

# Study of complications and outcomes of phacoemulsification cataract surgery at a tertiary hospital

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## Abstract

**Background:** Phacoemulsification has emerged, in recent years, as the most popular procedure to treat cataracts in patients in the developing world as it is safe and gives better visual outcomes such as early visual rehabilitation and emmetropia. In present study we analysed complications and outcomes of Phacoemulsification Cataract Surgery at a tertiary hospital. **Material and Methods:** Present study was a retrospective, observational study conducted in consecutive phacoemulsification cataract surgeries done from January 2018 to December 2020. **Results:** During study period 2240 patients underwent phacoemulsification surgery by trainee ophthalmologists at our hospital and total 46 (2.05%) complications were noted. There were 22 intra-operative (0.98 %) and 24 post-operative (1.07 %) complications noted. Male (56.52 %) were more than female (43.48 %). Most common age group was 51 – 60 years (45.65 %), followed by 61 – 70 years (36.96 %). Visual outcomes after management of complications (after 1 month) was 6/12 or Better in 91.3 % patients and < 6/12 but ≥ 6/60 in 6.52 % patients. Common intraoperative complications were posterior capsule rupture with vitreous loss (31.82 %), posterior capsule rupture without vitreous loss (18.18 %), zonular dialysis (13.64 %) and Descemet's membrane detachment (13.64 %). Other less common intraoperative complications were failure to implant lens (9.09 %), iris prolapse (4.55 %), capsulorrhexis extension (4.55 %) and broken haptic (4.55 %). Common postoperative complications were corneal edema (37.5 %), wound leak (20.83 %), secondary glaucoma (12.5 %) and epithelial defect (12.5 %). Other less common postoperative complications were hyphema (8.33 %), retained cortical matter (4.17 %) % decentered IOL (4.17 %). **Conclusion:** Incidence of complications of cataract surgery with phacoemulsification technique is less still anticipation of these complications and also preparation and prophylactic measures may decrease incidence of these complications.

**Keywords:** Phacoemulsification, cataract surgery, complications, intraocular lens

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## INTRODUCTION

Unoperated cataract remains the most common cause of blindness worldwide, even though the disorder can be effectively and inexpensively treated with a standard procedure.<sup>1</sup> Cataract surgery is one of the most frequently performed surgery in the world. The surgery promises vision to the large number of patients affected by the opacification of the crystalline lens. The surgery has great visual outcomes but poses a learning curve for the beginner surgeons. In the past 20 years, phacoemulsification and small incision cataract surgery, both of which use small, rapidly healing cataract surgical wounds, have been widely adopted. Phacoemulsification is the gold standard for

cataract surgery, and for good reason—over the decades it has been shown to be a safe and efficacious procedure that returns excellent visual outcomes to patients with cataracts.<sup>2,3</sup> Phacoemulsification has emerged, in recent years, as the most popular procedure to treat cataracts in patients in the developing world as it is safe and gives better visual outcomes such as early visual rehabilitation and emmetropia.<sup>4</sup> Phacoemulsification requires a much smaller incision (3.2 mm) than SICS but the incision size dependent on the type of phacoemulsification machine being used. An ultrasonic probe is used to emulsify the cataractous crystalline lens, and the debris is aspirated with high vacuum. In present study we analysed complications and outcomes of Phacoemulsification Cataract Surgery at a tertiary hospital.

## MATERIAL AND METHODS

The study was carried out at Department of Ophthalmology, Terna medical college, Nerul, Navi Mumbai. The study design was a retrospective, observational study. Study approval was taken from institutional ethical committee.

### Inclusion criteria

The data of consecutive phacoemulsification cataract surgeries done from January 2018 to December 2020 was analyzed.

### Exclusion criteria

High risk patients with zonular weakness, posterior polar cataracts, corneal dystrophy or pathology, unocular patients, post uveitic cataracts, pseudoexfoliation syndrome, patients younger than 35 years, patients requiring general anesthesia, traumatic cataracts, white cataracts and nuclear sclerosis grade 4. Patients with uncontrolled diabetes, uncontrolled hypertension and active infection anywhere in the body. Demographic,

clinical details were noted. Blood pressure was measured and routine blood/ urine investigations were done. Pre operatively each patient was subjected to a complete anterior segment examination, posterior segment examination, intraocular lens powering and intraocular pressure measurement. Phacoemulsification surgeries were assigned to post MS (Master of Surgery) ophthalmologists after having observed and been first assistant to at least 30 phacoemulsification surgeries. The pre-operative, operative and post-operative details were noted. The surgeries were done under local anesthesia. The intraoperative complications including the operative step involved were documented. Postoperatively visual acuity and complete anterior and posterior segment examination were documented. Major surgical complications such as posterior capsular rupture or zonulodialysis with vitreous loss with successful Intra Ocular Lens (IOL) implantation, suprachoroidal hemorrhage, new vitreous hemorrhage (VH)/retinal detachment (RD)/Endophthalmitis within 90 days of surgery, any complication requiring reoperation within 90 days of surgery were noted. Statistical analysis was performed using descriptive statistics.

## RESULTS

During study period 2240 patients underwent phacoemulsification surgery by trainee ophthalmologists at our hospital and total 46 (2.05%) complications were noted. There were 22 intra-operative (0.98 %) and 24 post-operative (1.07 %) complications noted. Male (56.52 %) were more than female (43.48 %). Most common age group was 51 – 60 years (45.65 %), followed by 61 – 70 years (36.96 %). Visual outcomes after management of complications (after 1 month) was 6/12 or Better in 91.3 % patients and < 6/12 but  $\geq$  6/60 in 6.52 % patients.

**Table 1: General Characteristic**

Characteristic	No. of patients	Percentage
Patients underwent surgery (eyes)	2240	
Complications	46	2.05%
Intra-operative	22	0.98 %
Post-operative	24	1.07 %
Gender		
Male	26	56.52 %
Female	20	43.48 %
Age		
$\leq$ 40 years	2	4.35 %
41 -50	5	10.87 %
51 – 60	21	45.65 %
61 – 70	17	36.96 %
>70 years	1	2.17 %
Visual outcome after management of complications (after 1 month)		
6/12 or Better	42	91.3 %
< 6/12 but $\geq$ 6/60	3	6.52 %
< 6/60	1	2.17 %

Common intraoperative complications were posterior capsule rupture with vitreous loss (31.82 %), posterior capsule rupture without vitreous loss (18.18 %), zonular dialysis (13.64 %) and Descemet's membrane detachment (13.64 %). Other less common intraoperative complications were failure to implant lens (9.09 %), iris prolapse (4.55 %), capsulorrhexis extension (4.55 %) and broken haptic (4.55 %).

**Table 2: Intraoperative complications**

Complication	No. of patients (n=22)	Percentage
Posterior capsule rupture with vitreous loss	7	31.82 %
Posterior capsule rupture without vitreous loss	4	18.18 %
Zonular Dialysis	3	13.64 %
Descemet's Membrane Detachment	3	13.64 %
Failure to implant lens	2	9.09 %
Iris Prolapse	1	4.55 %
Capsulorrhexis Extension	1	4.55 %
Broken Haptic	1	4.55 %

Common postoperative complications were corneal edema (37.5 %), wound leak (20.83 %), secondary glaucoma (12.5 %) and epithelial defect (12.5 %). Other less common postoperative complications were hyphema (8.33 %), retained cortical matter (4.17 %) % decentered IOL (4.17 %).

**Table 3: Postoperative complications**

Complication	No. of patients (n=24)	Percentage
Corneal edema	9	37.5 %
Wound Leak	5	20.83 %
Secondary Glaucoma	3	12.5 %
Epithelial defect	3	12.5 %
Hyphema	2	8.33 %
Retained cortical matter	1	4.17 %
Decentered IOL	1	4.17 %

## DISCUSSION

Phacoemulsification offers desirable anatomical and functional results following cataract surgery and has become gold standard procedure in developed countries.<sup>4</sup> Early best corrected visual acuity correlates equally well with later best-corrected vision in these cases as in those with more modern surgery in which smaller wounds are used (small-incision cataract surgery and phacoemulsification) is therefore encouraging.<sup>5</sup> Phacoemulsification under topical anesthesia performed by resident surgeons was reported by Randleman JB *et al.* 86.6% cases achieved a BCVA of 20/40 or better. Postoperative complication rate was 9.9%. Vitreous loss was seen in 4.1% of cases.<sup>6</sup> In study by Agrawal G<sup>7</sup>, rate of major surgical complications was 3.70% for JR4 performing phacoemulsification. Aravind Haripriya *et al.*,<sup>8</sup> studied 20,438 (26%) phacoemulsification, 53,603 (67%) manual SICS, and 5736 (7%) ECCE. The overall intraoperative complication rate was 0.79% for staff, 1.19% for fellows, 2.06% for residents, and 5% for visiting trainees. The overall complication rate was 1.11% for phacoemulsification. However, the combined complication rate for trainees was significantly higher with phacoemulsification (4.8%). The corrected distance visual acuity was better than 6/12 in 96% after phacoemulsification complications. We have noted less

complications in phacoemulsification surgeries in present study. Aravind Haripriya *et al.*,<sup>8</sup> concluded that for staff surgeons experienced with both phacoemulsification and manual SICS, intraoperative complication rates were comparably low. However, for trainee surgeons, the complication rate was significantly higher with phacoemulsification, suggesting that manual SICS may be a safer initial procedure to learn for inexperienced cataract surgeons in the developing world. Gogate P *et al.*,<sup>9</sup> analyzed, 11 comparative studies documenting 76,838 eyes that had undergone cataract surgery considered for analysis. The phacoemulsification group had statistically significantly less astigmatism and more eyes with UCVA of 6/9. UCVA at near was statistically significantly better with SICS due to astigmatism and safer during the learning phase ( $P = 0.003$ ). The average time for SICS was lower than phacoemulsification and cost  $< \frac{1}{2}$  of phacoemulsification. The outcome of this meta-analysis indicated there is no difference between phacoemulsification and SICS for BCVA and UCVA of 6/18 and 6/60. Endothelial cell loss and intraoperative and postoperative complications were similar between procedures. The American Academy of Ophthalmology recommends a first-day postoperative (POD1) visit should be done in functionally monocular patients, following intraoperative complications, or in those at a high risk of

immediate postoperative complications such as intraocular pressure (IOP) spike. In patients without these risks the follow-up visit should be scheduled within 48 h.<sup>10</sup> Early vision assessment for all patients and follow-up assessment only for patients who return to the clinic without prompting are valid measures of operative quality in settings where follow-up is poor.<sup>5</sup> A stepwise training progression whereby sufficient experience with large incision ECCE precedes learning manual SICS and phacoemulsification is taught only after competency with manual SICS (which includes capsulorhexis) is achieved. So that phacoemulsification trainees already have experience performing capsulorhexis, which is one of the most difficult steps to learn.<sup>8,11</sup> Phacoemulsification surgery is associated with high costs, including the cost of the Phaco machine, maintenance and upgrades of the machine and facilities, staff wages and the cost of consumables. However, phacoemulsification can be taught to resident doctors with good visual results and a comparable rate of major surgical complications. The beginner resident surgeon graduates comfortably to phacoemulsification with low complication rates and good visual results.<sup>7</sup>

## CONCLUSION

Incidence of complications of cataract surgery with phacoemulsification technique is less still anticipation of these complications and also preparation and prophylactic measures may decrease incidence of these complications. Proper training of trainee ophthalmologists can reduce earlier complications observed during training period.

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