 05 patients and post of visual outcome at 6 weeks after the cataract surgery with VA (6/6-6/18) was recorded in 110 patients

On the 1st postoperative day, 54 patients had a near normal presenting vision of 6/6 - 6/9 for distance and had quiet eyes with no complications ([Table 4]). In the remaining 66 patients examined, vision was from 6/9 - 6/60 and less. The visual outcome could be classified as good, borderline and poor ([Table 6]). The most common early complication that occurred on 1st postop day upto 1st week was striate keratopathy (SK) in 13 cases. Corneal edema was seen in 09 cases and was graded as: Grade 1: haze not interfering with visibility of iris details, Grade 2: mild obscuration of iris details, Grade 3: moderate obscuration of iris details, Grade 4: complete opacification of stroma. Patients were put on topical 5% NaCl. The next common causes were irregular pupil in 12 cases, residual lens matter in 09 cases. Anterior uveitis, Toxic anterior segment syndrome (TASS), pupillary membrane are seen in 11 cases and a couple of patients were given subconjunctival injection of gentamycin, dexamethasone and mydrinicaine. The corneal edema clears after 1st week and the anterior chamber inflammatory response also resolves then. On posterior segment examination 10 cases presented with macular edema, 1 patient had intraocular hemorrhage with secondary glaucoma and 1 patient showed signs of acute onset endophthalmitis. [Table 5] shows the uncorrected presenting vision at 4 weeks postoperatively. Normal distant vision of 6/6 was seen in 65 patients. The principal reason for subnormal vision in our study was astigmatism seen in 39 cases, the surgically induced astigmatism (SIA) varies from -0.75D to -2.25D at 90 degrees +/- 20 degrees, the commonest

being -1.25D at 90 degrees, with majority of cases having against-the-rule astigmatism (ATR). This high difference in astigmatism is because of the skills of the post graduate trainees doing the initial surgical wound in some cases.

Uncorrected myopia is seen in 03 cases and consecutive hypermetropia in 02 case. In our study the other causes of late postoperative complications were posterior capsular opacity (PCO) in 05 cases, pseudophakic bullous keratopathy (PBK) in 02 patients, cystoid macular edema (CME) in 01 case, intraocular haemorrhage with secondary glaucoma in 02 case and 01 patient had infective endophthalmitis. Spectacle correction and YAG laser capsulotomy improved the final visual outcome in all cases except a few. PBK did not improve even after DSAEK (Descemet's stripping automated endothelial keratoplasty) done elsewhere in 2 case, due to the progression to glaucomatous optic atrophy. Long standing CME progressed to lamellar macular hole in 1 case.

In our study, [Table 6] shows the postoperative visual outcomes at 6 weeks after cataract surgery. Good outcome with best corrected visual acuity (BCVA) 6/6 - 6/18 was recorded in 110 cases. In 04 cases of borderline outcome (BCVA <6/18-6/60) the causes in our study are high postop astigmatism of > 4D in 02 patients, high consecutive myopia >4.5D recorded in 01 case, and 1 patient had dense PCO even after YAG capsulotomy.

Poor visual outcome of BCVA < 6/60 was reported in 6 cases in our teaching hospital based study. The complications were PBK in 02 cases, long standing CME in 01 case, vitreous hemorrhage in 02 cases and endophthalmitis in 01 case.

A. Descriptive Results:

TABLE-1: SHOWS THE NUMBER OF MALE AND FEMALE

Gender	Number	Percentage
Male	66	55%
Female	54	45%
Total	120	100%

PIE DIAGRAM

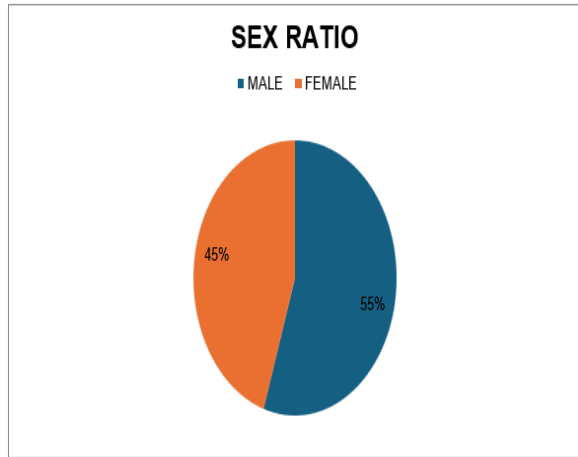


FIG-1: PIE DIAGRAM REPRESENTING THE PERCENTAGE OF MALE AND FEMALE  
TABLE-2

TABLE-2 SHOWS THE NUMBER OF PATIENTS IN EACH GROUP

AGE GROUP	NUMBER OF PATIENTS	PERCENTAGE
50-55	35	29.17%
56-60	30	25%
61-65	25	20.83%
66-70	20	16.67%
>70	10	8.33%
TOTAL	120	100%

BAR DIAGRAM-1

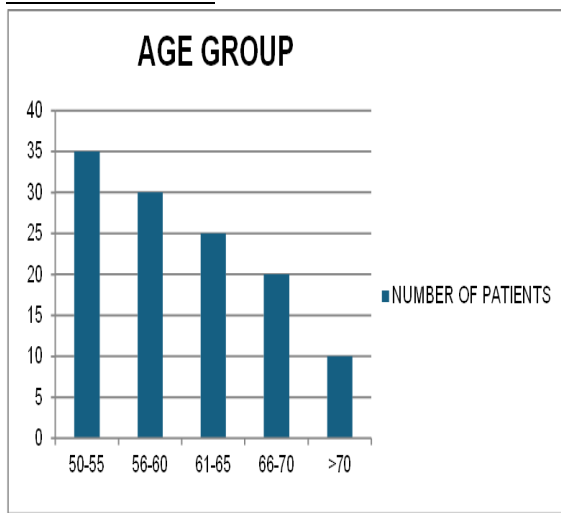


FIG-2: BAR DIAGRAM REPRESENTING THE NO.S OF PATIENTS IN EACH AGE GROUP

TABLE-3 SHOWS THE NUMBER OF PRE-OP AND POST-OP PATIENT'S VISUAL ACUITY

VA	NO OF PATIENTS	
	PRE OP	POST OP AT 6WEEKS
<6/60	70 (58.33%)	06 (5.00%)
<6/18-6/60	45 (37.50%)	04 (3.33%)
6/6-6/18	05 (4.17%)	110 (91.67%)
Total	120 (100%)	120 (100%)

BAR DIAGRAM-2

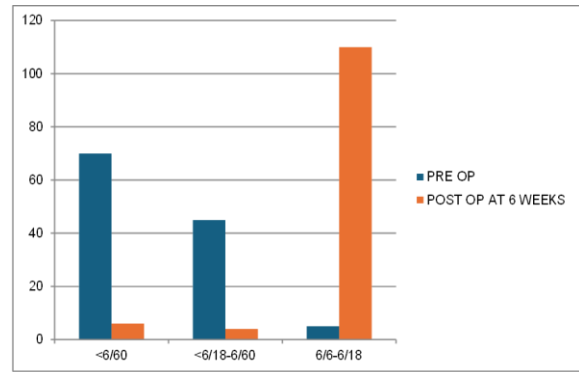


FIG-3: BAR DIAGRAM SHOWING COMPARISON OF PRE AND POST –OPERATIVE VISUAL ACUITY IN THE OPERATED EYE

TABLE-4 SHOWS THE COMPLICATIONS ON 1ST POST-OP DAY TO 1ST WEEK

SI NO.	COMPLICATIONS	NO. OF PATIENTS
1	NO COMPLICATIONS	54 (45%)
2	STRIATE KERATOPATHY	13 (10.83%)
3	CORNEAL EDEMA	09 (7.50%)
4	ANTERIOR UVEITIS, TASS, PUPILLARY MEMBRANE	11 (9.17%)
5	RESIDUAL LENS MATTER	09 (7.50%)
6	MACULAR EDEMA	10 (8.33%)
7	IRREGULAR PUPIL, PUPILLARY CAPTURE OF IOL	12 (10%)
8	ACUTE ONSET ENDOPHTHALMITIS	01 (0.83%)

9	INTRAOCULAR HAEMORRHAGE WITH SECONDARY GLAUCOMA	01 (0.83%)
Total		120 (100%)

	UNRESOLVING VITREOUS HAEMORRHAGE	01 (0.83%)
Total		120 (100%)

TABLE-5 SHOWS UNCORRECTED PRESENTING VISION AT 4 WEEKS

SI NO.	FINDING	NO. OF PATIENTS
1	NORMAL DISTANT VISION	65 (54.17%)
2	ASTIGMATISM	39 (32.5%)
3	UNCORRECTED MYOPIA	03 (2.5%)
4	UNCORRECTED HYPERMETROPIA	02 (1.67%)
5	UNCORRECTED PCO	05 (4.17%)
6	DOPHAKIC BULLOUS KERATOPATHY	02 (1.67%)
7	CYSTOID MACULAR EDEMA	01 (0.83%)
8	INFECTIVE ENDOPHTHALMITIS	01 (0.83%)
9	INTRAOCULAR HAEMORRHAGE	02 (1.67%)
Total		120 (100%)

TABLE-6 SHOWS POSTOP VISUAL OUTCOMES AT 6 WEEKS AFTER CATARACT SURGERY

VISUAL OUTCOMES	CAUSES	NO.OF PATIENTS
GOOD OUTCOME	BCVA 6/6-6/18	110 (91.67%)
BORDERLINE OUTCOME	BCVA <6/18-6/60	04 (3.33%)
POOR OUTCOME	BCVA <6/60	
	OPHAKIC BULLOUS KERATOPATHY	02 (1.67%)
	LONGSTANDING CYSTOID MACULAR EDEMA	01 (0.83%)
	INFECTIVE ENDOPHTHALMITIS	02 (1.67%)

B. Statistical Analysis:

Software: SPSS v25.0| Significance: p<0.05

TABLE-7 SHOWS PRE-OP AND POST -OP VISUAL ACUITY IMPROVEMENT (McNEMAR'S TEST)

VA CATAGORY	PRE-OP %	POST-OP %	IMPROVEMENT
<6/60	58.33%	5.00%	53.33%
<6/18-6/60	37.50%	3.33%	34.17%
6/6-6/18	4.17%	91.67%	87.50%
Result: $\chi^2=92.31, df=1, p<0.01$ (Highly significant)			

TABLE-8 SHOWS WHO OUTCOME CLASSIFICATION AT 6 WEEKS

CATEGORY	NO. OF PATIENTS	PERCENTAGE	WHO BENCHMARK
GOOD 6/6-6/18	110	91.67%	≥80%
BORDERLINE <6/18-6/60	4	3.33%	-
POOR <6/60	5	5.00%	≤5%

TABLE-9 SHOWS GENDER VS VISUAL OUCOME (CHI-SQUARE TEST)

GENDER	GOOD OUTCOME	POOR/BORDERLINE OUTCOME	GOOD OUTCOME %
MALE	57	9	86.36%
FEMALE	53	1	98.15%
$\chi^2=0.452, p=0.5$ 01 (No significant difference)			

TABLE-10 SHOWS AGE-GROUP VS POOR OUTCOME (CHI-SQUARE TEST)

AGE GROUP	TOTAL PATIENT	POOR OUTCOME (<6/60)	POOR OUTCOME%
50-60 YEARS	65	1	1.54%
>61 YEARS	55	5	9.09%
$\chi^2=6.23, p=0.040$ (significant)			

TABLE-11 SHOWS SUMMARY OF STATISTICAL SIGNIFICANCE

ANALYSIS	TEST USED	p-VALUE	INTERPRETATION
PRE-OP VS POST-OP	McNEMAR'S	<0.001	HIGHLY SIGNIFICANT IMPROVEMENT
GENDER VS OUTCOME	CHI-SQUARE	0.501	NO ASSOCIATION
AGE VS POOR OUTCOME	CHI-SQUARE	0.040	SIGNIFICANT (OLDER AGE HIGHER RISK)
WHO BENCHMARKS	DESCRIPTIVE	-	EXCELLENT SURGICAL QUALITY

VI. DISCUSSION

In our prospective study ,we selected 120 cases who underwent Ultrasonic Phacoemulsification or manual SICS, followed by the placement of a posterior chamber intraocular lens.during a 1 year period. As observed by Ang GS et al the complications and outcome also depends on the skill of the operating surgeons.[12] On the 1st postoperative day, 45% patients in our study had a near normal presenting vision of 6/6 - 6/9 and had quiet eyes with no complications. Venkatesh et al also reported 39% patients with good vision at first follow-up.[15] Rajiv B Khandekar et al in 2010 reported in their study that one day after cataract surgery, 6618 (46%) patients had good vision, 6213 (43.2%) had borderline vision, and 1545 (10.7%) had poor vision.[26] The remaining 46 (n=46) patients in our study had a subnormal vision from < 6/9 - 6/60 and less on

follow-up from 1st day to 1st week, the most common causes being striate keratopathy (SK) (10.83%) and corneal edema (7.5%). Similarly Sharma et al (2019) reported 15% cases with SK and 12.5% with corneal edema in the viscoexpression technique of nucleus delivery.[16] Venkatesh in a study of 100 eyes that underwent Manual SICS with mature white cataract reported corneal edema with >10 Descemet's folds in 6%, and 7% cases had corneal edema with

<10 Descemet's folds.[17] We had 9.17% cases with anterior chamber (AC) inflammatory response, and 7.5% with residual lens matter. Similar results of 10% AC response and 10% retained cortical matter was reported by them too.[17] Cystoid macular edema (Irvine - Gass syndrome) examined by +90D lens was seen in 8.33% of our cases, and also reported in 9.28% cases of the hospital based study by V H Karambelkar et al[18] and similarly CME has been diagnosed in 6.67% patients in a study done by Hiranmoyee et al.[19]

At 4 weeks postoperative follow -up for spectacles prescription, we had (n=39) 32.5% patients with uncorrected astigmatism with an average of -1.25D against the rule astigmatism. Andleeb Ahangar, Aalia Rasool Sufi et al from Kashmir (2014) reported in their SICS group that 17 (56.6 %) patients had a mean postoperative astigmatism of 0.75 ± 0.40 diopters, with the majority having against-the-rule (ATR) astigmatism.[20] In patients not improving with spectacle correction, posterior capsular opacity (PCO) was found in 4.12% of our cases.These cases were then treated by Nd:YAG laser capsulotomy to improve visual outcome.

In [Table 6] of our teaching hospital study, poor outcome (BCVA <6/60) at 6 weeks was seen in 05% of our operated cataract cases. Our study results matched with Pararajasekharam who suggested that less than 5% of operated cataract should have BCVA of <6/60. [13] Based on the WHO benchmark of 5% for poor outcome of cataract surgery, the 5% for poor outcome in our study is significantly similar.[11] Long standing corneal edema progressed to PBK in 2 (1.67%) of our cases despite vigorous management. Stefan Pricopie et al reported that pseudophakic bullous keratopathy may occur in around 1 to 2% of the patients undergoing cataract surgery.[21] PBK was associated with marked visual loss, which was

permanent despite clear grafts in 29 of 92 eyes followed-up for one year or longer in a study by Juan J Arentsen et al.[22] Poor outcome was also seen in 1 case of CME (0.83%) in our study that eventually progressed to lamellar macular hole. Marilita M et al in 1 case reported that Macular Hole formation may even occur in cases of pseudophakic macular edema, representing a rare complication of Irvine-Gass syndrome.[23] The 1 case of poor outcome due to intraocular hemorrhage / vitreous hemorrhage was due to blunt trauma to the eye sustained after surgery. Despite further management the visual outcome remained poor.

In our study we also had 02 cases of acute onset infective endophthalmitis (1.67%) with poor visual outcome. Instillation of povidone iodine 5% solution in the conjunctival sac for 2 min before surgery is done in all our cases to decrease bacterial flora. Finally 0.5 ml subconjunctival injection of gentamicin and dexamethasone is given to all patients on completion of cataract surgery. Mahalingam P, Sambhav K et al observed that the visual outcome after endophthalmitis is generally poor but aggressive and appropriate treatment can improve the visual outcome.

Although their results showed that standard interventions led to improvement in VA, only a minority of patients achieved final VA of  $\geq 6/60$ . [24] A retrospective observational series conducted at a single eye hospital by Ravindran et al. reported 0.12% incidence of endophthalmitis after Manual SICS. [25] The final VA of majority of their patients, even after aggressive treatment, was less than 6/60, which indicates the poor prognosis of this disease. Borderline outcome of BCVA  $< 6/18$  to 6/60 was attained in 3.33% of the patients in our study at the end of 6 weeks. ([Table 6])

Postoperative good visual outcome (BCVA 6/6-6/18) was obtained in 91.67% patients after MSICS + IOL . Pararajasekharam suggested that >90% of patients operated for cataract with lens implant should have good grade of vision (BCVA 6/6 – 6/18) and less than 5% of operated cataract should have BCVA of  $< 6/60$ . [13] But recently, WHO and International Agency for the Prevention of Blindness (IAPB) have recommended that more than 85% of operated cataract cases should have good grade of vision (6/6 to 6/18) (IAPB Action Plan). [14], [11] Our study results matched with these indicators and suggest that

high quality of SICS with IOL implant in our institute is maintained.

Statistical significance ( $p < 0.001$  visual acuity improvement) confirms excellent surgical quality matching international standards.

## VII. CONCLUSION

6 weeks follow up of Phacoemulsification or MSICS show a high percentage of striate keratopathy, corneal edema, acute onset endophthalmitis, surgically induced astigmatism possibly due to the initial corneoscleral wound incision being sometimes performed by the trainees. High incidence of PCO may be reduced by implanting costlier square edge IOLs and percentage of macular edema decreased by the blue- light filtering IOLs. In 91.67% operated cases having good outcome, implant of aspheric IOLs can prevent annoying aberrations and help in improving the overall patient satisfaction and quality of life.

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