

Study of visual outcome in patients of intra-operative complications after small incision cataract

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Abstract

Background: In India, Cataract is the leading cause of avoidable blindness and cataract surgery forms the major workload of most ophthalmic units in the country. An estimated 4 million people become blind because of cataract every year, which is added to a backlog of 10 million operable cataracts in India, whereas only 5 million cataract surgeries are performed annually in the country. Thus, a technique of cataract surgery that is not only safe and effective but also economical and easy for the majority of ophthalmologists. It is estimated that about 25% of poor outcomes of cataract operations performed in developing countries annually are due to surgical complications. Minimizing intra-operative complications of cataract surgery is an important step towards eliminating visual impairment caused by such complications. **Aim & Objective:** 1. To study intra-operative complications of manual small incision cataract surgery. 2. To study the visual outcome in patients of intra-operative complications following its management. **Methods:** Prospective cross-sectional study, **Study setting:** Ophthalmology Department of tertiary care centre. **Study population:** All patients with cataract requiring surgery admitted in tertiary care center **Sample size:** 700 **Results:** majority of study subjects belongs to age group 41 -40 years contributing 511 cases (73%) followed by age group 65 yrs and more 133 (19%), 16-40 age group 35 (5%) and 15 years or less 21 (3%) respectively. males contributing 390 cases (55.71%) followed by females 310 cases (44.29%). Male: Female ratio is 1.25: 1. preoperative visual acuity in operated eye is in the range of < 3 /60 - Perception to light (PLPR) in majority of subjects contributing 497 cases (71%) followed by 161 cases (23%) in between < 6/ 60 - 3 /60 group, 35 cases (5%) in < 6 /18 to 6 /60 group and 7 cases (1 %) in 6 /18 or better group respectively. most common intraoperative complication was posterior capsular rent contributing 19 cases (2.71%) followed by iris prolapse 14 cases (2%), premature entry 10(1.43%), Descemet's membrane stripping 10 (1.43%), intraoperative hyphaema 8 (1.14%), capsular extension in 7 cases(1%) Iridodialysis in 5 (0.71%) and zonular dialysis in 5(0.57%) respectively **Conclusions:** Rate of complication was higher in hypermature type of cataract .There was no statistical significant association between age and intraoperative complications.

Keywords: Intracapsular cataract extraction (ICCE), Extracapsular cataract extraction techniques, Manual small incision cataract surgery (SICS), phacoemulsification.

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Introduction

In India, Cataract is the leading cause of avoidable blindness.¹ and cataract surgery forms the major workload of most ophthalmic units in the country. An estimated 4 million people become blind because of cataract every year,² which is added to a backlog of 10 million operable cataracts in India, whereas only 5 million cataract surgeries are performed annually in the country.³ Thus, a technique of cataract surgery that is not only safe and effective but also economical and easy for the majority of ophthalmologists.

The prevalence of cataract in different populations has been reported between 2.0% and 65%.^{4,5} Vision loss from unoperated cataract represents an estimated 50% or more of the global burden of blindness.⁶ According to the World Health Organization (WHO), the number of people with treatable cataract blindness will reach 40 million by the year 2020, and the need for cataract surgery will increase three fold.⁷ Despite 10 – 12 million cataract surgeries performed globally every year, there is significant backlog of cataract cases. Conventional extracapsular cataract surgery (ECCE), MSICS, and phacoemulsification (phaco) are the three most popular forms of cataract surgery in India.⁸ Phaco is the technique of choice in the Western world and tertiary eye care centers in India.

It is estimated that about 25% of poor outcomes of cataract operations performed in developing countries annually are due to surgical complications.⁹ Minimizing intra-operative complications of cataract surgery is an important step towards eliminating visual impairment caused by such complications. Thus It is important to collect data about intra-operative complication of cataract surgery in order to identify patients at risk and to monitor their management before and after surgery.

Methodology

Study design: Prospective Cross sectional study. **Study setting:** Ophthalmology department of tertiary care centre. **Study population:** All patients with cataract requiring surgery admitted in tertiary care center

Sample size: With reference to study by Limbu et al(2014)¹⁰, prevalence of intraoperative complications in SICS was 5.8%.

Formula for sample size = $4 * P * Q / L^2$, Where P= prevalence of Intraoperative complications = 5.8%, Q= 1- P = 94.20, L= Allowable error = 2 % of absolute error · N= $4 * 5.80 * 94.20 / 4$.N= 546.36. **However 700 subjects were included in this study**

Inclusion criteria: Patients who are diagnosed with visually significant cataract requiring surgery but without the following exclusion criteria.

Exclusion criteria: Patients undergoing combined surgery. Patients associated with other ocular disease.

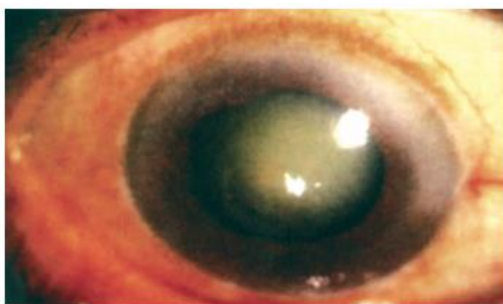
Study Procedure: Consecutively sampled, 700 patients of small incision cataract surgery were studied for intra-operative complication and visual outcome following its management at tertiary care centre during study duration.

Method Of Collection Of Data: Ethical Clearance: Ethical clearance was obtained from institutional ethics committee. Informed consent was obtained from study subjects after explaining study procedure in local language. Predesigned and pretested case record form was used as a tool for data collection. All patients fulfilling the inclusion criteria were subjected to detailed history taking regarding symptoms and duration of disease.

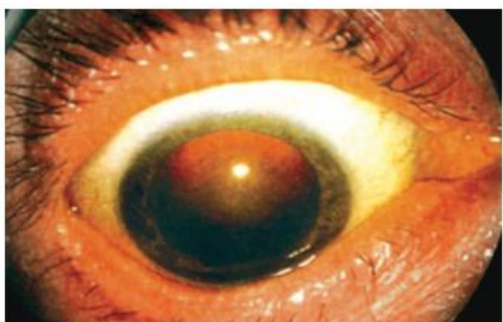
Data was collected about sociodemographic characteristics of study subjects like age, sex, address, occupation education status and socioeconomic status. Also data regarding past medical history and comorbid conditions like diabetes and hypertension was collected in case record form. A careful and detailed ocular examination as well as clinical examination was undertaken.

Statistical Analysis

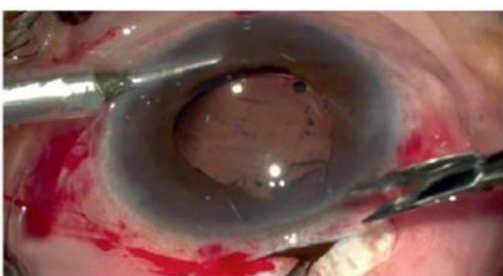
Data was entered in windows excel format and presented with the help of frequency and percentage tables. Association among the study groups is assessed with the help of chi-square test using Open EPI statistical software version 3.01. P value less than 0.05 was taken as significant. Graphical representation is done in MS excel 2010.



Picture 1: Immature senile cortical cataract



Picture 2: Nuclear senile cataract



Picture 3: Small incision cataract surgery

Observations and Results

The observations and results of the present study are as follows

Table 1: Distribution of cases according to Age

Age in Years	Frequency	Percentage
15 or less	21	03
16- 40	35	05
41- 65	511	73

65 or more	133	19
Total	700	100

As shown in above table majority of study subjects belongs to age group 41 -40 years contributing 511 cases (73%) followed by age group 65 years and more 133 (19%),16-40 age group 35 (5%) and 15 years or less 21 (3%) respectively.

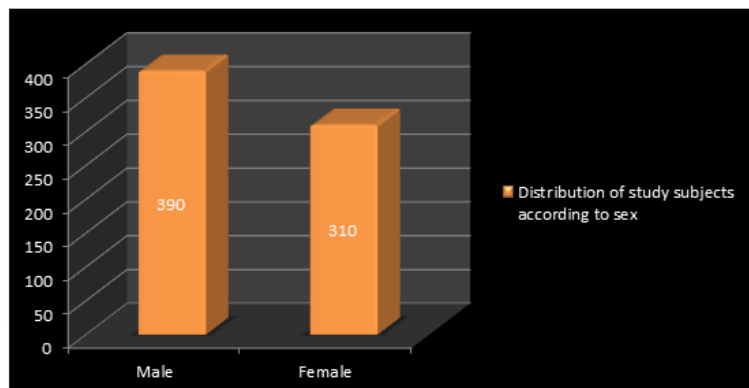


Figure 1: Distribution of study subjects according to sex

As shown in above table majority of study subjects are males contributing 390 cases (55.71%) followed by females 310 cases (44.29%). Male: Female ratio is 1.25: 1

Table 2: Distribution of preoperative visual acuity in operated eye and fellow eye (N=700)

Visual Acuity	Operated eye		Fellow eye	
	N	%	N	%
6/ 18 Or better	007	01	126	18
< 6 /18 - 6 / 60	035	05	224	32
< 6 /60 - 3 / 60	161	23	133	19
< 3 /60 - PLPR	497	71	196	28
No perception of light	000	00	021	03
Total	700	100	700	100

As shown in above table preoperative visual acuity in operated eye is in the range of < 3 /60 - Perception to light (PLPR) in majority of subjects contributing 497 cases (71%) followed by 161 cases (23%) in between < 6 / 60 - 3 /60 group, 35 cases (5%) in < 6 /18 to 6 /60 group and 7 cases (1 %) in 6 /18 or better group respectively

Table 3: Distribution of intraoperative complications among study subjects (N=700)

Complication	Frequency	Percentage
Premature entry	10	1.43
Intraoperative Hyphaema	08	1.14
Posterior capsular rent	19	2.71
Iris prolapse	14	2
Zonular dialysis	04	0.57
Iridodialysis	05	0.71
Descemet membrane stripping	10	1.43
Capsular extension	07	1
Total	77	11

As shown in above table most common intraoperative complication was posterior capsular rent contributing 19 cases (2.71%) followed by iris prolapse 14 cases (2%), premature entry

10(1.43%), Descemet's membrane stripping 10 (1.43%), intraoperative hyphaema 8 (1.14%), capsular extension in 7 cases(1%) Iridodialysis in 5 (0.71%) and zonular dialysis in 5(0.57%) respectively

Table 4: Association between age and intraoperative complications among study subjects

Age in Years	Complication				Total (N=700)	
	Present		Absent		N	%
	N	%	N	%		
15 or less	02	9.52	19	90.47	21	03
17- 40	05	14.28	30	85.71	35	05
41- 65	65	12.72	446	87.27	511	73
65 or more	15	11.27	118	88.72	133	19

Chi square value 0.4753, Df=3,P value= 0.9242 # Not significant

Inference: There is no statistical significant association between age and intraoperative complications.

Table 5: Correlation between type of cataract and intraoperative complication (N=77)

Cataract	Complication						
	PC tear	Iris prolapse	Zonular	Capsular	Descemet's detachment	Hyphaema	others
Mature	00	00	00	05	00	04	04
Hyperature	10	00	04	02	00	03	03
PSC	05	03	00	00	07	01	03
Nuclear	04	10	00	00	01	00	00
Cortical	00	01	00	00	00	00	00
Posterior polar	00	00	00	00	00	00	00
Other	00	00	00	00	02	00	05

AS shown in above table rate of complication is higher in hyperature type of cataract contributing 22 cases (28.57%) followed by PSC 19 cases (24.67%) ,Nuclear 15 cases (19.48%), Mature cataract 13 cases (16.88%) ,cortical 1 case (1.29%) and other type of cataract 2 cases (2.59%) and 5 cases(6.49%) of complicated cataract with iridodialysis respectively.

Discussion

This prospective cross sectional study was conducted on 700 consecutively sampled subjects with SICS in ophthalmology department of a tertiary care hospital. Age distribution of the study subjects was studied. In present study it was seen that majority of study subjects belongs to age group 41 -40 years contributing 511 cases (73%) followed by age group 65 yrs and more 133 (19%),16-40 age group 35 (5%) and 15 years or less 21 (3%) respectively.[Table no.1] Similar findings were seen in study by Limbu B, Jha HC (2014)¹⁰ in which it was observed that most common age group of cataract was > 40 -65 years in 72.5 % cases followed by age > 65 years in 21.6 cases ,> 15-40 years in 5.3 % and < 15 yrs in 0.6 % of cases respectively .

These findings are consistent with present study. A study by Patil Mrudula (2016)¹¹ showed that the age at presentation ranged from 38-85 years. Maximum number of patients 134 (53.6%) were in 61 to 70 year age group. Association between age and intraoperative

complication was studied [Table no.4] However no statistical significant association was seen .Sex distribution of study participants in present study shown that majority of study subjects are males contributing 390 cases (55.71%) followed by females 310 cases (44.29%).Male: Female ratio is 1.25:1. [Figure No.1] Contrasting results were seen in study by Limbu e al (2014) ¹⁰ ,in which it was seen that cataract was more common in females (55.3%) as compared to males (44.3%).

Visual acuity of all subjects was estimated with Snellen's chart preoperatively. In present study it was seen that preoperative visual acuity in operated eye was the range of < 3 /60 - Perception to light (PLPR) in majority of subjects contributing 497 cases (71%) followed by 161 cases (23%) in between < 6/ 60 - 3 /60 group, 35 cases (5%) in < 6 /18 to 6 /60 group and 7 cases (1 %) in 6 /18 or better group respectively [Table no 2] A study by Limbo et al (2014)¹⁰ stated that Large proportion of eyes 508 (46.7%) out of 1087, had preoperative visual acuity of counting finger from half meter to perception of light.

A study by Patil Ms et al (2016)¹¹ stated that 87(34.8%) patients had preoperative visual acuity of perception of light and hand movements, 119(47.6) had between 1/60 and 3/60 and 44(17.6%) had a visual acuity of 6/60. A study by Unnati sharma et al (2019)¹² shown that (77/200) of patients had preoperative BCVA in the range of PL to +3.0 logMAR unit, 22% (44/200) had BCVA >+3.0 to +2 logMar unit, 20% (40/200) had BCVA >+2.0 logMar to +1.0 logMar unit, and 19.5% (39/200) had BCVA >+1.0 logMar unit.

Proportions of intraoperative complications in this study shown that most common intraoperative complication was posterior capsular rent contributing 19 cases (2.71%) followed by iris prolapse 14 cases (2%), premature entry 10(1.43%), Descemet's membrane stripping 10 (1.43%), intraoperative hyphaema 8 (1.14%), capsular extension in 7 cases(1%) Iridodialysis in 5 (0.71%) and zonular dialysis in 5(0.57%) respectively.[Table No.3]

Intraoperative complications:

1. Posterior capsular rent (With or without vitreous loss)

Gogate P M¹³ in his study evaluated posterior capsular rent as the most common intraoperative complication. It was seen in 18 out of 358 patients (5.02%) & the incidence of PC rent was higher in hypermature and hard cataract & those with small size pupil. ¹¹Aneesh Neekhra et al ¹⁴,conducted a study among 1820 patients who underwent cataract surgery. Out of 1820, manual SICS was performed in 600. They found that the incidence of posterior capsular tear in patients who underwent SICS was 4% i.e in 24 patients. Hennig et al ¹⁵ reported posterior capsular rent in 0.2% cases whereas Khan reported 3.33%¹⁶ In Present study most common intraoperative complication was posterior capsular rent contributing 19 cases (2.71%) as consistent with above studies.

2. Iris Prolapse

Iris prolapse was seen in 14 cases (2 %) in present study. Balmer et al.¹⁷ reported iris prolapse in 0.5% cases. Kongsap et al.¹⁹ in his study reported that iris prolapse as the most common intraoperative complication occurred in 7.37% cases. Yasir Iqbal et al.¹⁸ reported iris prolapse as the third commonest intraoperative complication encountered in 9 patients (3%).These findings goes well with present study .

3. Premature entry :

Yasir Iqbal et al,¹⁹ conducetd a study among 300 patients who underwent manual SICS and reported premature entry and iris prolapse were the third commonest intraoperative complication encountered in 9 patients (3%). Hennig A, Kumar J, Singh AK, Ansari A, Singh S, Gurang R, Foster A21(2001)¹⁶evaluated 2167 patients who underwent cataract extractions.Schroeder²² reported tunnel complications in 1.5% of cases. Schroeder suggested management of a premature entry by starting a more shallow dissection at the other end of the tunnel and suturing of the wound at the end of surgery. Surgical complications was seen in

1.2%. In present study premature entry contributed 10 cases (1.43%). These findings are similar with the above studies.

4. Zonular Dialysis

Khanna RC, Kaza S, Palamaner Subash Shantha G, et al.¹³ reported zonular dialysis in 20 patients (3.8%) out of total 522 patients who underwent MSICS. This was the most common complication reported in their study.²⁰ In present study zonular dialysis was seen in 5 cases (0.57%).

5. Capsular Extension

Capsule related complications occurred in 7 cases (1 %) in our study out of total 700 cases. P. Kongsap¹⁹ reported capsule related complications in 2.11% cases.

6. Superior Iridodialysis

This rare complication occurred in 1 case (0.4%) out of total 700 cases. Gogate et al.¹³ reported iridodialysis in 2 cases (0.56%) out of total 358 manual SICS cases. Our study is in accordance with the above study. Zaman, Mir, et al.²², reported iridodialysis as the second most common complication in his study. Out of total 1500 cataract surgeries performed, iridodialysis occurred in 20 cases (1.6%).

7. Descemet's membrane stripping

Khanna RC, Kaza S, Palamaner Subash Shantha G, et al.²⁰ evaluated 522 patients undergoing manual SICS & reported descemet detachment in 7 patients (1.3%). Schroeder²² reported Descemet's detachment in 0.7% of cases.

Correlation between type of cataract and intraoperative complication was studied. It was seen that rate of complication was higher in hypermature type of cataract contributing 22 cases (28.57%) followed by PSC 19 cases (24.67%), Nuclear 15 cases (19.48%), Mature cataract 13 cases (16.88%), cortical 1 case (1.29%) and other type of cataract 2 cases (2.59%) and 5 cases (6.49%) of complicated cataract with iridodialysis respectively. [Table No.5] Similar findings were seen in a study by Patil MS et al (2016)¹¹ in which it was stated that Mature senile cataract, Hypermature cataract and Posterior Subcapsular Cataract with NS grade 3 were associated with higher rate of intraoperative complications. These findings go well with present study.

Uncorrected Visual acuity was measured on 1 st postoperative day it was seen that 329 cases (47%) had UCVA of 6/9 on 1 st postoperative day followed by 6/12- 6/18 in 315 (45%), 6/24 - 6/36 in 42 (6%) and 1/60 in 14 (2%) cases respectively. Similar findings were seen in study by Gogate PM et al¹³ Postoperatively patients were followed up till 6 th post operative week. On 6 th post operative week visit best corrected visual acuity was estimated. In present study it was seen that 554 subjects had BCVA in the range of 6/6 -6/18 contributing 554 cases (87.25%) followed by 6/24 - 6/60 in 73 cases (11.49%) and less than 6/60 in 8 cases (1.25%) respectively. 65 participants lost to follow up at 6 th week postoperative visit.

In a study by Patil MS et al (2016)¹¹, it was seen that Out of 250 cases, 246 came for follow up till 6th week. 214 (85.6%) patients had post operative BCVA 6/6 at the end of 6th week, 25(10%) patients had 6/9, 5 patients (2%) had 6/12-6/18 and remaining 2 patients (0.8%) had 6/24-6/36 BCVA. Visual outcome (WHO Grading) observed in 246 cases showed Good visual outcome in 99.18% cases (BCVA >6/18) and borderline visual outcome in 0.81% cases (BCVA 6/24-6/60). Kapoor et al.(1999)²³ reported 79.9% eyes obtained 6/18 or better vision. Ravindra et al²⁴ in 1996 reported a BCVA of 6/18 or better in 80.7%. Sudhakar et al.²⁵ in 1989 reported a visual acuity of 6/12 or better in 80.7%. Manual small incision cataract surgery is faster, cheaper and effective technique to tackle a huge backlog of cataract for developing countries in compare to instrumental phacoemulsion^{26,27} Although with increasing number of visually impaired and blind people gaining access to cataract surgical services due

to the development of prevention of blindness programmes in many countries.²⁸ Despite these positive trends the number of people blind due to cataract is increasing because of the changing demographic structure of populations.²⁹

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