

# Incidence Of Cystoid Macular Edema After Cataract Surgery In A Tertiary Care Hospital Of Rajasthan , India : A Study Of 100 Cases

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## Abstract

Cystoid macular edema (CME) is the important postoperative complication of cataract surgery, which can compromise the result of a cataract surgery. It can occur even after uneventful cataract surgery, but the incidence rapidly increase after complicated cataract surgery.

**Purpose:** To study incidence of Cystoid Macular Edema after cataract surgery in a tertiary care Hospital of Rajasthan, India.

**Methods:** A total of 100 eyes of 100 patients, aged from 35 to 80 years were enrolled in the study after taking informed consent. Patients with normal clinical profile with no history of hypertension, diabetes mellitus, or any ocular trauma or infection/ inflammation were included in this study. Patients were evaluated for macular thickness with the help of OCT pre operatively and then again at 1, 4 & 6 weeks post-operatively. Similarly distance visual acuity was recorded post-operatively at 1, 4 & 6 week on Snellen's visual acuity chart. Correlation was done between post-operative macular thickness and visual acuity, and incidence of CME was assessed.

**Results :** All 100 patients were operated by either phacoemulsification or small incision cataract surgery with intra ocular lens implantation. Out of 100 patients 48 were male and 52 were females. 6 patients lost in follow up at 4th & 6th week. Out of 94 patients, 4 patients developed CME. 1 out of 48 cases operated by Phacoemulsification developed CME (2.08%) while 3 out of 46 cases operated by SICS developed CME (6.52 %).

**Conclusion :** CME is a postoperative complication of cataract surgery. Incidence of clinical cystoids macular edema is 4.25 % in our study. OCT is a newer, non-invasive test that is very sensitive and enables the detection of even very small changes in retinal thickness and volume. It can be used as a routine test even after uncomplicated cataract surgery, to detect CME.

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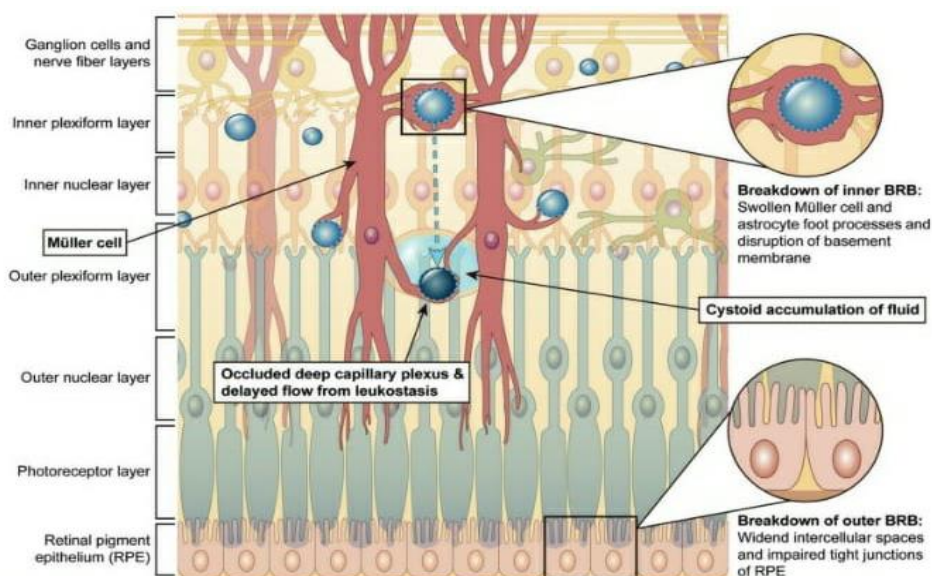
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## I. Introduction:

Cataract is the major cause of blindness in India, amounting for 81% of total number of cases. Cystoid macular edema (CME) is one of the important postoperative complications of cataract surgery, which can compromise the result of a cataract surgery. Macular edema is defined as the swelling or thickening of the neurosensory retina within the macular region, which results from fluid collection within or below the retina. Cystoid macular edema (CME) is a type of macular edema characterized by the formation of radially oriented multiple cyst-like spaces within the neurosensory retina.[1,2] Excess fluid predominantly accumulates in the inner nuclear layer and the outer plexiform layer of Henle.[2]



**Figure : Showing pathophysiology of Cystoid macular edema BRB: Blood-retinal barrier; RPE: Retinal pigment epithelium. Blue dots: Disrupted basement membranes**

CME is commonly found in older patients. In most of the cases, CME resolves of its own, but even in these cases patients might have problems in their daily life due to decrease in contrast sensitivity. Chronic CME does not resolves of its own; it may lead to permanent diminution of vision and various complications such as macular hole and retinal detachment that may lead to loss of vision. Diabetic retinopathy and retinal vascular occlusions are the most common underlying diseases of CME.[1,2] CME may also be complicated in severe hypertensive retinopathy, uveitis, macular telangiectasia, vitreoretinal interface abnormalities, or following intraocular surgery. This is a nonspecific sequelae of many ocular diseases, which eventually cause impaired central vision.

In 1953 Irvine first reported CME following cataract surgery. It is demonstrated angiographically by Gass and Norton in 1966, so it is known as Irvine-Gass syndrome. [3,4,5] Incidence of CME after cataract surgery depends on complication during or after surgery, diagnostic method, time of diagnosis. It can even occur after uneventful cataract extraction, but the incidence rapidly increases after complicated surgery.

Different surgical techniques and procedures used represent one of the causes of the large heterogeneity in the studies. Most investigators have found a reduced incidence of CME after extra capsular surgery as opposed to intracapsular procedures. Recently, it has also been shown that phacoemulsification with continuous curvilinear capsulorhexis (CCC) induced a less severe blood-aqueous barrier breakdown than extra capsular cataract extraction (ECCE) with a linear capsulotomy.

Phacoemulsification using small incisions and implantation of a foldable intraocular lens (IOL) is currently the preferred technique which is efficient, and uneventful surgery is generally associated with good visual results.[6-10] However cystoid macular edema (CME) may develop which can result in suboptimal postoperative vision.[11,12,13]

Optical coherence tomography (OCT) is a non-invasive and accurate method to estimate the macular thickness and detect the presence of CME and to assess the benefit of various modes of treatment. Although the FA has been considered the diagnostic gold standard for pseudophakic CME, OCT is now the method of choice, being a non-invasive technique to evaluate and follow CME after cataract surgery. An additional advantage of the use of OCT is that the thickening of macular area effectively measures the edema, and therefore correlates better with vision than the angiography. Various factors have been thought to be causative of CME, which include surgery induced disruption of blood aqueous barrier, vitreous traction, rupture of posterior capsule, light toxicity etc. These factors cause release of prostaglandins and consequent breakdown of blood - retinal barrier which eventually leads to cystoid macular edema .

In this prospective study, primary objective is to determine incidence of CME following uncomplicated cataract surgery (small incision cataract surgery) and Phacoemulsification. Secondary objective is to evaluate the effect of such damage on the visual acuity by measuring best-corrected visual acuity (BCVA).

## **II. Material And Methods**

This study was conducted at Department of Ophthalmology, Kota Medical College and associated Hospital, as a prospective, involving adult patients undergoing routine cataract surgery with intra ocular lens

(IOL). This was a prospective study conducted to assess the incidence of post-operative CME in patients undergoing cataract surgery. Enrolment was for a period of 6 months, from 1<sup>st</sup> September to 28<sup>th</sup> February. A total number of 100 cases were studied. This prospective study comprised 100 eyes of 100 patients who had undergone small incision cataract surgery and phacoemulsification with intraocular lens implantation and prior ethical clearance was obtained from institutional ethical review board. Written informed consent was obtained from patients participating in this study.

**Inclusion criteria**

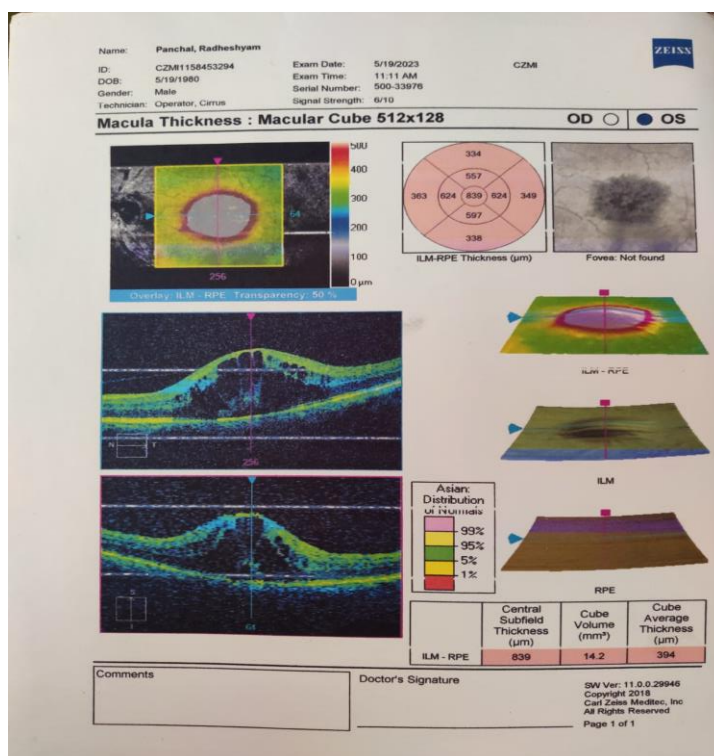
- Age more than 35 years but less than 80 years
- No history of diabetes, hypertension.
- No history of any ocular surgery within last 6 months
- No evidence of CME prior to surgery or where the cataract had precluded visualization of the fundus preoperatively.

**Exclusion criteria**

- Any other ocular disease with potential to affect visual acuity.
- Inability to provide informed consent.

Patient’s demographic data were recorded. Best corrected visual acuity was recorded on Snellen’s distant visual acuity chart at 6 meters. Examination was done for all patients to rule out any co-existing ocular pathology. Slit lamp evaluation was done to detect any anterior segment abnormality and for grading of cataract. IOP was measured by Schiottz tonometer. Detailed fundus examination was done with slit lamp biomicroscopy using +90 D lens and indirect ophthalmoscopy. All subjects were investigated for absence of any evidence of macular edema with the help of Optical Coherence Tomography (Zeiss Cirrus HD OCT 500) before cataract surgery. The foveal thickness and total macular volume were measured on the preoperative day. Cataract surgery was performed by either phacoemulsification or small incision cataract surgery with intra ocular lens implantation. Surgeries were performed by senior surgeons experienced in phacoemulsification & SICS.

Postoperative 1st week, 4th week & 6th week, distance visual acuity was recorded carefully on Snellen’s visual acuity chart. At each visit, a complete ocular examination, including intraocular pressure measurement, and Slit lamp evaluation was again carried out to rule out any anterior segment abnormality. Evaluation with regard to clinical CME using direct, indirect ophthalmoscope, and 90 diopter lenses, was performed in the operated eyes. Similarly OCT readings of foveal thickness and total macular volume were recorded on 1 week, 4th week & 6th week post operatively. Each eye was dilated with Tropicamide 1% before recording the images and scans were performed with a minimum pupillary diameter of 5 mm.



**OCT Image showing cystic spaces in Retinal layers indicating CME in a patient after cataract surgery**

### III. Results

The study was conducted in the department of ophthalmology over a period of 1 year in which 100 eyes of 100 patients were examined preoperatively and postoperatively for development and treatment of CME. There was no history of hypertension, DM, ocular trauma or inflammation in study subjects. As shown in table 1 out of 100 randomly selected patients 48 were males and 52 were females. 6 patients lost in follow up. Majority of patients belonged to age group >60(56%). Mean age was 61 years, as cataract is age related change in natural lens.

**Table 1. Distribution of the subjects under study as per age**

Age (in years)	Numbers	Percentage
35-40	5	5
41-60	39	39
> 60	56	56
Total	100	100

Majority of immature cataract were operated by phacoemulsification (72.41%) while advanced cataract (grade 3 and more) were preferred for SICS (78.5%) as shown in table 2.

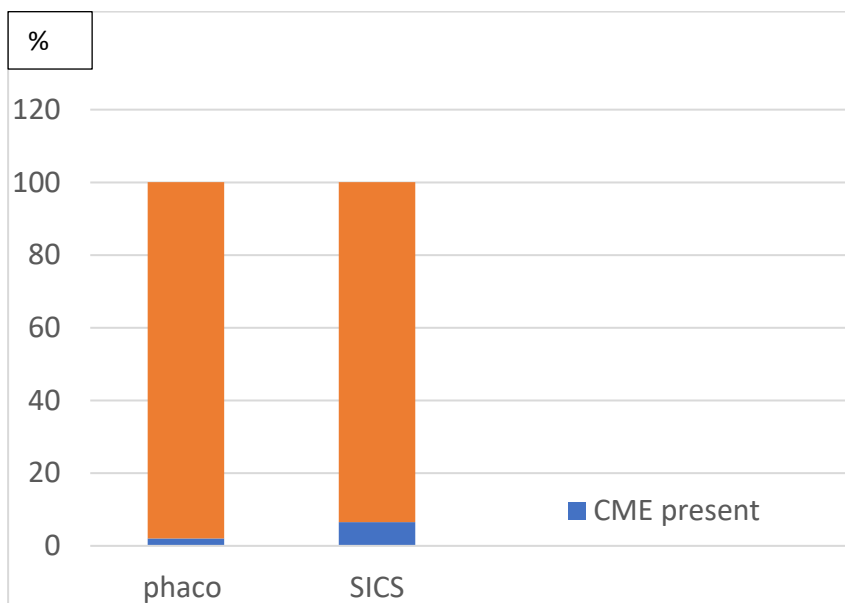
**Table 2. Distribution of study subjects according to maturity of cataract**

NS Grade	Phaco	SICS	Total
<= 3	42	16	58
>3	9	33	42
Total	51	49	100

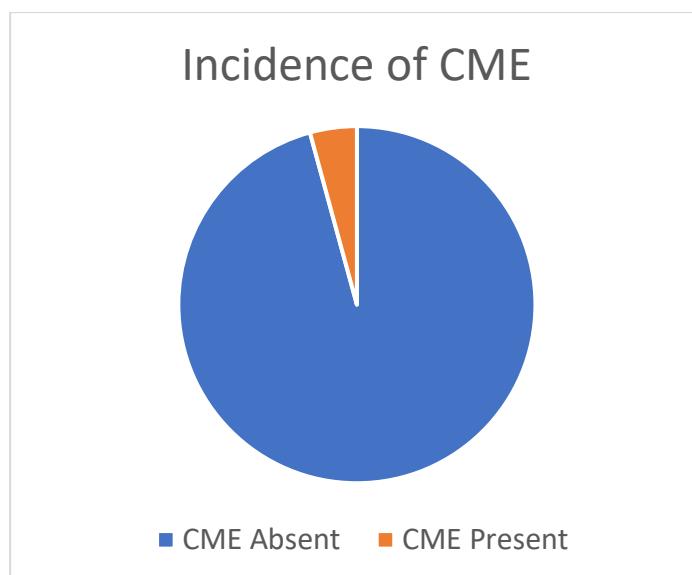
According to table 3, 1 out of 48 cases operated by Phacoemulsification developed CME (2.08%) while 3 out of 46 cases operated by SICS developed CME(6.52%).

**Table 3. Showing Incidence of CME in Phaco and SICS Cases**

Type of surgery	CME present	CME absent	Percentage
Phaco	1	47	2.08%
SICS	3	43	6.52%
Total	4	90	4.25%



**Graph showing incidence of CME more in SICS cases than Phaco**



**Pie chart showing overall incidence of CME in 100 study subjects**

Higher incidence of CME with harder cataracts, found in our study (table 4), may be related to increased operative time and intraoperative iris trauma. There are many studies that suggest long surgery time as a cause for development of CME. Residual lens matter and exposure to light of microscope for longer time may lead to development of CME after cataract operation.

**Table 4. Comparison of density of cataract with occurrence of CME**

Density of cataract	CME developed	CME absent	Percentage
<3	1	57	1.75%
>3	3	39	7.6 %
Total	4	96	

#### **IV. Discussion**

Out of 100 patients 98 patients complete the 1 week follow up and 94 patients complete the 4th & 6th week follow up. Majority of patients have shown BCVA 6/9 and more till the end of 4th & 6th week. In Phaco, there were 3 patients showing BCVA less than 6/9. On fundus examination & OCT 1 out of these patients had

CME and 2 patients showed high astigmatism. In SICS there were 7 patients having BCVA less than 6/9, 3 out of 7 patients were having CME and 4 patients were having high astigmatism.

Jaggernath J et al showed that both PHACO and SICS are safe and effective techniques to rehabilitate cataract patients, SICS being more useful for hard cataracts and is the preferred technique for less-resourced settings.[14] Small incision cataract surgery is comparable to phacoemulsification in almost all aspects except post-operative astigmatism. Jurecka T et al studied about retinal thickness and macular volume after the cataract surgery, which reached the maximum in months 1 and 2 in all examined areas.[15]

Jain et al, study done in a medical college and hospital of Bhopal India has shown an overall low incidence of CME after cataract surgery (3.26%). [16] In 1999, a publication showing data collected in 4 hospitals of four countries by the International Cataract Surgery Outcomes Study, showed a prevalence of CME as a complication of cataract surgery with phacoemulsification of 0.3% in the United States, of 1.4% in Canada, of 0.0% in Denmark and of 0.6% in Spain.[17-20] Incidence of cystoid macular edema is 4.25% in our study. 3 out of 4 CME occurred in our study are present in cases which were complicated by PC rent, 1 in Phaco & 2 SICS group, p value is less than .00001 (significant at  $p < 0.01$ ) that shows the statistically significant correlation between vitreous loss & increased surgical time with CME.

With the advent of newer and more sensitive technologies like OCT, the incidence of CME after uneventful cataract surgery has been found to be greater than was previously thought.

## **V. Conclusion**

In modern cataract surgery, the incidence of vision threatening complications has been significantly reduced, regardless of the technique used (Phaco/SICS). OCT is a quantitative measurement and enables the detection of minimal changes in retinal thickness and volume even after uncomplicated cataract surgery. Earlier FFA was considered as gold standard for diagnosis of CME. But FFA is an invasive test, with side effects ranging from nausea (up to 20%) to its rarest complication, anaphylaxis and death. Therefore it is important to have alternative **non invasive methods** such as OCT.